Advancing our Understanding of Nursing Work and Work Role Effectiveness:

Is the Irish Nursing Minimum Data Set for Mental Health psychometrically robust and can it be used to inform nursing sensitive patient outcomes?

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I hereby certify that this material, which I now submit for assessment on the programme of study leading to the award of Ph. D. is entirely my own work, that I have exercised reasonable care to ensure that the work is original, and does not to the best of my knowledge breach any law of copyright, and has not been taken from the work of others save and to the extent that such work has been cited and acknowledged within the text of my work.

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List of Acronyms

BNMDS	Belgian Nursing Minimum Data Set
CFA	Confirmatory Factor Analysis
CFI	Comparative Fit Index
EFA	Exploratory Factor Analysis
EU	European Union
HoNOS	Health of the Nation Outcomes Scale
HDDS	Hospital Discharge Data Set
HRB	Health Research Board
HSE	Health Service Executive (Ireland)
ICNP	International Classification of Nursing Practice
NHIS	National Health Information Strategy
NHS	National Health Service (UK)
I-NMDS	Irish Nursing Minimum Data Set
I-NMDS (MH)	Irish Nursing Minimum Data Set for Mental Health
KMO	Kaiser Meyer Olkin measure of Sampling Adequacy
ML	Maximum Likelihood Rotation
NMDS	Nursing Minimum Data Set
NMDSN	Nursing Minimum Data Set for the Netherlands
NREM	Nursing Role Effectiveness Model
OECD	Organisation for Economic Cooperation and Development
PCA	Principal Components Analysis
Ridit	Relative to an identified distribution
RMSEA	Root Mean Square Error of Approximation
SF 36	Short Form 36
UMHDDS	Uniform Minimum Health Discharge Data Set
UMHDS	Uniform Minimum Health Data Set

Abstract

The aim of this study was to investigate the validity and reliability of the Irish Nursing Minimum Data Set for mental health to determine its usability in the clinical setting. A secondary aim of this study was to explore the ability of the tool to capture nursing sensitive outcomes of care, conceptualised and defined according to change in the patient's condition mediated by nursing interventions. The research methodology was guided by a measurement error concept map. The validity of the Irish Nursing Minimum Data Set for mental health was established through the implementation of a number of studies to test for construct validity, content validity, face validity and discriminative validity. The reliability of the Irish Nursing Minimum Data Set for mental health was established through tests of internal consistency, factorial stability and interrater reliability.

A secondary analysis of the study data was carried out to establish whether the tool could be used to investigate nursing sensitive outcomes of care. This analysis was guided by a model of nursing role effectiveness and implemented using structural equation path analysis.

The overall findings of the study inferred that the Irish Nursing Minimum Data Set for mental health possessed relatively good levels of construct validity, content validity, face validity and discriminative validity. Further research is required to add to the knowledge base regarding the construct validity of the tool in particular. While some level of reliability of the tool was established, further investigation of its interrater reliability is recommended. The findings of the outcomes analysis inferred that the Irish Nursing Minimum Data Set for mental health has potential to yield useful information regarding the unique contribution that mental health nurses make to patient/client outcome achievement.

Introduction and Background to the Study

Today, nursing is at the core of health care, representing a necessary yet costly resource that should be managed and used in an organised and efficient manner. In order to most effectively manage nursing work, it is essential that information regarding the main tenets of the nursing role be made available to key decision-makers. Until very recently, little scientific evidence existed to identify the central components of nursing care in Ireland. This lack of nursing evidence is a problem reflected in international health care settings.

Both in the literature and in practice, difficulties exist in articulating and describing nursing work in sufficient detail. Internationally, there is recognition of shortcomings in the provision of quality information aimed at describing nursing work activity (Clark and Lang 1992, Scott et al, 2006a, MacNeela et al, 2006, Maben, 2008). In Ireland, it is acknowledged that the availability of adequate information regarding nursing skills and resources for health policy has major implications for the nurse and consequently for patient* care (Brennan, 2003, Department of Health and Children, 2004, 2006). Nursing documentation in Ireland is not standardised, nor is it electronically based. As such, nursing care characteristics and standards cannot be reliably compared or properly evaluated for better service, including clinical practice, planning and evaluation.

Insufficient nursing information systems impact on many areas of nursing care, including transparency regarding the impact of nursing care on patient recovery. Forchuk (2001) points out that nursing, like other professions, strives to implement strategies or interventions that are known to be effective and asks whether such interventions are necessarily 'nursing' interventions. Are patient outcomes in any way due to the nursing input into the caring process and if they are then why is the nursing contribution to these outcomes not immediately evident?

Note that throughout this thesis, the terms patient and client are used interchangeably, with emphasis being given to the term 'client' in reference to mental health specific care. In keeping with the literature , 'patient' is used in reference to outcomes.

‘If the evidence does not exist for a nursing intervention, does this reflect an ineffective intervention, or an understudied intervention?’ (Forchuk, 2001 p. 40). If we have not done the research, or perhaps cannot effectively do the research, then we cannot sufficiently answer this question.

Moving Towards the Generation of Evidence

In 2002 the Health Research Board (HRB) in Ireland granted funding for a programme of research aimed at developing a quality, standardised information system for nursing, the Irish Nursing Minimum Data Set (herein referred to as the I-NMDS). The concept of the Nursing Minimum Data Set (NMDS) represents an attempt to standardize the collection of nursing data and ultimately to provide quality and timely data regarding the input of nursing into health care delivery (MacNeela et al, 2006).

The Nursing Minimum Data Set can be defined as a minimum set of elements of information with uniform definitions and categories concerning the specific dimensions of nursing, which meets the information needs of multiple data users in the health care system (Werley & Lang, 1988). The idea of the ‘minimum’ data set stems from the need to balance scientific rigor and accuracy of results with work demands of those tasked with data collection, so that the time resource required for completion of the NMDS is kept to a reasonable level.

To date, nursing minimum data sets have been developed in the US, Australia, Belgium, the Netherlands and Thailand, among other countries (Werley, 1988, Werley et al, 1991, Gliddon, 1998, Sermeus et al, 1996, 2005, Goossen et al, 2000, Volrathongchai et al, 2003). While taking different forms internationally, the basic aim of the NMDS is to determine what nurses do and to what effect.

A valid and reliable NMDS can be used to describe the nursing care of individuals, families and communities in a variety of settings. It can also be

used to demonstrate or project trends regarding nursing care provided, to allocate nursing resources to patients or clients according to their health problems or nursing diagnoses, and to stimulate nursing research through links to the data existing in health care information systems. Finally a valid and reliable NMDS can be used to provide data and information about nursing care to influence practice, administrative and health policy decision making (Werley & Lang, 1988).

This HRB programme of research resulted in the collaboration of two Schools of Nursing in Ireland, The School of Nursing at Dublin City University and the School of Nursing, Midwifery and Health Systems at University College Dublin.
The main objectives of this collaborative programme were:

1. To deliver a quantitative Nursing Minimum Data Set for Ireland that could describe patient problems, nursing activities, interventions and patient outcomes in mental health and general nursing settings
2. To provide an insight into how organisational and interpersonal factors contribute to the nursing decision making process and
3. To identify how effective clinical decision-making can be promoted

The development of the Irish Nursing Minimum Data Set involved research across both general and mental health nursing settings. This research ultimately led to the decision to develop two separate nursing minimum data sets, one specific to mental health and one specific to general nursing. While the two data sets shared a number of common variables, each respective data set contained a number of variables unique to the nursing specialty it represented. The present study is concerned with the development of a Nursing Minimum Data Set for Ireland, specific to the mental health care setting, as per objective 1. above.

The I-NMDS for Mental Health Nursing

Development of the first draft version of the Irish Nursing Minimum Data Set for mental health (I-NMDS (MH)) took place between 2002 and 2006. The main purpose of the I-NMDS (MH) was to record the mental health nursing contribution to care in Ireland, while presenting minimal resource demands for those tasked with I-NMDS (MH) completion.

The I-NMDS (MH) development process focused on carrying out rigorous research designed to identify the essential components of mental health nursing care in Ireland. Three separate research studies were carried out to inform the content of the I-NMDS (MH) (Hanrahan et al, 2003, Corbally et al, 2004, Scott et al, 2006a). Research involved i) analysis of nursing records, ii) focus group discussions to identify the nursing contribution to care and iii) a three-round Delphi survey to assess consensus among nurses regarding the core elements of their practice. Research findings were synthesised to yield the first draft of the Irish Nursing Minimum Data Set for mental health (Scott et al, 2006b).

This draft version of the I-NMDS (MH) comprised four distinct sections referring to demographics, patient problems, nursing interventions and co-ordination and organisation of care activities. A total of 63 variables were contained within the draft I-NMDS (MH), 36 of which related to the clients' presenting problems and 27 of which related to both nursing interventions and coordination/organisation of care activities carried out by the nurse on behalf of the client. An outcomes scale was also included on the I-NMDS (MH) which allowed for an evaluation of change in client problems throughout the nurse caring period. A 'User Manual' was developed in tandem with the I-NMDS (MH), outlining all variable and scale label definitions as well as guidance on tool completion (Scott et al, 2006c).

While the I-NMDS (MH) had been drafted, a considerable amount of further tool development research was required to determine whether it was psychometrically robust.

Study Aim

The main aim of this study was to investigate the validity and reliability of the Irish Nursing Minimum Data Set for mental health, I-NMDS (MH).

A further aim of this study was to investigate the potential of the I-NMDS (MH) to capture nursing sensitive outcomes of care, conceptualised and defined according to change in the client's condition, mediated by nursing interventions. This study aim came about as a direct result of limitations noted with the measurement and conceptualisation of outcomes of nursing care within the first draft of the I-NMDS (MH).

Objectives of the Study

There were three major objectives of the study. These included the following:

1. Establishing the validity of the I-NMDS (MH) through the implementation of different tests to investigate the tool's construct validity, including face, content and discriminative validity
2. Establishing the reliability of the I-NMDS (MH) through the implementation of different tests to investigate the tool's internal consistency, factorial stability
   and interrater reliability
3. Establishing the potential of the I-NMDS (MH) in the investigation of nursing sensitive patient/client outcomes, through a secondary analysis of the data. This objective came about after the implementation of the pilot study

Study Hypotheses

H1: The I-NMDS (MH) possesses good levels of construct validity, including content, face and discriminative validity
H2: The I-NMDS (MH) possesses good levels of internal consistency, factorial

stability and interrater reliability
H3: The I-NMDS (MH) can be used to capture nursing sensitive outcomes of care, defined as changes in the patient's/client's condition, mediated by nursing interventions

Overview of the Thesis Structure

This thesis is divided into three main sections to facilitate the reader. Section I includes the background to the research area and an overview of the relevant literature reviewed. Section II details the research methodology used for the study. Section III incorporates the findings and discussion of the validity and reliability studies as well as the stand alone studies on interrater reliability and nursing sensitive patient/client outcomes. This section also incorporates the overall study conclusion.

The thesis is broken down as follows:

Section I

Chapter One Background to the Research Area ***The Irish health service information requirement*** Chapter One explores the availability of health information and evidence upon which key decision makers in the Irish health service can rely. The main objective of this chapter is to outline the background and context for the overall research study.

Chapter Two Mental Health Nursing, ***'If we cannot name it, we cannot control it, finance it, research it, teach it, or put it into public policy' (Clark and Lang, 1992 p. 109)*** This chapter includes a review of the literature pertaining to mental health nursing role definition internationally and in Ireland. The literature included in this chapter highlights the need for standardised mental health nursing related data to increase the visibility, effectiveness and value of the work of mental health nurses.

Chapter Three Nursing Sensitive Outcomes of Care ***Conceptualisation and measurement issues*** The aim of this chapter is to review conceptualisation and measurement issues pertaining to nursing sensitive patient/client outcomes. No studies reviewed specifically reported mental health related nursing sensitive patient/client outcomes using a nursing sensitive research tool. It is concluded within this chapter that there is a gap in the research relating to mental health nursing sensitive patient outcomes using an NMDS.

Chapter Four The Nursing Minimum Data Set Concept

The focus of Chapter Four is on the use of the Nursing Minimum Data Set (NMDS) as a standardised information system to increase the transparency of the nursing role. Uses of the NMDS are outlined and international trends in NMDS development are described. Finally a review of other relevant standardised information systems is included in this chapter.

Chapter Five Measurement Error, the Validity and Reliability Concepts

This chapter reviews the concepts of validity and reliability using a conceptual map of measurement error.

Section II Methodology

Chapter Six The Irish Nursing Minimum Data Set for Mental Health

Chapter Six outlines the I-NMDS (MH) tool in its draft format.

Chapter Seven Research Methodology Development

The aim of this chapter is to consider areas important to the research design and to outline a phased approach to the implementation of the study.

Chapter Eight The Pilot Study

This chapter details the pilot study to prepare the I-NMDS (MH) for national validity and reliability testing. The pilot study incorporates studies of the

content and face validity of the I-NMDS (MH) and a feasibility study to test the main study research plan. Findings of the pilot study are used to inform changes required to the I-NMDS (MH) as well as the larger research study protocol.

Section III Findings and Discussion

Chapter Nine Study Implementation, Preliminary Findings and Discussion

The aim of Chapter Nine is to report on the procedure adopted for the large Scale validity and reliability testing of the I-NMDS (MH). A detailed breakdown of the descriptive statistics, missing values analysis and distribution of the I-NMDS (MH) data is outlined. The chapter concludes with a discussion on the findings of this preliminary, preparatory analysis.

Chapter Ten Findings *Construct Validity and Reliability of the I-NMDS (MH)*

Chapter Ten outlines the findings of the construct validity, internal consistency, stability and discriminative validity of the I-NMDS (MH). A post hoc confirmatory factor analysis of the resulting factor structure is also outlined with a cautionary note attached to interpretation of the results. The chapter concludes with a discussion of the findings of the national validity and reliability testing of the I-NMDS (MH).

Chapter Eleven Establishing the Interrater Reliability of the I-NMDS (MH)

Chapter Eleven outlines the procedure and findings of the stand alone study to establish the interrater reliability of the I-NMDS (MH). Much discussion is devoted to the analysis of the data in light of ambiguities relating to recommended reliability tests and data distribution.

Chapter Twelve Assessing the Impact of Nursing Interventions on Client Wellbeing *Building a Model of Nursing Outcomes*

Chapter Twelve outlines the study to investigate whether the I-NMDS (MH) can be used to demonstrate the impact of psychological care nursing interventions on client emotional health problems over the 5 days of the I-NMDS (MH) validity and reliability study. In order to do this a model of nursing sensitive patient/client outcomes is constructed and findings of the secondary analysis of the data to build and test this model are discussed.

Chapter Thirteen Conclusion

Finally, Chapter Thirteen concludes the study and includes an outline of study limitations and recommendations for future research using the I-NMDS (MH).

References

Appendices

SECTION I

Background to the Study and Literature Review

CHAPTER ONE

Background to the Research Area

The Irish health service information requirement

1.1 Introduction

The Irish Health Service is the largest employer in Ireland, employing over 110,000 staff members in 2007 (Health Service Executive, Annual Report and Financial Statements, 2008)*. The organisation of the health service is such that it is responsible for a wide range of services delivered by a diversity of professionals. Recognition of the dedication and commitment of Irish health care workers is established both at home and abroad. This commitment has ensured the provision of high standards of care to those in need, despite the difficult circumstances in which staff frequently work. 'The people who work at all levels of our health service are entitled to expect the system to be organised in a way which best allows them to use their skills and energy to provide quality care within the resources available. They deserve no less than the opportunity to work in a system that will support them in doing what they wish to do: offer the highest quality service to the public' (Brennan, 2003 p.24). In order to facilitate the health care worker in his/her endeavour to provide high quality patient care, evidence regarding best practice is essential. In Ireland, evidence of the contribution that health care workers make to the provision of patient care and the consequences of their work is largely unavailable. This has served to impede the efficient organisation and accountability of the health service.

** This is the most up to date data available on HSE employment figures*

In recent years, particularly over the past decade, the Irish health service has come under increasing criticism due to very high levels of acute hospital bed occupancy, insufficient bed numbers relative to demand, extensive waiting lists, the phenomenon of 'bed-blocking', cancellations of elective admissions and procedures, low levels of day case treatment and inadequate discharge planning for patients (Department of Health and Children, 2002a, HSE, 2007a). All of these problems have served to compromise patient care regardless of dramatic increases in health service expenditure.

Considered in the context of changes in the national demographic, it is likely that problems will continue well into the future. Ireland has one of the fastest growing populations in Europe and today there are approximately 4.34 million people living in the Republic of Ireland compared with 3,92 in 2002 (Health Service Executive, 2008). Between 1996 and 2006, the Irish population increased at a rate of approximately 1.7% per annum (Health Service Executive, 2007b). Population growth has been evidenced across all but the 10-14 year old age group. Over the last decade the 50-59 year old age group has increased by 41% while the 80+ age group has increased by almost 28% (Health Service Executive, 2008). Aging populations place pressure on any health service given the corresponding increase in chronic diseases and co-morbidities.

Health care spending increased from €2.2 billion to €9.4 billion in the years 1990 – 2002 (OECD Health Data, 2002) and for 2009 the health budget stands at over €14 billion, an increase of €454 million on that for 2007 (Lynch, 2008). However, in recent years a number of serious concerns have been raised regarding inefficiencies in health expenditure. These concerns focus on the lack of cost effective management, evaluation and reporting on health expenditure (Brennan, 2003).

One of the major problems with the Irish health system has been the lack of available health information systems to facilitate quality decision making regarding the delivery of high quality, effective and efficient health care. Without basic information regarding the performance of the service it is

difficult to make well-informed decisions regarding its future direction. Information is required for multiple needs, the most obvious of which perhaps include the provision of the best possible patient care, resource planning and the provision of value for money to the health care consumer. Information is necessary for care and service planning, for setting out budgets, for increasing our understanding of patient illness and keeping abreast of developments regarding the impact of medical and nursing interventions on patient presentations. The very real need for standardised, high quality health information forms the foundation upon which this thesis is built.

It is important to note that Ireland is not unique in its need for improved health information. Internationally there is a move towards developing and improving information systems to ensure increased accountability, efficiency and effectiveness in health service provision. For example, the European Union (EU) has recognised the need for better health information flow across its member states and is currently developing a health information portal to provide citizens, patients, health professionals, policy makers and other interested stakeholders with a single pan-European access point to required health information (European Commission, 2007). The objectives of the Community Public Health Programme 2003-2008 and the more up to date Health Programme 2008-2013 include establishing and operating a sustainable health monitoring system that will produce comparable health related information on the population, diseases and systems of care (European Commission, 2007). These objectives all point to improving the health of the citizens of all EU member states through information sharing and monitoring. Such plans and developments bring responsibility to the Irish Government to ensure that its own health information system is comprehensive, up-to-date and transferable to the EU systems.

In Britain, throughout 2006/07 the National Health Service (NHS) introduced new computer systems and services to improve how information is stored and shared in the NHS (NHS, 2007). Further to this, the testing and implementation of a national health care appointment booking system has been taking place. This system is proving effective and cost efficient. At present the NHS in

England is developing a care records service, due for completion by 2010. Upon completion, it is expected that the service will connect more than 30,000 General Practitioners and 270 acute, community and mental health NHS trusts in one information system. Among the objectives of this system is the facilitation of referrals and the storage and sharing of clinical and social care related information 'to ensure that those giving and receiving care have all the information they need whenever and wherever it is required' (National Health Service, 2005 p. 7).

1.2 The National Health Information Strategy

The Irish Government recognises the consequences of inadequate health information provision in its strategy document 'Quality and Fairness: A Health System for You' (Department of Health and Children, 2001a) and points to the need for a high-quality information infrastructure in order to realise its strategic objectives. There are four goals set out in the strategy document: 1) Better health for everyone, 2) Fair access, 3) Responsive and appropriate care delivery, and 4) High performance. The fact that delivery of these goals can only be made possible through the use of appropriate information is paramount.

In 2004 The National Health Information Strategy (NHIS) was published. The NHIS sets out the needs of health information users in Irish society, e.g. the general public, clients/patients, carers, health professionals, service staff, service managers, policy makers, Government, researchers and the media. The idea behind the strategy is to provide information users with easy access to good quality information. Plans for the strategy include the use of health information in decision making regarding service provision in areas that impact most greatly on national health, e.g. service planning, service implementation and human resource planning.

The NHIS bases its objectives on those outlined in the Governments health strategy 'Quality and Fairness: A Health System for You' (Department of Health and Children, 2001a), a strategy that recognises the need for significant

enhancements in the availability and quality of information in a range of service areas. Furthermore, it recognises the need for the development of a comprehensive infrastructure to allow better information flow to ensure more appropriate use of information in the care of patients as well as a more transparent and accountable health service. Below is an outline of how information can facilitate strategic goal attainment. These points are adapted from the NHIS (2004).

In order to achieve 'better health for everyone' the following information is required:

- Information for population health, so that evidence based planning can be facilitated
- Information for health impact assessment, to enable promotion of equity and health improvement as well as the prevention of ill-health through the identification of factors that impact on health
- Information for reducing inequalities in health, to allow for the socio-economic analysis of information to facilitate the implementation of strategies aimed at reducing such inequalities

In order to achieve 'fair access' the following is required:

- Improved information on entitlements
- The development of the Health Information Portal, to make health information more accessible to all users
- Information regarding accessibility across geographic locations and other population sub-groups

In order to achieve 'responsive and appropriate care delivery' the following is required:

- Information regarding the needs of individuals and families
- The development of the electronic health care record, to allow information sharing across team members and with the secondary care services
- Investment in information and communications technology in the primary care system to allow public access to health information
- Investment in management information systems to provide real-time information about current capacity to support care planning

•Information on health status and health needs to indicate health demand and consequently capacity

In order to achieve 'high performance' the following is required:

•Investment to provide best practice guidelines, electronic library services and decision support systems for health professionals e.g. the electronic healthcare record

•Investment in information to enable health service quality audits

•The provision of information regarding system, financial and professional accountability

•The provision of information to support needs assessment, service evaluation and the assessment of evidence

•Information sharing

The realisation of this strategy will provide much needed information for health service management and organisation. In particular it will be significant in the organisation of the largest professional group within the service, nurses.

1.3 Information for Mental Health Nursing Services

Nursing services make up approximately 30% of the overall staff complement within the Irish Health Service with approximately 39,000 nurses employed by the Health Service Executive today (HSE, 2008). Statistics on the volume of nurses employed in Ireland verify that nursing is a major component of health care, yet the lack of information available on the nature and effect of nursing work makes it difficult to elaborate on what they do.

Internationally, importance is being placed on the need to bridge the gap in the availability of information regarding the unique contribution that nurses make to health care delivery. Globally, there is recognition of the necessity for systematic descriptions of nursing (e.g. Sermeus & Delesie 1994, Clark, 1999, MacNeela et al, 2006). Without a definitive understanding of how nurses contribute to health care, it is very difficult to justify the need for the volume of

nursing care provided in Ireland. This point is very relevant to the current economic climate as the Irish health service faces immense pressure to cut costs and increase efficiencies.

Nursing information systems need to be developed and implemented. However, there appears to be a perception that health information in Ireland is a bureaucratic activity peripheral to the provision of health care. This has led to very limited investment in the area of health information. The consequence of this has been a great deficiency in the availability of information relating to health care activities and outcomes, particularly in mental health and mental health nursing (Department of Health and Children, 2006).

In Ireland, mental health services are in many ways considered and planned in isolation to 'general' health services. As with all areas of the health system, mental health related information is required for the provision of evidence to support future decisions regarding mental health policy development, resource allocation and budgeting. In more global terms, the fact that in Ireland, there is limited data regarding the extent of the mental health needs of the population dictates an urgent requirement for systematic and standardised mental health specific information gathering systems to be developed and implemented.

The Report of the Expert Group on Mental Health Policy (2006) specifically sets out the information requirements of service users and carers. These include:

- Information about specific mental health problems
- Information about mental health services
- Information about medication and other aspects of mental health service delivery such as involuntary admission
- Information about rights and Mental Health Acts
- Information on complaint procedures

Although some of this information is available across different health agencies e.g. the Mental Health Commission and the Health Research Board, there is no

central location at which the information that exists can be sourced. Presently there is an obvious need for a system of data collection specific to mental health nursing. Such a system must allow for the gathering of information that 'The Report of the Expert Group on Mental Health Policy' (Department of Health and Children, 2006) highlights as a requirement of both service users and carers. The following is an illustration of the kind of information available on mental health services in Ireland today. While it is limited, it is useful. The available information is outlined below to give context to the present study and to highlight the fact that information gathering within the mental health services in Ireland needs to be more practice focused.

While this information does not indicate important trends in patient care or diagnoses, it does outline some of the demographic characteristics of the Irish mental health inpatient and, to a lesser extent, community based population.

1.3.1 Inpatient Mental Health Services: What we know

The most up to date data available on inpatient mental health services in Ireland comes from the report on the Activities of Irish Psychiatric Units and Hospitals 2007 (Daly, Walsh and Moran, 2008). According to this report the number of admissions to Irish psychiatric units and hospitals stood at 20,769 in 2007. This represented an increase of 481 admissions between 2006 and 2007. There were 5,853 first admissions in 2007, an increase of 252 on the number of first admissions in 2006 (5,601). In line with the pattern of previous years, re-admissions accounted for 72% of all admissions in 2007.

Twenty-nine per cent of all admissions were resident in the Dublin Mid-Leinster, Health Service Executive (HSE) designated area, 27% were resident in the HSE South area, 23% were resident in the HSE West area and 20% were resident in the Dublin North-East area. There was an equal proportion of male and female admissions in 2007 however, females had a higher rate of all admissions, at 491.3 per 100,000, compared with males, at 488.4. Males had a higher rate of first admission, at 146.2 per 100,000, compared to females, at 129.9.

The 45–54 year age group had the highest rate of admissions in 2007, at 780.9 per 100,000 of the population. This was followed by the 35–44 year age group, at a rate of 735.8, and the 55–64 year age group, at a rate of 673.9. Rates of first admissions were higher among the younger age groups, with the 20–24 year age group having the highest rate, at 208.8 per 100,000 of the population, followed by the 18–19 year age group, at 203.9, and the 25–34 year age group, at 187.7.

Depressive disorders were the most common cause of admission accounting for 28% of all and 31% of first admissions. Schizophrenia accounted for 19% of all and 12% of first admissions, while alcoholic disorders accounted for 13% of all and 14% of first admissions.

There were 20,498 discharges from Irish psychiatric units and hospitals in 2007. Almost half (49%) of all discharges occurred within two weeks of admission. A further 20% occurred within two to four weeks of admission and 24% occurred within one to three months. Ninety-four per cent of discharges occurred within three months of admission. Two per cent of discharges occurred after one year in hospital. The average length of stay was 25.5 days.

1.3.2 Community Mental Health Services in Ireland: What we know

The task of reviewing the statistics relating to community mental health service provision in Ireland is an onerous one, given the lack of available data in this area. Across community based mental health services including outpatient clinics, day hospitals, day centres and community residences there is no comprehensive, systematic and centralised system of data collection relating to the types of professionals working in these services and the types of clients they care for. This is currently a major problem for facilitating the understanding and planning of community mental health care in Ireland, a problem which is acknowledged by the Mental Health Commission (Department of Health and Children, 2006).

The following is a review of the types of community based mental health

services currently available in Ireland, including a demographic overview of service characteristics. This information is taken from the report on 'Community Mental Health Services in Ireland: Activity and Catchment Area Characteristics 2004' published by the Irish Mental Health Commission (2006). Given the problems noted with data collection for Irish community mental health services, these data are not exhaustive.

Outpatient clinics: Community mental health outpatient clinics in Ireland are characterised by consultations with doctors', visits with nurses and may or may not incorporate psychological and social workers in the delivery of patient care. Most often these clinics are concerned with dispensing depot medication. In 2004, over 14,000 outpatient clinics were held in 241 locations throughout Ireland, catering for over 81,000 patients. Of these patients, over 13,117 were new admission patients in the 16 years plus age group. An examination of the rates per 100,000 of the population over 16 years shows that the total number of patients attending these clinics was approximately 212,646. When broken down according to HSE designated areas it is estimated that the Dublin Mid-Leinster area outpatient clinics catered for a total of 36,764 patients and had 81, 637 outpatient clinic attendances. The HSE Dublin North East area catered for 20,066 patients and had 42,806 attendances while the HSE West area catered for 11,289 patients had 46,872 attendances. Finally the HSE South area saw 13,592 patients and had 41,329 attendances.

Day hospitals: The function of the day hospital in the Irish context of community based mental health care is to provide intensive treatment to the patient akin to that available in a hospital setting for acutely ill patients. However, day hospitals tend to have a function that expands far beyond this definition (Mental Health Commission, 2006). In 2004 a total of 58 day hospitals in Ireland provided a total of 1,022 patient places. The number of patients attending day hospitals in 2004 was 19,110 with a total of 162,233 attendances. When broken down according to HSE areas the Dublin Mid-Leinster area catered for 7,781 patients with 37,276 attendances. The Dublin North East area catered for 1,359 patients with 17,498 attendances. The HSE West area catered for 5,388 patients with 60,908 attendances and the HSE

South area catered for 4,582 patients with 46,551 attendances.

Day Centres: The function of the community mental health day centre in Ireland is to provide social care for service users, with an emphasis on rehabilitation and activation services (Mental Health Commission, 2006). As with the day hospital situation, the function and activities of day centres go beyond this definition and it is not unusual for day hospital type services to be delivered within day centres and vice versa. It is therefore difficult to fully comprehend the types of interventions being administered within these community based services. In 2004 there were 106 day centres in Ireland providing a total of 2,486 places to approximately 9,000 patients. This equated to a total of 413,771 attendances at the day centres over the year. When broken down according to HSE areas the HSE Dublin Mid-Leinster area catered for 2,117 patients with 89,329 attendances. The HSE Dublin North East area catered for 2,825 patients with 67,276 attendances. The HSE West area catered for 1,891 patients with 187,853 attendances and the HSE South area catered for 2,216 patients with 69,317 attendances.

Community residences: The function of mental health community residences in Ireland is to provide either a) high support, 24 hour in situ supervised care b) medium support, day only or night only in situ supervised care or c) low support, nurse visitation based but non in situ supervised care. Many of the community residences in Ireland are considered a home for residents and therefore the level of activity and turnover within them is low relative to day centres and day hospitals. The number of residents in community residences in 2004 was 3,065 residents. Fifty per cent of residents were in high support community residences, with 20.4% in medium support residences and 29.6% in low support residences. When broken down according to HSE area a total of 573 residents were living in community residences in the Dublin Mid-Leinster area, 608 were living in the North-East area, 1133 were living in the West area and 751 were living in the South area.

1.4 Conclusion

As with all areas of health care in Ireland and internationally, the health information deficit serves to impede the decisions of policy makers, health care workers, patients and their families. It is imperative that health care related information becomes more accessible, useful and comprehensible so that a culture of information gathering and use can be fostered in Ireland. This information can then provide the evidence required for the provision of high quality health care to ensure improved patient outcomes.

Nursing in general suffers from what might be described as a lack of identity. Clark (1999) asks the questions 'why do we have such difficulty describing the difference between a professional nurse and a health care assistant or a 'generic health carer?' (Clark, 1999 p.42). There is a clear need for mental health nurses to make visible their contribution to the work of the multidisciplinary team and ultimately to patient care, both in Ireland and internationally. There is a recognisable gap in the literature in the area of Nursing Minimum Data Sets specific to mental health internationally. While there are minimum data sets for multidisciplinary mental health practice e.g. the RAI: MH (Hirdes et al, 2001) and the 'The Minimum Psychiatric Data (MPD_{21})' in Belguim (unpublished), it appears that there is yet to be such a system developed specifically by and for nurses.

The development of mental health specific NMDS, which is the focus of this thesis, will allow for transparency of mental health nursing work and accountability in terms of the impact of nursing on patient outcomes. Once the nursing contribution to patient care has been made visible, work can be done to inform the development of more advanced health information systems that are being advocated throughout health policy documents in Ireland and across developed countries. One way of ensuring increased availability of evidence regarding the nursing contribution to patient care is through the development of a data collection system that will allow mental health nurses to clearly articulate the work that they do, the characteristics of the clients that they care for and the outcomes of their nursing work.

It is hoped that the research reported herein will be of value to the nursing research and broader health science community both in Ireland and internationally. The value of this research is derived from the fact that a) it is concerned with the development of an NMDS specific to mental health b) the NMDS strucutre is established using advanced statistical processes to both assess the factorial model upon which the tool is based and to investigate the impact of the nursing process on patient care and c) it adds to the nursing outcomes research base by utilising a nursing specific minimum data set to analyse nursing sensitive patient outcomes.

CHAPTER TWO

Mental Health Nursing

'If we cannot name it, we cannot control it, finance it, research it, teach it, or put it into public policy' (Clark and Lang, 1992 p. 109)

2.1 Introduction

As indicated in Chapter One (p. 29) nursing is one of the most resource intensive areas of health care delivery, yet it is essentially invisible in health policy decisions and in descriptions of health care (Clark, 1999, Scott et al, 2006a). While contemporary definitions of nursing attempt to highlight the diverse observable and unobservable aspects of the profession, it is suggested that in practice, nursing can lack definitional clarity and professional identity (Clark, 1999, Buller & Butterworth, 2001, MacNeela et al, 2006, Maben, 2008, International Council of Nurses, 2009a).

The lack of a unique identity for the nursing profession has been attributed to the fact that historically, nurses have developed, sustained and passed on 'invisible' knowledge and skills for which there are no formal vocabularies. In this way the work of the nurse is largely unseen, except by other nurses (Bone, 2002, Bjorklund, 2004). Recent research into how nurses document and articulate their contribution to care has found that much of what they do is not recorded in nursing documentation and as such, it becomes invisible (Hyde et al, 2005, Butler et al, 2006). In addition, the dominance of the medical model as a framework for nursing activity has been found to render the psychological and social aspects of caring unimportant in the overall context of both general and mental health nursing (Barker et al, 1999, Hummelvoll et al, 2001, Hyde et al, 2006).

2.2 What Do Mental Health Nurses Do?

There is widespread agreement that difficulties exist in the definition of mental health nursing (Peplau, 1987, Machin and Stevenson, 1997, Hamblet, 2000, Cowman et al, 2001). It has been suggested that reliance on psychiatric and psychological language and models to frame and describe mental health nursing care has impeded the evolution of a unique nursing language and consequently the visibility and autonomy of the profession (Crowe, 2000, MacNeela et al, 2007).

Previous research has established that the role of mental health nurses is generally poorly articulated, and that mental health nurses themselves struggle to articulate their unique role in the delivery of client care and to gain a sense of professional identity (Warne et al, 2000). While it is agreed that the nurse/client relationship is central to mental health nursing, there remains a lack of agreement on how the nurse/client relationship should be defined (Hutschemaekers et al, 2005, Perraud et al, 2006). The importance of this relationship seems to be underacknowledged and as a consequence, undervalued (Barker et al, 1999, O'Brien, 1999, Cowman et al, 2001, Deady, 2005).

Added to these definitional difficulties, contradictions exist across models and theories of mental health nursing practice regarding psychotherapeutic, patient focused verses biological approaches to care (Forchuk, 2001). For example, recovery based models of nursing care, like the Tidal Model which focus on the patient's story and enabling the patient to recover through hope, optimism, promotion of self care and social inclusion (Barker, 2001) are becoming more widely supported. However, despite ground made in the implementation of psychotherapeutic, patient focused models like the Tidal Model and indeed despite moves away from the traditional power base in hospitals to community based care, psychiatry continues have a powerful influence over mental health client care (Brimblecombe, 2005, Stickley, 2009).

The dominance of psychiatry in the organisation of care however, contrasts with the reality of nursing practice. This contrast is highlighted in studies to investigate the nature of the mental health nursing role. These studies infer that psychosocial client problems and nursing interventions are most salient in the overall context of mental health nursing practice, while the physical/biological dimensions of the nursing role are less important and prevalent than might be expected (Fourie et al, 2005, Scott et al, 2006a, Morris et al, in press). Findings like these give further weight to attempts to ensure that the social context of the caring role and the nature of the nurse/client relationship is prioritised over psychiatry and medicine in the organisation of mental health nursing practice (Coleman and Jenkins, 1998, Barker et al, 1999).

2.3 Mental Health Nursing in Ireland

Irish mental health nurses make up a significant portion of the health services personnel who work with clients in the community and inpatient based services. An Bord Altranais, the Irish nursing board, estimate that registered mental health nurses practice across forty mental health services in Ireland based in the community (including the home) and in inpatient wards and units (An Bord Altranais, 2009). As discussed in Chapter One (p. 30) above, standardised information systems are required to facilitate improved planning and practice within these services (Department of Health and Children, 2006). In order to optimise the function of these systems, clear evidence of the mental health nursing role is required.

However, research suggests that Irish mental health nurses find it difficult to articulate what their role entails compared with nurses from other disciplines e.g. general medicine (Corbally et al, 2004, Deady, 2005). This may be due in part to ongoing changes in the Irish mental health service, particularly over the last 25 years. As might be expected, the role of the mental health nurse in Ireland has evolved with this process of change, as new skills are required to ensure the smooth transition from institutionalised to community based care. The integration of nursing into multidisciplinary team based practice, the

emergence of new clinical and advanced nurse specialist roles and the concept of the 'home based team', are all recent developments in mental health service provision in Ireland.

The first study to investigate the nature of Irish mental health nursing work was carried out by Cowman and colleagues in 1997. This study has since been cited by many as evidence of the way in which mental health nursing in Ireland is organised and operationalised. While this research was greatly welcomed, eleven plus years of developments in the Irish mental health service with little or no follow up studies left a significant gap in the availability of evidence regarding the true nature of Irish mental health nursing today.

This gap has been partly filled in recent years, through the implementation of a number of studies to investigate the way in which Irish nurses, including mental health nurses, document, articulate and agree on the major elements of their caring role (Hanrahan et al, 2003, Corbally et al, 2004, Irving et al, 2004, 2006, Scott et al, 2006a). This research has served to give a reasonably comprehensive indication of the kinds of client problems mental health nurses are frequently presented with, the interventions they carry out on the client's behalf and to a lesser extent, the outcomes of their caring role. It is important to note that these investigations were carried out to inform the development of the first draft of the Irish Nursing Minimum Data Set for mental health (Scott et al, 2006a).

2.3.1 Core Elements of the Irish Mental Health Nursing Role

A major output of this recent research, a content analysis of Irish mental health nursing documentation, indicated that nursing work typically relates to physical, psychological and social problems among clients diagnosed with schizophrenia, bi-polar disorders and depression (Hanrahan et al, 2003). This study revealed that mental health clients in Ireland experienced a range of problems relevant to a biopsychosocial caring perspective. For example, mental health problems were noted to include those related to adherence to medication, hygiene, motivation, anxiety, aggression, sleep deprivation, lack of social

support and social skills. In addressing these client problems, nurses recorded a variety of psychosocial nursing interventions, primarily relating to developing a trusting and therapeutic nurse/client relationship. Nursing interventions involved promoting positive self-image and improved levels of self-esteem, improving or maintaining a positive social environment for the client and promoting social independence, hygiene and activities of daily living (Hanrahan et al, 2003). Research suggests that these support oriented interventions are valued by the client in nurse/client interactions and client recovery (e.g. Crowe et al, 2001).

While nursing documentation is of central importance in highlighting the nursing process, it is but one way in which the multitude of activities that nurses engage in can be uncovered (Karkkainen, 2005). Further to this, nursing documentation is not always entirely accurate and accuracy can depend on the system in place (Hill-Westmoreland, 2005)**.** What nurses' document about their caring work may only partially reveal the caring activities that they have actually engaged in. For example, Hyde et al, (2005) noted that the content of Irish general nursing documentation depicted 'an almost complete absence of emotions, feelings and experiences relating to the (client) illness' (p. 74). Elements of nursing such as spending time with the client and advocating on their behalf was not documented by nurses while the more physical, technical or task orientated elements of nursing practice were very much present. In this way, failure to document 'intangible' nursing interventions served to render them invisible or even non-existent.

A second study of the role of nurses in Ireland employed focus group methodology and highlighted both similarties and differences across the work of mental health and general nurses (Butler and Corbally, 2004). From a mental health nursing perspective, nurses were united in their articulation of the fact that they found it very difficult to describe what they actually did in practice, a finding that is supported in similar studies internationally (e.g. O'Brien, 2000, Forchuk, 2001, Bone, 2002). Irish mental health nurses mainly articulated the use of informal processes of assessment and reassessment of their clients as opposed to formal processes of assessment, more typically found in general

nursing (Corbally et al, 2004, Butler et el, 2004). Again, mental health nurses inferred that the client problems that they encountered were typically of a psychosocial nature and included problems with mood, aggression, motivation, suicidal intention, insight into illness, family and community support and social independence. Similar types of physical problems to those uncovered by Hanrahan et al (2003) were noted, including problems with adherence to medication, hygiene, nutrition and sleep.

Scott et al (2006a) used the Delphi methodology to uncover consensus among mental health nurses regarding the core elements of their practice. Use of the Delphi survey is advocated where there is a lack of previous research in an area of interest and where expert insights into that area are required (Linstone and Turoff, 1975, Powell 2003, Schell, 2006). In mental health, the Delphi method has been used to explore components of schizophrenia care (Fiander et al, 1998), clinical indicators for mental health nursing (Gaskin et al, 2003), clinical risk management (Sharkey and Sharples, 2001), mental health nursing in primary care (Walker et al, 2000) and service provision in severe mental illness and substance misuse (Jeffrey et al, 2000). Scott et al's use of this methodology served to confirm agreement of Irish mental health nurses, the 'experts' in the research process, on a core set of mental health related client problems and nursing interventions, previously indicated in both the focus group and documentary analysis discussed above.

A comparison between the findings of Cowman et al (2001) and Scott et al (2006a) inferred that mental health nursing in Ireland involves a significant amount of psychosocial intervention work. The results of Scott et al's (2006a) work revealed consensus opinions of Irish mental health nurses regarding the core elements of their practice. These 'core elements' included client anxiety, relationship building, and developing and maintaining client trust, providing informal psychosocial support, advocacy, encouraging adherence to treatment or interventions, supporting family needs and promoting social functioning.

Similarly Cowman et al (2001) found that mental health nurses were most inclined to engage in interventions relating to ensuring client independence e.g.

prompting him/her to wash, assisting clients to make their own choices regarding care, prompting clients to identify problems and suggesting possible coping strategies. Nurses also tended to engage in interventions to inform, educate and support both the client and his/her family, to promote social independence through life skills development and to generally talk, listen and counsel the client (Cowman et al 2001). This pattern of findings supports the view that mental health nursing in general is more concerned with psychosocial care and the nurse client relationship than it is with medical care (e.g., Peplau, 1952, Barker et al, 1999, O'Brien, 1999, 2000, Cowman, 2001).

2.3.2 Indirect Mental Health Nursing Work

Across both the work of Scott et al (2006a) and Cowman et al (2001) nurses were found to engage in indirect non-clinical interventions, including working and communicating with other nurses and multidisciplinary team members, documentation and planning client care, assessing clients, teaching and assessing staff and students, co-ordinating the services of nurses and other professionals for clients and administration/organisation of the clinical area. These results demonstrate the importance of defining the nurse's indirect care activities in the context of their nursing role. In the area of nursing minimum data set development, this finding is of interest as previous NMDS tools have purposefully omitted this kind of indirect nursing intervention work, due to its perceived irrelevance to nursing practice (e.g. Goossen et al, 2000). This may indicate differences in the organisation of care internationally.

2.3.3 Outcomes of Irish Mental Health Nursing Care

Outcomes of mental health nursing in Ireland were identified by Scott et al (2006a) to include general psychological and social indicators of the quality of nursing care provided to the client, as well as the effectiveness or success of nursing care across a wide range of other indicators. These indicators included the resolution of presenting problems, client trust and satisfaction, the ability of clients and their families to cope successfully, preventative care and effective organisation and coordination of care.

While Scott's work did not specifically identify the various ways in which nurses in Ireland measure nursing outcomes, a study published by the National Council for the Professional Development of Nursing and Midwifery in Ireland (2006) found that Irish mental health nurses were most likely to use Beck's Depression Inventory (Beck et al, 1961, 1974, 1988), the Waterlow Pressure Area Risk Assessment scale (Waterloo, 1985) and the Mini-Mental State Examination (Folstein et al, 1975) to assess the impact of nursing on client care. A further finding of this study, was that fifty five different assessment scales or tools were used to identify client outcomes of nursing care across a limited number of ten different mental health services. Other scales identified were the Rosenberg Self-Esteem Scale (Rosenberg, 1965), the Edinburgh Post-Natal Depression Scale (Cox et al, 1987) and the Side-Effects Scale/Checklist for Antipsychotic Medication (Bennett et al, 1995a) and the KGV (M) Symptom Scale (Krawiecka et al, 1977). This finding emphasises concerns expressed in Chapter One above, regarding the lack of a centralised and standardised approach to information gathering on the role of nurses in Ireland.

2.4 Conclusion

It is clear that internationally, difficulties exist in defining what mental health nurses do in practice, a difficulty exacerbated by the use of medically oriented models of care in a profession that appears to have a strong psychosocial and client interaction based orientation. This is no different in Ireland. While the evidence base in Irish mental health nursing research has been lacking, a number of important studies have emerged in the past 4 to 5 years. These studies have served to increase our understanding of different client problems, nursing interventions and outcomes of care relevant to mental health nursing in Ireland. The only other relevant research identified in this area was conducted over eleven years ago, an indication of the historically low level of priority given to both nursing research and nursing information gathering in the Irish health service, in particular the Irish mental health service.

Throughout the studies cited in this chapter, evidence of a psychosocial and, to a lesser extent, a biopsychosocial model of Irish mental health nursing care was evident. Consideration of the research findings in terms of these models of care provides for the identification of the more subjective elements of mental health nursing such as providing the client with support and encouragement and building a trusting nurse/client relationship. This is important given the difficulties that exist in articulating the less observable aspects of the nursing role (Hyde et al, 2005).

Contrary to other research conducted to outline important elements of nursing practice, the literature highlighted the importance of the coordination and organisation of care role of Irish mental health nurses.

Finally, while the literature reviewed offered preliminary evidence of the way in which mental health nurses conceptualise and prioritise the importance of the outcomes and goals of their nursing care, a lack of a coherent conceptual understanding of nursing related client outcomes was evident. Given the importance attributed to highlighting the impact of nursing interventions on client outcomes at both Government and service level, the gap in the Irish nursing literature in this area is significant. The requirement to successfully highlight the nursing contribution to client care in Ireland necessitates an understanding of how this has been approached internationally.

CHAPTER THREE

Nursing Sensitive Patient Outcomes
Conceptualisation and measurement issues

3.1 Introduction

Within the literature, it is acknowledged that a lack of definitional clarity, a professional vocabulary and professional identity make it difficult to infer the value of nursing to health care delivery (Clark, 1999, Buller & Butterworth, 2001, Bone, 2002, MacNeela et al., 2007). Up until recently there has been a notable lack of focus on the impact of nursing care on patient well being (Kreulen and Braden, 2004). While the research has advanced in the area of general and acute hospital nursing (e.g. Doran et al, 2006, Aiken et al, 2008) there is a real need for nursing outcomes research in the area of mental health.

3.2 Nursing Sensitive Patient Outcomes: Definition and Measurement

Patient outcomes that result from the nursing input into the patient caring process tend to focus on how the patients' health problems are affected by nursing interventions. These patient outcomes are typically referred to as nursing-sensitive patient outcomes. Nursing-sensitive patient outcomes have been defined as measurable changes in a patient's state of health or condition as a result of nursing interventions and for which nurses are responsible (Maas et al. 1996, Van der Bruggen & Groen 1999). Nursing-sensitive patient outcomes are within the scope of nursing practice, are integral to the processes of nursing care and can be evidenced by an empirical link between the nursing process and the patient condition (Given et al, 2004).

Note that in keeping consistent with the literature 'patient' is used in the place of 'client' in this chapter

While the need to create an agreed set of measures to best capture the quality of nursing care in hospitals has been acknowledged (Van den Heede et al, 2007) there are two predominant perspectives on the investigation of nursing sensitive patient outcomes that have been investigated in the literature.

The first involves the investigation of outcomes according to a process model of care whereby 'outcomes are affected not only by the care provided but also by the factors related to the patient, to the interpersonal aspects of care and to the setting or environment in which care is provided' (Irvine et al, 1998 p.58). The second perspective encompasses nursing sensitive patient safety outcomes which include the unintended effects of inadequate nursing care such as medication errors, patient falls and nosocomial infections, on patient outcomes (McGillis-Hall, 2004). While nurses are not only responsible for such adverse patient outcomes, they are linked to nursing care because nurses are the healthcare workers closest to the patient and are responsible for monitoring the patients health progress on a regular basis. Nursing sensitive patient safety outcomes are frequently examined according to their relationship to varying levels of nursing education and skill mix (e.g. Needleman et al 2002, Aiken et al, 2002, 2003, Rafferty et al, 2007).

3.3 The Investigation of Nursing-Sensitive Patient Outcomes According to a Process Model of Care

Irvine et al (1998) note the challenge associated with identifying outcomes for which a nurse is directly responsible. They point out that this is due to the fact that outcomes are dependent on many aspects of care e.g. the care setting, the nurse and the patient characteristics. Further to this, outcomes are reflective of what has gone before them e.g. the severity of the patient's illness and the type and level of nursing interventions carried out in response to the illness. Considering the study of nursing-sensitive patient outcomes in this way addresses the nursing contribution to patient outcomes by a) explaining the processes responsible for the observed outcome b) identifying the factors that contribute to the occurrence of those processes and c) identifying the subsequent effects of the nursing process on patient outcome achievement

(Sidani, 2004). This theory driven approach proposes that outcome achievement is variable and variability is dependent on characteristics of the patient, the care giver, the care setting, the care actually received by the patient and the characteristics of the expected outcomes based on care provided. Irvine et al (1998) and Doran et al (2002) explored this perspective, developing and testing the Nursing Role Effectiveness Model (NREM) to guide the examination of the contribution of nursing to health care.

The NREM is based on the idea that outcomes are multifaceted and reflective of what precedes them. According to this conceptual model, the achievement of specific patient outcomes is illustrated in relation to the independent, dependent, and interdependent roles assumed by nurses. The NREM accounts for the structure, process, and outcomes of care. Structure refers to the attributes of the settings in which care occurs, process relates to what is actually done in giving and receiving care and outcomes relate to the effects of care on the health status of patients and populations (Donabedian, 1966, 1980). Within the NREM the structural variables include the nurse, patient and nursing unit characteristics that influence the processes and outcomes of health care. These might include for example, the nurses' experience and qualifications, patient diagnosis or age and organizational characteristics such as staff mix and workload. Process variables include the nurses' independent role (i.e. those functions and responsibilities that only the nurse is held accountable for) the nurses' dependent role (i.e. functions and responsibilities associated with implementing medical/physician related orders and medical treatments) and the nurses' interdependent role (i.e. activities or functions that the nurse engages in that are to some extent dependent on the functions of other health care workers). Finally, the outcome variables relate to the patient's condition, behaviour or perception deemed to be attributable to nursing interventions (Irvine et al, 1998). The underlying proposition of the model is that structural variables impact on nurses' role performance, which impacts on patient outcome achievement (Doran et al, 2002).

In contrast to other approaches to nurse-sensitive patient outcomes research, this approach serves to account, rather than control for the many factors that

contribute to patient state and nursing care (Sidani, 2004). Furthermore, use of this theory-driven approach to outcome assessment dictates the researcher's definition of outcome as it insists that any outcome is responsive to care provided. In this way, it makes elements of nursing care mediators between initial patient state and patient outcomes of care. Such outcomes can relate to patient health e.g. physical, psychological, social and behavioural well being and are examined through the illustration of change in patient state over a caring period (Johnson et al, 2000, Sidani, 2004).

3.4 The Investigation of Nursing Sensitive Patient Safety Outcomes

Nursing sensitive patient outcomes have also been conceptualised as what might be termed 'patient safety outcomes' (McGillis-Hall et al, 2004 p.42). In the past, investigations of nursing related patient outcomes tended to focus on patient safety outcomes rather than monitoring change in patient state as a result of nursing interventions. Studies of outcomes in this way are usually cross-sectional rather than longitudinal in design and focus on the impact of staffing levels and skill mix on patient safety. The outcomes most frequently investigated include mortality, morbidity, failure to rescue, pressure ulcers, infection, falls, medication errors, nurse satisfaction and costs and the relationship between such patient outcomes and nurse staffing levels and skill mix (e.g Aiken et al, 2002, 2008, Needleman et al, 2002, 2007, Cho et al, 2003, Sasichay et al, 2003, McGillis-Hall et al, 2004, Lang et al 2004, Kane, 2007).

The work of Aiken et al (1994, 2002, 2003, 2008) is among the most highly cited and replicated nursing outcomes research in the literature. Outcome measures in the work of Aiken include patient mortality and failure to rescue. Findings of this research have indicated that higher numbers of patients per nurse are associated with an increase in patient death within 30 days of admission, increases in the odds of failure to rescue and increases in the level of burnout and job dissatisfaction among nurses (Aiken et al, 2002). In addition, Aiken et al (2003) found that in hospitals with higher proportions of nurses educated at baccalauteate level or higher, patients experienced lower mortality and lower failure to rescue rates. This research has more recently

been verified by Aiken and colleagues who found that poor nurse staffing and education can have serious consequences for patient outcomes (Aiken et al, 2008).

Replication of Aiken's work has recently taken place in the UK to examine the effects of hospital-wide nurse staffing levels on patient mortality, failure to rescue, nurse job dissatisfaction, burnout and nurse-related quality of care. The findings of this research indicated that higher patient to nurse ratios led to higher levels of dissatisfaction and burnout among nurses. Findings also inferred that lower patient to nurse ratios led to better patient outcomes (Rafferty et al, 2007). These findings suggest that staffing levels in UK hospitals have the same impact on patient outcomes and nurse retention as they do in the USA.

McGillis-Hall et al, (2004) examined nursing related patient outcomes, again from a nurse staffing perspective, and found that a higher proportion of professional nurses in the staff mix was associated with lower rates of medication errors and wound infections i.e. more favourable patient outcomes. Similar relationships between nurse staffing and adverse clinical events have been found whereby each adverse event is associated with a significantly prolonged length of stay and increased medical costs (Cho et al, 2003). These findings are of interest in terms of current health service concerns over rising costs in Ireland.

It is interesting to note that much of this work has been carried out in the USA and Canada and that findings may have implications for the UK and Ireland. For example, Lankshear (2005) addresses the relatively low levels of nurse staffing ratios in the UK, stating that the idea of introducing more care assistants, diluting the nursing skill mix and reducing costs, may be a false economy. The reason given for this statement relates to findings that indicate better patient outcomes result from higher quality nursing skill mix. The research suggests that savings as a result of reducing the nursing skill mix level may result in higher levels of patient complications and adverse outcomes, which are likely to carry a higher financial burden in the long term. This is very

relevant to the Irish health service today, where increases in numbers of care assistants are advocated in recent Government policy (Department of Health and Children, 2001b). The current economic climate has given rise to fears of care assistants being used in the place of qualified nurses to save on staffing costs. It should be pointed out that Ireland has a high ratio of nurses to patients (between 1:6 and 1:15 nurses to patients or 14 nurses to every 1,000 of the population compared with an OECD average of 9.7 (Speirs, 2005)) yet problems persist regarding the delivery of effective and efficient care. This raises questions regarding nursing skill mix and patient outcome achievement in Ireland. Related research should aim to establish whether better educated nurses operating in smaller teams, comprising appropriate skill mix (and smaller nurse to patient ratios), result in more effective patient care. The results of such a study could have serious implications for health service resource management in the future.

While the research on nursing sensitive patient safety outcomes provides evidence of the relationships between nurse staffing and adverse/positive patient outcomes, it has been reported that such evidence is inconclusive. It appears that the evidence of the effect of nursing hours or skill mix on patient falls and pressure ulcers is ambiguous and effectively unsupported in the literature (Lake et al, 2006).

Lankshear et al (2005) conducted a systematic review of nurse staffing and related healthcare outcomes and reported that typically, studies of nursing staffing and patient outcomes have used different methodologies including different outcome measures and measurement methodologies. This has made comparisons and evaluation of outcomes research difficult. In examining the relationship between nurse staffing and outcomes, staffing has been measured according to patient to nursing ratios or the number of hours per patient per day. These studies have typically employed cross-sectional designs. Lankshear (2005) criticises the cross-sectional nature of this research, stating that longitudinal design would serve to reduce error by virtue of the time factors involved.

The cross-sectional nature of Aiken and others work is note-worthy as it is not possible to infer changes in patient health as a result of differing levels of nursing interventions over the care period. Cross-sectional studies of this nature do not provide direct evidence of the impact of the nursing contribution to patient care as one cannot measure time related change in the patient condition.

3.5 Outcomes Measurement in Mental Health

Within the context of mental health patient care, outcomes have been conceptualised as measures of change in the level of functioning, severity of symptoms and / or quality of life and direct, systematic measurement of the results of treatment (Sederer, Dickey, and Hermann 1997, Blumenthal, 1999, Rosenheck, Stolar and Fontana, 2000, Morley et al, 2007). Conceptualisations of patient safety-type outcomes of care are few and far between within the mental health literature, although it is reported that medication administration and control and restraint practices can have detrimental effects on patient recovery and/or wellbeing (Gurwitz et al, 2000, Castle, 2006, Gerolamo, 2006). On the whole, little is documented on the relationship between nursing care and patient outcomes in the mental health care setting (Gerolamo, 2006). Where the research exists, the tendency is to measure patient outcomes by way of change in patient symptoms and functioning following the administration of care interventions using a multiple of tools. The problem here is that the implementation of a wide variety of outcomes measurement tools to measure change in the patient condition makes it difficult to compare results across health care settings and different studies of mental health outcomes.

Measures of patient outcomes within the mental health care arena include the Health of the Nation Outcomes Scale (Wing et al, 1994, 1998), Beck Anxiety Inventory (Beck et al, 1988), the Beck Depression Inventory (Beck et al, 1961, 1974), the Hospital Anxiety and Depression Scale (Zigmond and Snaith, 1983), the Global Assessment of Functioning scale (part of the Diagnostic and Statistical Manual of Mental Disorders, American Psychiatric Association, 1994) the Medical Outcomes Short Form, SF-36 (Ware, Snow, Kosinski and Gandek, 1993) and the General Health Questionnaire (Goldberg and Williams,

1988). These scales are symptom specific and do not allow for the recording of information on the kind of treatment the patient receives. In addition, they are not nursing specific and tend to have a multidisciplinary and/or patient rating focus. Therefore, they do not marry well with models of patient outcomes such as Donabedian's Process Model of Care (1966, 1980) and Irvine et al's Nursing Role Effectiveness Model (1998). Furthermore, the majority of these scales are symptom and functioning assessment scales which have been implemented as outcomes measures.

The implementation of these scales in the measurement of patient outcomes has typically involved the analysis of change in the patients instrument score from pre- to post-intervention (e.g. Rees, Richards and Shapiro, 2004, Greenberg and Rosenheck, 2005, Morley et al 2007). While this method of outcomes measurement is closely aligned to nursing sensitive patient outcomes models, the measurement tools lack a comprehensive, nursing focused conceptual basis and are therefore questionable in terms of their ability to assess the nursing impact on patient outcome achievement.

The Health of the Nation Outcomes Scales (HoNOS) (Wing et al, 1994, 1998) is one tool that has been developed specifically as a standardized patient outcomes assessment tool for routine use in mental health services. While it is not specifically designed for use by nurses, nurses are considered to be regular users of the scales (Lambert, Caputi and Deane 2002). The HoNOS was developed in the United Kingdom (Wing et al, 1994, 1998) in response to a Government call for the improvement of the health and social functioning of mentally ill people. It has since been implemented internationally e.g. in Australia, Ireland and Italy, among other countries to assess its usability in patient outcomes assessment (Stedman et al. 1997, Browne, Doran and McGauran, 2000, Parabiaghi, Barbato, D'Avanzo, Erlicher and Lora 2005).

The HoNOS comprises 12 variables each measured on a five point scale, from 0 (no problem) to 4 (severe/very severe), yielding a total problem severity score from 0 to 48. Independent studies have evaluated its reliability, subscale structure, sensitivity to change and appropriateness for routine clinical use (e.g.

Parabiaghi et al, 2005, Rees, Richards and Shapiro, 2004, Trauer, 1999). Comparisons of the results of these studies indicate that the structure of the scale is not entirely robust e.g. Trauer (1999) reported relatively low Cronbach Alpha scores for HoNOS subscales, indicating poor internal consistency. While the scale appears to have good levels of test-retest reliability, its ability to detect clinical change in the patient state is questionable (Page, Hook and Rutherford, 2001).

Finally, Nursing Minimum Data Sets (discussed in detail in Chapter Four below) have tried to measure outcomes of care in different ways. In developing the NMDSN Goossen et al (2000) found that while outcomes tended not to be included in nursing documentation systems, nurses themselves appeared to conceptualise outcomes as a state in which the problem was solved or the problem remained, or as interventions necessary to solve the problem. Hospitals on the other hand were found to use specific registrations for accidents, patient falls and patient satisfaction. In drafting the NMDSN, Goossen et al (2002) noted the inclusion of outcomes relating to patient falls, satisfaction with care and information and satisfaction with pain management but warned that further research on this area of nursing was merited. The original BNMDS did not include outcomes (Sermeus et al, 1994, 2002). However, in its revised state it is linked to the Belgian Hospital Discharge Data Set so that outcomes of care relating to e.g. the reduction in length-of-stay and nurse staffing, can be examined in terms of diagnostic related groups (Sermeus et al, 2005).

At around the same time as the HoNOS was being developed, a number of principles for mental health patient outcomes assessment were proposed by a task force, the 'Outcomes Round Table', sponsored by the Johns Hopkins University and the National Alliance for the Mentally Ill (Smith et al, 1997). These principles, based on measurement science, psychometrics, and health services research, were the output of a group of mental health consumer, professional, service, and policy-making organizations and include the following:

- Outcomes assessments should be appropriate to the application or question being answered. One application is to understand the relationship between patients' health status (outcomes), disease status, and treatment (processes of care). A second application is to more broadly understand the general health status, symptoms, mental health status, or global well-being of groups of patients
- Among the outcomes that can be assessed are symptoms (i.e. functioning, including physical, mental, and social functioning); global well-being and health-related quality of life
- Tools for assessing outcomes should have demonstrated validity and reliability and must be sensitive to clinically important change over time. i.e. as patients experience clinically significant changes in their condition or conditions, the assessment tools should be able to detect the changes
- Outcomes assessments should always include the patient's perspective and where appropriate, family members
- Outcomes assessment systems should place minimal burden on the respondent in terms of time and effort to complete the system
- Outcomes assessment systems should be usable across different care settings. The ability to compare outcomes across care settings can assist in quality improvement efforts
- Outcomes assessments should include general health status i.e. physical, mental, and social functioning, as well as self-reported perceptions of overall health as well as mental health status. General health is vital to overall health and therefore needs to be a part of outcomes assessment
- Outcomes assessment tools should quantify the type and extent of treatment the patient receives for the target condition in order to understand the clinical relationship between the outcomes of care and treatment. Efforts to improve the quality of mental health care require both treatment process and outcomes information (Smith et al, 1997)
- Outcomes assessment tools should include generic and disorder-specific information that is predictive of expected patient outcomes

- Outcomes should be initially assessed and reassessed at clinically meaningful points in time given the course of the disorder (Smith et al, 1997).

3.6 Conclusion

Current trends in the delivery of health care are resulting in the need to link patient outcomes to nursing care. While much research has been conducted into the impact of nursing care on patient health, a sizeable amount of this research has reported patient outcomes in terms of nurse staffing characteristics and adverse effects or 'patient safety outcomes'. Less research has been conducted into the change in the patient's condition as a direct result of nursing interventions.

The work of Irvine et al (1998) and Doran et al (2002) has been important within the area of nurse-sensitive patient outcomes research as it advocates a conceptual model upon which patient outcomes analysis can be based. The Nursing Role Effectiveness Model (Irvine et al, 1998, Doran et al, 2002) promotes a comprehensive way of examining nursing-sensitive patient outcomes by addressing a) the characteristics of the environment in which nursing interventions take place b) the interventions responsible for the patient outcome and c) the effects of the nursing interventions on patient outcome achievement (Sidani, 2004). In this way the impact of nurse staffing characteristics are considered in the assessment of patient outcomes but nursing interventions are considered to be the mediators between patient condition at the outset and patient condition post nursing care. This implies an assessment of 'nursing sensitive' outcomes of care.

While the Nursing Role Effectiveness Model is progressive, it does not appear to have been applied within the context of mental health nursing where research into nursing sensitive patient outcomes is in its infancy. The conceptualisation of patient outcomes in the research that exists in the area of mental health are akin to those advocated by the NREM. In other words, patient outcomes are largely considered in terms of change in the patients

condition as a result of the administration of caring interventions. The literature reports studies of patient outcomes that are reliant on results gleaned from measurement tools that are not nursing specific and that have not been developed solely for the purpose of measuring patient outcomes. While the HoNOS is outcomes measurement specific, it is multidisciplinary in design and appears to lack credibility in terms of validity and reliability.

Having reviewed the patient outcomes literature from a multidisciplinary and general health care perspective as well as from a mental health nursing perspective, it is concluded that there is a gap in the area of mental health nursing sensitive patient outcomes research. While few studies report mental health nursing related findings, no studies appeared to report mental health nursing related findings based on a research tool developed to specifically measure outcomes related to the mental health nursing role. As such, there is room for the development of a research tool to measure the impact of mental health nursing on mental health patient outcomes. Any attempt to develop such a tool should be guided by recommendations set out by Smith et al (1997) which emphasise that a patient's mental health cannot be viewed in isolation from his/her general well-being. As such, mental health patient outcomes measurement should account for the well-being of the person as a whole incorporating physical, social and psychological functioning. Further to this, good construct validity and reliability of the tool should be prioritised in its initial development to avoid problems such as those reported for the HoNOS. Finally, in order to capture the process, structure and outcomes of mental health nursing, any tool to capture the contribution of mental health nursing to patient care should include variables that capture a) characteristics of the caring environment, b) characteristics of the patient prior to the administration of nursing interventions, c) information relating to the nursing care the patient receives and finally d) characteristics of the patient's condition post the administration of nursing interventions.

CHAPTER FOUR

The Nursing Minimum Data Set Concept

4.1 Introduction

Improving our understanding of how to use nursing resources most effectively can be achieved through the identification of how nurses organise their role in terms of activities and interventions. This can also be achieved by analysing how nursing interventions relate to patient outcomes. The need to explicitly define the nursing role has been recognised in Ireland. This has led to the development of a nursing information system to assess nursing care across both general and mental health settings (Scott et al, 2006a, Butler et al, 2006).

Preliminary research relating to descriptions of the Irish general and mental health nursing roles was completed in the years 2003 to 2006. This resulted in the development of the draft Irish Nursing Minimum Data Set for mental health (Scott et al, 2006a). This chapter aims to establish how the Nursing Minimum Data Set (NMDS) can provide the evidence necessary to adequately define nursing practice and facilitate quality decision making regarding the management and future development of the nursing profession in Ireland.

4.2 Overview of Nursing Minimum Data Sets

Since 1993 an international movement towards ensuring the comprehensive description of nursing care through the use of classification systems has been underway. The International Classification of Nursing Practice, (ICNP) is described as an integral part of the global information infrastructure, informing health care practice and policy to improve patient care worldwide. Its main aims are to serve as a major force to articulate nursing's contribution to health and health care globally and to promote harmonization with other widely used classifications and the work of standardization groups in health and nursing

(International Council of Nurses, 2009b). Work on the development of the Nursing Minimum Data Set has formed part of this movement to articulate the contribution that nursing makes to patient care (Werley 1991). It is widely accepted that NMDS data can support evidence-based practice by informing educators and policy makers of what happens in the practice setting, facilitating the examination of phenomena-interventions-outcomes links within and across practice settings, and underpinning the development of nursing informatics systems (e.g. Henry, 1995, Goossen, 2000).

The international need to standardize and systematically describe nursing according to patient problems, nursing intervention and outcomes of nursing care has long been advocated (e.g. Werley et al. 1991, Clark & Lang 1992, Sermeus & Delesie 1994, Mortensen, 1997, Goossen et al, 2000). Nursing minimum data sets (NMDS) have been developed and implemented in an effort to systematically collect this kind of standardized nursing information (e.g. Werley et al 1991, Sermeus et al, 1994, 2005, Goossen et al. 1998).

The Nursing Minimum Data Set is based on the concept of the Uniform Minimum Health Data Set 'A minimum set of variables of information with uniform definitions and categories, concerning a specific aspect or dimension of the health care system, which meets the essential needs of multiple data users' (Werley et al, 1991). Definition of the Nursing Minimum Data Set (NMDS) is closely aligned to that of the Uniform Minimum Health Data Set i.e. it is a minimum set of elements of information with uniform definitions and categories concerning the specific dimensions of nursing (Werley & Lang, 1988). This information can then be made available to a large and variable group of users to satisfy a broad range of information requirements (Sermeus et al 1994). In this way, use of NMDS information is not confined to nurses but can be relevant and useful to a wide variety of professionals requiring such data (Goossen et al, 2000). To date, the minimum data set concept has been used across health care settings for health disciplines in their own right and on a multidisciplinary basis (MacNeela et al, 2006).

Once determined valid and reliable, an NMDS can be used for multiple purposes including the following:

- To establish comparability of nursing data across clinical populations, settings, geographic areas, and time. For example, in Belgium, the fingerprint graph (Sermeus et al, 1996) was developed for the purpose of detailing information gathered using the Belgian Nursing Minimum Data Set (BNMDS). Levels of nursing activity across nursing units, wards and hospitals are graphed for comparative analysis and the information is used by head nurses to inform decisions on unit staffing. While the nurses' judgement is key to this process, decisions are facilitated by the graphical fingerprint information (Sermeus, 1996)
- To describe the nursing care of individuals, families and communities in a variety of settings. In Belgium, BNMDS data is used in the analysis of hospital admission and intervention appropriateness (Sermeus et al., 2007). Recent research into the use of evidence in the administration of nursing interventions for pressure ulcer care utilised the revised Belgian Nursing Minimum Data Set in conjunction with the Hospital Discharge Data Set (HDDS). Evidence regarding pressure ulcer care was translated into a decision tree of recommended interventions, based on patient risk. Results of the study indicated that levels of under-care and over-care of patients could be detected using such an evidence based rule, implemented on a database level (Sermeus et al, 2007)
- To demonstrate or project trends regarding nursing care provided and allocation of nursing resources to patients or clients according to their health problems or nursing diagnoses
- To stimulate nursing research through links to the data existing in health-care information systems
- To provide data and information about nursing care to influence practice, administrative, and health policy decision-making (Werley & Lang, 1988, Werley et al, 1991)

4.3 Nursing Minimum Data Set Terminology

In order for a data set to be formally recognised it should have a well developed and organised terminology i.e. variables should be well identified, worded and organised. Furthermore, it should be relevant to clinical practice with a well defined recording system and it should be systematically developed, usable, valid and reliable (MacNeela et al, 2006). As has already been inferred, invisibility of the nursing profession is in many ways due to the lack of a nursing language. The non-standardisation of information related to nursing concepts and nursing language leads to various meanings and understandings being attributed to concepts of nursing care and nursing management (Morris et al, 2007). Nursing information systems with standardised structured definitions of nursing concepts, such as the NMDS, should rely on uniform standardized nursing language to describe nursing related patient problems, nursing interventions and nursing related patient outcomes (Turtiainen et al, 2000).

As has already been described, internationally there have been moves to develop nursing language systems that include nursing diagnoses, interventions and outcomes that form the basis of information systems such as nursing classification systems and nursing minimum data sets (Gordon, 1998). Nursing classification systems have been developed to standardise nursing language and concepts and to describe nursing practice. A number of these systems have also served to inform the development of nursing minimum data sets. Nursing minimum data sets and nursing classification systems both aim to establish an accepted nursing language and to support nursing care delivery. The difference in the systems is that nursing classification systems offer an exhaustive account of nursing language and activity while nursing minimum data sets offer a powerful, standardised yet limited account of the nursing process based on data collected (Goossen et al, 2002, MacNeela et al, 2006).

The Nursing Interventions Classification, 'NIC', (Dochterman & Bulechek, 2004) is one of the most influential nursing classification systems in NMDS development (e.g. Volrathongchai et al, 2003, Sermeus et al, 2005). The North

American Nursing Diagnosis Association (NANDA, 2003), The Nursing Outcomes Classification system or NOC (Johnson and Maas, 2000, Moorhead, Maas, & Johnson, 2004), the Systematized Nomenclature of Medicine Clinical Terms, SNOMED CT (College of American Pathologists, 1993) and the OMAHA System (Martin, 2005) are other examples of classification systems used in nursing. While NANDA, NIC and NOC are specific to nursing, SNOMED and Omaha are relevant to other health disciplines. NANDA, NIC and NOC progressively used in the nursing clinical setting, research and education.

The North American Nursing Diagnosis Association (NANDA, 2003) is a taxonomy of nursing diagnoses and is recognized as the pioneer in diagnostic classification in nursing. The Nursing Interventions Classification 'NIC', (Dochterman & Bulechek, 2004) is a classification of direct, indirect, independent and collaborative interventions that nurses perform on behalf of patients. The Nursing Outcomes Classification system, 'NOC' (Johnson and Maas, 2000, Moorhead, Maas, & Johnson, 2004) is a standardized classification of patient outcomes used to evaluate the effects of nursing interventions on patient status. All three classification elements consist of a concept label, a definition, defining characteristics, outcome indicators and/or activities. The linking of NANDA, NIC and NOC can illustrate the relationships between and among nursing diagnoses, interventions, and outcomes (Kautz et al 2006). When NANDA, NIC and NOC are integrated into hospital nursing information systems it should be possible to make nursing care and its associated activities and achievement of nursing-sensitive outcomes evident (Lunney, 2006).

Another nursing classification system in development is the International Classification for Nursing Practice (ICNP), which represents an international attempt to classify nursing diagnoses, interventions and outcomes. The benefits of this system include unifying nursing language on an international level, across specialties, languages and cultures (International Council of Nurses, 2009).

4.4 International Trends in the Development of Nursing Minimum Data Sets

A valid NMDS is based on the identification and operationalisation of core elements of nursing practice, 'those which are used frequently by the majority of nurses across care settings' and are organised into a taxonomy of e.g. patient phenomena, nursing interventions and outcomes of nursing care (MacNeela et al, 2006 p. 45). NMDS development has gathered momentum internationally with developments taking place in countries such as the USA (Werley et al, 1988) Belgium (Sermeus et al, 1996, 2005), The Netherlands (Goossen et al, 2000), Switzerland (Berthou et al, 2007), Finland (Turtiainen et al, 2000), Australia (Gliddon 1998) and Thailand (Volrathongchai et al, 2003). An international Nursing Minimum Data Set (i-NMDS) is also under development. The development process aims to support the on-going identification of national minimum data sets congruent with the elements, definitions, and data collection strategies of the i-NMDS and to coordinate ongoing international data collection and analyses of the i-NMDS. The developed data set should support the description, study, and improvement of nursing practice on an international scale (Goossen, Delaney and Coenen 2003).

Implementation of nursing minimum data sets has tended to focus on the general nursing environment (e.g. Werley et al, 1998, Sermeus et al, 2005) with some deviations into other areas of nursing. For example, in Australia, the objective of the Community Nursing Minimum Data Set Australia (CNMDSA) is to introduce standardization and comparability into the collection of a minimal set of data to describe community nursing (Australian Council of Community Nursing Services, 1991). Nursing Minimum Data Sets have also been applied to parish nursing (Coenen et al, 1999), occupational health (Silveira and de Fatima, 2006) and long stay institutions (Junger et al, 2007).

4.5 NMDS Development in the USA

The Uniform Minimum Health Data Set concept was first developed in 1969 by the Health Information Policy Council in the USA with a view to developing national health data standards and guidelines (Werley et al, 1988).

This was the precursor to the development of the original Nursing Minimum Data Set. Built on the concept of the Uniform Minimum Health Data Set (UMHDS), the NMDS consists of elements of the Uniform Health *Discharge* Data Set (UMHDDS), the only part of the UMHDDS that was adopted for widespread use in the USA (Karpiuk et al, 1997). The way in which the NMDS was developed influenced methodologies in the development of subsequent NMDSs.

In 1985, a national group of experts was invited to participate in a 3-day NMDS conference aimed at agreeing the content and form of the first NMDS. Participants in the conference included nurse experts from areas including practice, education, research, policy, information systems, health data and records and UMHDSs. The result of the NMDS development conference was the first draft of the NMDS consisting of 3 categories of elements including nursing care, patient demographics and service. The draft NMDS was then refined by a post-conference task force who produced a refined instrument, including the following elements:

Nursing Care Elements: Nursing diagnosis; Nursing interventions; Nursing outcomes; Intensity of nursing care

Patient Demographics: Personal identification; Date of birth; Sex; Race and ethnicity; Residence

Service: Unique facility or service agency; Unique health record number or patient/client or principal registered nurse provider unique number; Episode admission or encounter date; Discharge or termination date; Disposition or termination date; Disposition of patient or client; Expected payer for most of the bill

Many of the elements contained within the first version of the NMDS were in line with those contained in the UMHDDS. The reliability of the NMDS was established via interrater reliability testing and comparing NMDS data elements with data contained within nursing records. A total of 116 client health records from a number of clinical sites were used to collect NMDS data and it was found that the majority of NMDS elements could be found in the

records for over 90% of cases. Satisfactory interrater agreement was also found (Devine and Werley, 1988, Werley et al, 1991).

Conclusions regarding the use of the NMDS inferred that national or international adoption of the tool could lead to widespread access to comparable, core nursing data, enhanced nursing documentation and information systems, the identification of national and international trends in patient problems and nursing interventions, improved service quality and financial management and comparative research on nursing care (Werley et al 1991). Since the development of the NMDS (Werley et al, 1988), a number of subsequent nursing minimum data set instruments have been developed internationally. Of the international developments, it is appropriate to acknowledge the Belgian NMDS (Sermeus et al, 1992, 2005) and the NMDS, for the Netherlands (Goossen, 2002) as being the most widely cited within the academic literature.

4.6 The Belgian Nursing Minimum Data Set

The Belgian Nursing Minimum Data Set, (BNMDS) is a patient and patient care information system for all Belgian hospitals, representing the first NMDS to be implemented on a national basis. The development of the BNMDS, or the Belgian `Minimale Verpleegkundige Gegevens' (MVG) resulted from an initial list of 111 interventions, drawn up by the Belgian Nurses' Association. An initial test of the validity of the interventions list was implemented across 13 hospitals and 92 wards with data representing 12,105 inpatient days. The validity testing resulted in the list of nursing interventions being reduced to 23 (Sermeus, 1992). Over a decade later the BNMDS was revised. Revision of the BNMDS for cardiology, oncology, geriatric, chronic care, paediatric and intensive care programmes took place between the years of 2000 and 2006. The revisions were made to account for changes in nursing practice, developments in nursing language and classification systems, changes in healthcare management and the requirement to integrate the system with the Belgian Hospital Discharge Data Set (HDDS) (Sermeus et al, 2005).

The development of the revised BNMDS involved using NIC as a conceptual framework whereby a list of NIC variables, and previous BNMDS variables were included in an alpha version of the BNMDS. Definitions, registration requirements and response categories based on information gathered from expert panels were developed by a research team. Indicators relating to hospital financing, nurse staffing allocation, assessment of appropriateness of hospitalisation and quality management were all found to be priorities for inclusion in the alpha version of the BNMDS (Sermeus et al, 2005). Validation of the tool then took place within a total of 66 hospitals, whereby data were collected for a total of 95,000 inpatient days. Validity and reliability testing resulted in the accepted revised BNMDS. Criterion related validity was determined by comparing the revised version of the BNMDS with the original version of the instrument using Spearmans Rho and Kendalls Tao correlation coefficients. Construct validity was established using Principal Components Analysis using the NIC framework of variable classes, and content validity was established with the help of clinical and management nursing experts. Finally, interrater reliability methodology involved testing participant responses at three points in time. In total, 66 research coordinators within the clinical setting were asked to score six written cases, describing patient condition and nursing care given during one patient day. The reliability score was calculated as a percentage of the respondents who scored cases according to a gold standard developed by the researchers prior to study implementation. Eighty percent of variables on the revised instrument observed reliability scores of 70% or more.

The final revised BNMDS consisted of 37 core variables based on NIC with supplementary variables for each care programme i.e. 15 for oncology, 11 for geriatric, 16 for chronic care, 9 for cardiology, 19 for paediatric care and 16 for intensive care programmes. This version of the BNMDS was then linked with the HDDS with a view to linking nursing data with diagnosis related groups (DRGs). The aim of linking the BNMDS with DRGs and the HDDS was essentially to assist in understanding how medical and nursing data interrelate and to potentially provide nursing profiles per DRG. See Table 1, Appendix A (p. 317) for an overview of the variables contained within the BNMDS.

Implementation of the BNMDS is mandatory. Data are collected during four registration periods annually on nationally selected inpatient days. Data collected with the BNMDS has been used for hospital budgeting and to inform staffing levels in hospitals (Sermeus et al 2005). Fingerprint graphs (Sermeus et al, 1996) were specifically developed for the purpose of detailing nursing activities across nursing units and are currently used by head nurses to inform decisions on unit staffing. Furthermore, the revised BNMDS incorporates the San Joaquin patient classification system to inform requirements relating to workload and staffing levels (Sermeus et al, 2007). This system includes a classification of nursing workload according to whether it is 'low intensity' or 'high intensity', using a 5-point scale. Workload measurement is dependent on the number of patients in each category of the rating scale i.e. 0 – 4, the total number of patients and the number of staff i.e. head nurse, staff nurses, nursing aids, student nurses.

Ridit analysis (Bross, 1958) is used to analyse differences in intervention activity across care settings and time boundaries. This also serves to indicate the discriminative validity of the tool. The BNMDS has been adapted and tested in Finland and has been shown to be valid and reliable to be used in the description of nursing practice in Finland (Turtiainen et al, 2000).

4.7 The Nursing Minimum Data Set for the Netherlands

The Nursing Minimum Data Set for the Netherlands was developed in response to the lack of available nursing data and the fact that no system of nursing data collection existed in the Netherlands. The development of the NMDSN engaged a multi-method research approach including interviews, document analysis, consensus rounds, seeking validation in the literature, and drawing up lists of most frequently occurring patient problems, interventions and outcomes of care (Goossen et al, 2000). Research was conducted across 8 hospitals and 16 wards. A total of 56 participants including nurse managers and staff nurses engaged in semi-structured group interviews. Interviews with nurse managers focused on staff allocation and data used to support decision-making. Interviews with staff nurses focused on nursing documentation, influence over

budget and personnel decision making, use of nursing information to support decision making and drawing up lists of frequently occurring patient problems, nursing interventions and outcomes of nursing care. Participants were presented with the interview notes to ensure they concurred with the nurses opinions expressed in the interviews.

Further to this, nursing documentation was analysed to inform the content of the NMDSN. Interview and documentary data as well as literature reviews were used to develop the NMDS. Patient classification variables, complexity of care variables and BNMDS variables were also included in the data set. Once the final draft of the instrument had been prepared it was sent to participating hospitals where participants fed back on how applicable and suitable it was to practice. The final list of variables for inclusion in the NMDSN spanned across patient demographics, health care setting, patient medical condition, patient problems, outcomes and interventions. A comprehensive overview of these can be viewed in Table 2, Appendix A (p. 319).

In addition, all of the patient classification indicators of the San Joaquin System (Grunveld et al. 1987, in Goossen et al, 2000), and all but one of the Belgian Nursing Minimum Data Set variables were included in the NMDSN. Furthermore, a complexity of care scale, a calculation of nursing intensity and two visual analogue scales, on which the nurse could score the complexity of care and the appropriateness of the amount of care that could be given, were integrated into the tool (Goossen et al, 2000).

Variables relating to coordination and organization of care activities were excluded from the NMDSN as they were not deemed relevant. This is interesting as it has been argued that exclusion of the coordination of care element of the nursing role can lead to under representation of nursing within data sets resulting in potential problems with their overall validity (Turtiainen et al, 2000, MacNeela et al, 2006).

The majority of variables on the NMDSN are measured on categorical yes/no rating scales. The remaining variables are measured on ordinal, interval and

ratio scales. Goossen et al (2003) established the discriminative validity of the NMDS using Ridit analysis (Bross, 1958). The NMDSN instrument was assessed for reliability using Cohen's Kappa coefficient and the percentage agreement between two raters in residential home and somatic nursing home wards. For residential homes, kappa scores indicated poor to almost perfect agreement between rater (k= -.09 to .85). Constants were also observed in the results of this analysis due to the low variability of ratings given to a number of variables on the NMDS. Percentage agreement scores
ranged from 64% to 100%.

Uses of the NMDSN, as outlined by Goossen et al (2002), include:

- Visualization of patient populations and nursing care using frequency scores
- Longitudinal representation of data to generate epidemiological data e.g. incidence and prevalence rates on the level of individual patients.
- Illustration of the diversity of patient populations and variations in nursing practice using RIDIT analysis and fingerprint graphs
- Supporting health policy decision making and workload management i.e. through the integration of workload measurement systems
- Testing instruments for nursing research against the NMDS

4.8 A Comparative Analysis of NMDS Tools

It is appropriate to state that the NMDS, the BNMDS and the NMDSN are among the most cited nursing minimum data set tools within the international literature. It therefore follows that they serve to influence the development of other nursing minimum data set tools. As such, it is interesting to examine the similarities and differences in the development methodologies used for each of these data sets. Table 1 below outlines a comparison across the NMDS, the BNMDS and the NMDSN in relation to their purpose, scope and development.

Table 1 Comparison of NDMSs (Adapted from Goossen et al, 1998)

Name of data set	(NMDS) (Werley et al, 1988)	MVG/RIM (Sermeus et al, 1992; 2005)	NMDSN (Goossen et al, 2000)
Country	USA	Belgium	The Netherlands
Purpose	Describe and compare nursing care	Bridge gap between variability of daily nursing practice and policymaking	Response to the lack of available nursing data and data collection system in the Netherlands
	Demonstrate & analyze trends in nursing care	Describe health status	
	Support nursing research	Allow for clinical nursing research	
	Base policy on factual data	Determine costs and effectiveness of nursing care	
		Determine intensity of nursing care	
		Determine hospital budgets and staffing	
Scope	National	National	National
Population	All settings	General hospitals	General hospitals
Development methodology	Expert group invited to develop content	Original BNMDS intervention list drawn up by Belgian Nurses Association	Content development came about through semi-structured interviews with clinical and management nursing staff
	Refinement of first draft NMDS by post-conference task force	Expert panel and research team responsible for making revisions to content of the revised BNMDS	Analysis of nursing documentation also informed content
	Comparison to UHDDS	Criterion related validity tested by comparing BNMDS I and II	Literature and classification systems review informed content
	Inter-rater reliability testing	Construct validity of BNMDS II tested using PCA	Interrater reliability established
	Comparison of NMDS data elements with those in nursing records	Content validity established using clinical and management nursing experts	Discriminative validity established using Ridit analysis
		Inter-rater reliability established	
		Discriminative validity established using Ridit analysis	

Describing nursing care at a domestic level was the overarching aim behind the development of each of these data sets. The NMDSN and the BNMDS were developed for populations specific to the general hospital setting, while the NMDS was developed and tested across nursing settings e.g. hospitals, nursing homes and clinics affiliated with hospitals (Werley et al, 1991). Variables included in the data sets were drawn up with the aid of expert panels and nursing groups (e.g. Werley et al, 1988, Sermeus et al, 2005) semi-structured interviews, nursing documentation analysis, literature and nursing classification reviews (Goossen, 2000). Finally each of these data sets was subjected to a range of different validity and reliability focused tests. It appears that the NMDSN was potentially subjected to a more intensive content selection procedure than the other two data sets while the BNMDS was subjected to the most comprehensive array of validity and reliability testing measures.

4.9 Recent Trends in the Development of Other Relevant Information Systems

Other recent developments in the movement towards adequate definition and description of the nursing role in a) the area of mental health and b) Irish nursing include the development of the Resident Assessment Instrument-Mental Health (RAI-MH) (Hirdes et al, 2001) and the Minimum Data Set Project for Nursing and Midwifery (Department of Health and Children, 2002b).

Despite the non-availability of a nursing minimum data set for mental health, international developments have been made to formulate mental health focused patient information systems with a view to ensuring the availability of comprehensive, standardised patient information regarding assessment and outcomes. The Resident Assessment Instrument-Mental Health (RAI-MH) (Hirdes et al, 2001) is one such instrument. The main objective of RAI-MH is to comprehensively assess psychiatric, social, environmental and medical patient issues at admission, with particular focus on patient functioning. Like the NMDS, the RAI-MH gives a broad description of patient functioning and goes beyond simple patient classification.

The RAI-MH is the product of an international collaboration of researchers from the United Kingdom, the United States, Japan, the Netherlands, Norway and Canada and is modelled on previously developed and validated RAI instruments for nursing homes, homes for the elderly and chronic care hospitals (Morris et al, 1990).

Among the reasons for pursuing the development of the RAI-MH were requirements to increase the quality and accountability of mental health services, to help organise priorities for quality management of services, to support decision-making and the evaluation of the cost-effectiveness of interventions and to integrate health information across sectors of the health care services. Furthermore, existing information systems were noted to be lacking information variables relevant to psychiatry (Hirdes et al, 2002). The result of the international collaboration of researchers on the development of the RAI-MH was a psychiatry specific RAI instrument designed to meet the unique needs of adults in inpatient settings including long-term, acute, geriatric and forensic psychiatry.

The RAI-MH includes trigger variables that indicate the presence or imminent risk of problems that affect the patients ability to function independently and that flag patients with a potential problem in need of further evaluation. Ultimately, the RAI aims to organise information that supports clinical decision making rather than replacing clinical judgement (Hirdes, 2002). The RAI-MH was tested for interrater reliability, obtaining average kappa scores of between .39 and .78 for variables across each section of the instrument. The internal consistency scores for the RAI-MH for selected outcome measures were between α =.77 and α= .95.

Further to this the Minimum Psychiatric Data (MPD21) (unpublished), a multidicsiplinary mental health focused minimum data set has been developed in Belguim. While it is multidisciplinary, it does have a nursing focus. This data set is managed by the Federal Public Service Health, Food Chain Safety and Environment in Belguim. While there is a limited amount of information available on this system in the english language it can be described as a

registration system, of every patient admission which was developed in 1996 in psychiatric hospitals and psychiatric services located in general hospitals. The registration expanded in January 1998 to residential psychiatric homes and sheltered living institutions. This registration is mandatory for these mental health services and is financed by the Federal Government.

The Minimum Data Set concept is not new in nursing in Ireland. In 2001, the Minimum Data Set Project for Nursing and Midwifery, was implemented by the Department of Health and Children in response to concerns about the adequacy, accuracy and timeliness of the data sources held on nursing and midwifery employment (Department of Health and Children, 2002b). A need for a nationally agreed minimum dataset to provide readily available, accurate and standardised information on nursing and midwifery in Ireland was identified. Following this, the instrument was developed and pilot tested.

The development of a national minimum dataset for nursing and midwifery employment was undertaken to ensure the availability of the information for forecasting. The information collected included demographic details, data on turnover and vacant posts and post-registration education opportunities available nationally. The National Nursing and Midwifery Human Resource Minimum Dataset now consists of thirteen variables of information to be gathered for each individual nurse and midwife. Variables of information include: Health Board/authority region, place of employment, work address, sex, date of birth, nationality, An Bord Altranais (the Irish Nursing Board) personal identification number, grade/job title, position title, commitment, contract and qualifications. Each variable is defined to ensure clarity and consistency of interpretation. The main objective of the instrument is to ensure that a comprehensive dataset is collected for all nursing and midwifery staff working in the defined area (including public and private organisations).

4.10 Conclusion

Internationally there is a growing body of evidence as to the merits of developing nursing minimum data sets to support evidence-based practice and

to highlight the impact that nursing interventions have on patient recovery. The development of such systems is imperative to the evaluation of the care offered to patients. It is concluded here that there are a number of important gains that can be made from the development of a nursing minimum data set to address concerns regarding the definition and contribution of the nursing role in Irish mental health care.

The most widely cited and comprehensively developed and used NMDSs include the US NMDS, the BNMDS and the NMDSN. Multiple methodologies have been implemented to ensure the appropriate inclusion of elements of nursing practice in the make up of these tools. While the conceptual basis of each is similar, their content varies based on what each NMDS aims to achieve. Although the NMDS can be said to be in its preliminary stages in terms of its implementation and use, the information that it has produced has proved valuable in providing standardised, comparable information regarding the nature of nursing practice across care setting and time boundaries. This information has also proved valuable in Government level decision making, in health care budgeting and ultimately in ensuring systems efficiency. Furthermore, NMDS data can be used to gauge levels of nursing workload and intervention intensity to inform decision making in such areas as nurse staffing.

In conclusion, the development of a valid and reliable Irish Nursing Minimum Data Set has the potential to facilitate the collection and analysis of nursing specific data on patient phenomena, nursing interventions and nursing outcomes. The international literature has demonstrated how an Irish Nursing Minimum Data Set could be used to comprehensively define the nursing role, to analyse the nature and volume of nursing activity across wards, hospitals and geographic locations, to inform budget and staffing decision making, to establish how nursing interventions contribute to patient outcomes and ultimately to improve the efficiency of health care delivery to ensure high quality patient care.

CHAPTER FIVE

Measurement Error, the Validity and Reliability Concepts

5.1 Introduction

The overall aim of this study was to increase the visibility of the contribution that mental health nursing in Ireland makes to health care delivery, through ensuring the validity and reliability of the I-NMDS (MH). It is contested throughout this thesis that the nursing contribution to mental health client care can be made visible through the use of a valid and reliable structured nursing minimum data set. That data set should be sensitive enough to capture client problems, nursing interventions and client outcomes that are central to the Irish mental health nursing role. The objective of this study was therefore to establish the validity and reliability of the I-NMDS (MH) so that, in the future, data collected using the I-NMDS (MH) could provide a knowledge base on the definition and focus of nursing. This knowledge could then be used to support future clinical, managerial and policy decision making regarding client care across individuals, services and communities (Crandall & Getchell-Reiter, 1993, Sermeus & Goossen, 2002, MacNeela et al, 2006).

The objective of this chapter is to review the concepts of validity and reliability to inform the methodology to establish the validity and reliability of the I-NMDS (MH). Higgins and Straubs (2006) measurement error concept map is used for this purpose. The concepts of validity and reliability are discussed throughout the chapter in reference to the I-NMDS (MH).

5.2 Measurement Error, Validity and Reliability

Establishing the validity and reliability of any research tool is essential to establishing whether it can appropriately address the research question, and

whether research findings resulting from tool implementation are replicable and generalisable. Validity refers to the extent to which a measure or set of measures correctly represent the concept of study and the degree to which it is free from any systematic or non-random error. Reliability on the other hand, refers to whether a research tool produces the same result on repeated trials.

In general terms, the concept of validity has been referred to as the best approximation to the truth or falsity of statements, e.g. research findings, including propositions about causation (Cook and Campbell, 1979, Nunnally and Bernstein, 1994). In scientific research, 'validity is essential to the research proposals theoretical framework, design and methodology' including how well a particular research tool measures what it is designed to measure (Higgins and Straub, 2006, p.24). Validity provides a basis for applying research findings to other populations, times or settings (Ferguson, 2004).

Like validity, establishing the reliability of any research tool is an important part of its development, as tool reliability is essential if it is to be applied with any level of confidence regarding its consistency and utility (Kraemer et al, 2002). Reliability has been described as the extent to which an experiment, test, or any measurement procedure yields the same results on repeated trials (Carmines and Zeller, 1979).

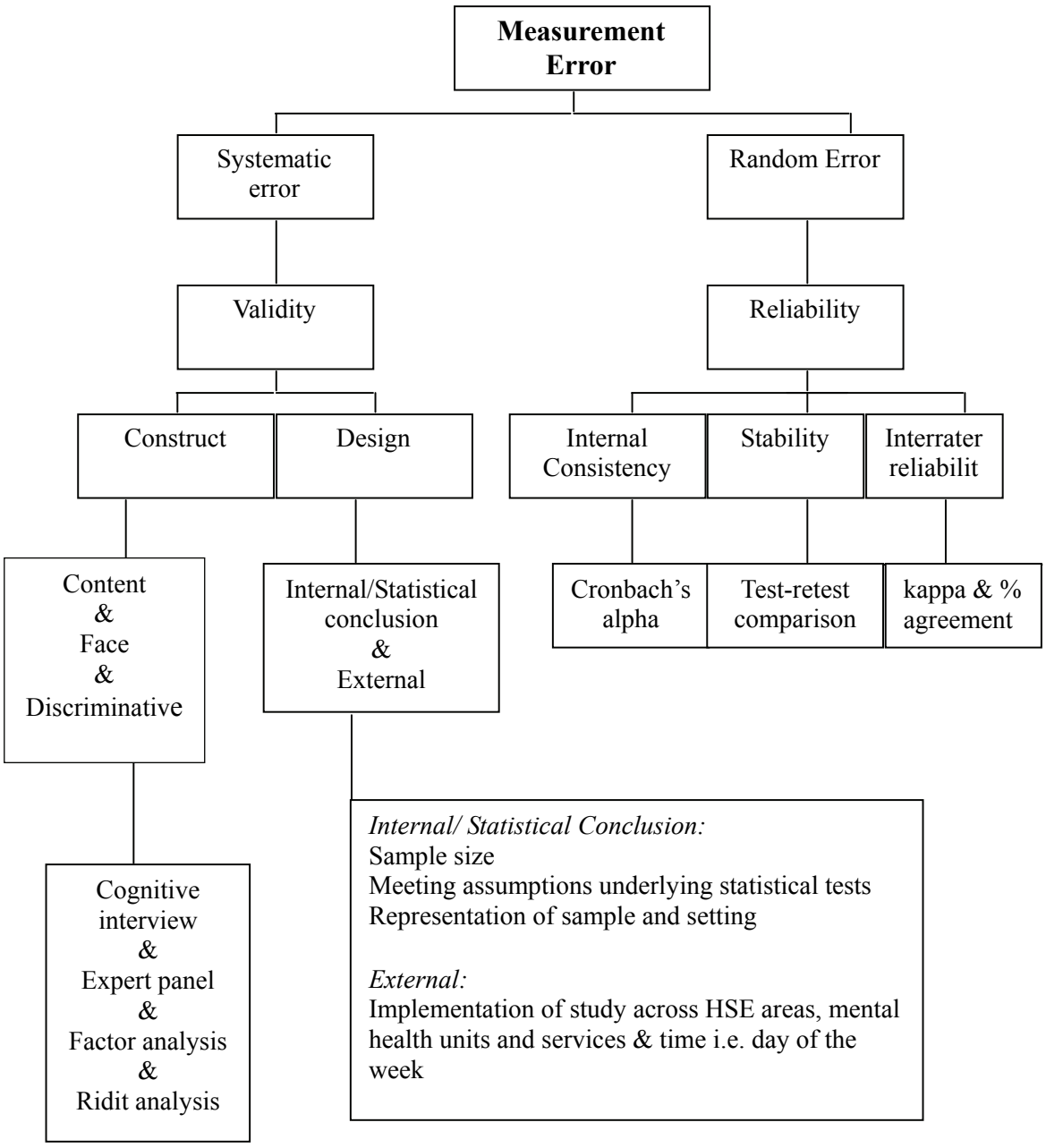
In order to maximise the validity and reliability of any research measurement tool, it is considered essential that a research study is designed in such a way as to minimise measurement error. Measurement error is the variation between measurements of the same quantity on the same individual or the difference between the true state of a concept and the state of that concept, observed through empirical research (Carmines et al, 1979, Bland et al, 1996).

Measurement errors can result from either systematic errors or random errors. Systematic error in a measurement is a consistent and repeatable bias from the true value and typically results from poor measurement design or study methodology. Random error on the other hand results from variations in the data due to problems with the precision of the measurement tool. Random error

typically results from variations between repeated measurements made under identical experimental conditions.

Minimising systematic error involves ensuring that the measurement tool being used for research investigation is valid and correctly represents the concept under investigation. Minimising random error involves ensuring that the measurement tool is reliable and replicates results under similar study conditions. Higgins and Straub (2006) proposed a measurement error concept map to facilitate the minimisation of measurement error in research design. An adaptation of Higgins and Straubs' (2006) concept map of measurement error is presented in Figure 1 below. This map includes tests of systematic and random error relevant to the present study. These tests will be discussed further below and in 7.4 of Chapter Seven.

Figure 1 An Adaptation of Higgins and Straubs' (2006) Concept Map of Measurement Error



5.3 The Validity Concept

5.3.1 Construct Validity

Construct validity is the relationship of the operational definitions of variables to their conceptualizations and therefore indicates that the operations that are meant to represent particular variables are in fact representative and exclusive (Ferguson, 2004). In other words, if a measure has construct validity it measures the theoretical construct that it is designed to measure. In this way, researchers work to establish a degree of construct validity for a particular concept that is specific to a theoretical framework (Higgins and Straub, 2006). As will be discussed in Chapter 6 below, the content of the draft I-NMDS (MH) was in line with the biopsychosocial model of nursing care (Scott et al, 2006b). Establishing the construct validity of the I-NMDS (MH) was considered necessary in order to assess whether the I-NMDS (MH) was theoretically consistent with this biopsychosocial theoretical structure (Engel, 1980).

Construct validity is an umbrella term, under which fall a number of other validity related concepts including content validity, face validity and discriminative validity. Ensuring that a research tool is content valid is imperative to enhancing its construct validity and is therefore important in the development of high-quality measurements (Polit et al, 2007). Content validity concerns the degree to which a scale has an appropriate sample of variables to represent theory or the construct of interest, or whether the domain of content for the construct is adequately represented by the variables (Polit and Beck 2004, 2007, Waltz, Strickland & Lenz, 2005). Content validity is further described as a critical review of a tool's variables in order to assess their semantic clarity and coherence (Higgins and Straub, 2006).

Face validity is defined as a complex, multidimensional construct which is useful for evaluating how test variables on a research or measurement tool appear to respondents and others and is an important component of validity (Thomas et al, 1992, Tweed and Cookson, 2001). Face validity relates to such questions as does the tool appear to be well designed, does it appear to collect the information it is designed to collect and does it appear usable? In contrast to

construct validity, face validity does not depend on established theories for support. Face validity judgements are perceptions and do not have to be correct. Whatever the true validity of the tool, if respondents do not deem the face validity of a tool to be good, then the tool and the results produced may be questionable (Tweed and Cookson, 2001).

Finally, discriminative validity is concerned with ensuring that a measure does not measure what it is not designed to measure, i.e. it discriminates. Discriminative validity refers to the degree to which two conceptually similar concepts are distinct and relates to a measure's ability to distinguish among groups that theory claims ought to be distinguished (Hair et al, 2005).

5.3.2 Design Validity

Design validity relates to the overall design of the research study and includes i) internal, ii) external and iii) statistical conclusion validity.

i) Internal validity refers to the confidence with which one can make statements about relationships between variables, based on the way the variables are measured (Cook & Campbell, 1979, Ferguson, 2004). Internal validity is concerned with the rigor of the study design whereby the degree of control exerted over potential extraneous variables determines the level of internal validity. Controlling for potentially confounding variables minimizes the potential for an alternative explanation of experimental causation and provides more confidence that 'cause' is due to the independent variable. Eight threats to internal validity have been defined: history, maturation, testing, instrumentation, regression, selection, experimental mortality and an interaction of these threats (Campbell and Stanley, 1963).

ii) External validity relates to the generalisability of the experimental causal effect on the independent variable to other populations, settings, measurement variables and times (Ferguson, 2004). However, typically in research investigations, the sample is not representative of the target population through randomization, and thus the findings pertain only to the sample of the study. External validity is a function of the researcher and the design of the research.

Representativeness of the sample theoretically allows for generalization of the results of the study to the target population (Christensen, 2001). As such it is important that the researcher is vigilent in identifying the study target population and ensuring that the sample used for the study adequately represents that population. As random sampling is not always possible in research, the researcher must outline the exact nature of the sampling technique used e.g. it should be overtly specified that the sample is convenience based. In situations where random sampling is not possible, maximising the size of the sample should be prioritised in order to attain representation of the population under investigation (Tabachnik et al, 2006).

The ability to generalise across setting (ecological validity) and time are also considerations in ensuring the external validity of a research study. Varying the setting, context and timings of the research e.g. rolling out the study across multiple sites and times of the day or week, can serve to reduce the threat that findings are relevant only in the experimental setting at one particular point in time (Ferguson, 2004).

iii) The final consideration in ensuring design validity relates to establishing statistical conclusion validity for the research study. Statistical conclusion validity is closely related to external validity and is concerned with both systematic and random error and the correct use of statistics and statistical tests (Nunnally and Bernstein, 1994, Higgins and Straub, 2006). In order to maximise statistical conclusion validity it is important to ensure that assumptions underlying statistical tests used in the research analysis are adhered to e.g. if the test requires a normal distribution, then that test should only be used if a normal distribution of the data is observed, otherwise the researcher should consider using a non-parametric version of the test or if appropriate, transform the variable scores. A second important consideration in the maximisation of statistical conclusion validity relates to ensuring an adequate sample size for the test being implemented, by adhering to acknowledged rules of thumb or implementing a power analysis.

5.4 The Reliability Concept

As discussed in section 5.2 above, the reliability of a research tool relates to its consistency, utility and the extent to which it produces the same results on repeated trials. A number of different reliability concepts and tests exist to ensure that it is consistent, usable and generally reliable. These include tests to establish the internal consistency, interrater reliability and the stability of the research or measurement tool under investigation.

5.4.1 Internal consistency is the extent to which each variable on a measurement tool measures the same concept or characteristic under investigation. Internal consistency estimates reliability by grouping questions in a questionnaire that measure the same concept and verifying how well they relate to one another (Hair et al, 2005). For example, within the I-NMDS (MH), one would expect client psychological problems variables to measure the same concept i.e. the level of the client's psychological wellbeing. High correlations among these variables would infer that they do measure client psychological wellbeing, and that the variables are reliably placed within this conceptual category. Low correlations would infer that they do not measure client psychological wellbeing, are poorly representative of this concept and that consequently this conceptual category 'client psychological wellbeing' possesses low levels of internal consistency.

Cronbach's alpha coefficient is used to provide an estimate of how well all the variables on a test instrument measure the same phenomenon. It is based on the number of test variables and their average inter-variable correlations. The possible range of scores for alpha is 0 to 1. An alpha score of 0.7 and above is deemed an indication of good internal consistency of a tool (Nunnally and Bernstein 1994, Pallant, 2005).

5.4.2 Stability or test-retest reliability refers to the test's consistency across multiple applications. It involves the use of the same test repeated over time and is defined as the extent to which test material can be relied on to measure a characteristic consistently over time with the same test material (Anastasi and

Urbina, 1997). In order to establish the stability of a tool it is given to a group of subjects on at least two separate occasions. Statistical analysis is then carried out to establish whether it is reliable. If the tool is reliable, respondents' scores on the first administration of the tool should be similar to, or correlate highly with, those observed on the subsequent administration of the tool.

5.4.3 Interrater reliability Interrater reliability relates to the 'level of agreement between a particular set of judges on a particular instrument at a particular point in time' (Stemler, 2004 p. 2). Interrater reliability addresses the consistency of the implementation of a rating system. Establishing the interrater reliability of a tool typically involves asking two or more respondents to rate the same subjects and then correlating their ratings. High correlations across ratings infer that the raters are rating the same construct, therefore inferring good interrater reliability. Numerous statistical tests are used to establish the interrater reliability of a measurement tool. The *k* statistic, or 'Cohen's kappa', is frequently cited in the literature as the most appropriate statistic to use in assessing interrater reliability as it is a standardised measure of agreement on categorical data, which corrects for chance agreement between raters (Landis and Koch, 1977, Sargeant et al 1998, Guggenmoos-Holzman, 1996). Percentage agreement, Kendall's Tau and Pearson's *r* are also frequently used in tests of interrater reliability.

5.5 Conclusion

This aim of this chapter was to review the concepts of validity and reliability as well as the tests used in their investigation. This review was important to informing the study research methodology. In order to frame the methodology, Higgins and Straub's (2006) conceptual map of measurement error was adapted. This map was useful in that it helped ensure that the I-NMDS (MH) would be adequately assessed in terms of its validity and reliability.

SECTION II

Research Methodology

CHAPTER SIX

The Irish Nursing Minimum Data Set for Mental Health

6.1 Introduction

The purpose of this chapter is to describe the I-NMDS (MH), (Scott et al, 2006b). Data elements and related definitions, scale of measurement and instruction for use are outlined.

6.2 Format of the I-NMDS for Mental Health

One of the main aims of the Delphi survey conducted by Scott et al (2006a) was to achieve consensus within a group of mental health and general nurses on what they considered to be the core elements of their nursing practice. The identification of core nursing elements across both groups of nurses addressed Werley et al's (1991) nursing minimum data set criterion that NMDS elements should be relevant across most areas of practice. The findings of the Delphi survey were then used to inform the content of the Irish Nursing Minimum Data Set for mental health nursing (Scott et al, 2006a, Scott et al, 2006b).

An underlying process model of care was imposed on the variables chosen for inclusion in the first draft of the I-NMDS (MH) (Donabedian, 1966, Scott et al, 2006b). The process model of care provided an organisational format with which to increase the visibility of elements of nursing care relating to client problems, nursing interventions and nursing outcomes of care. Donabedian's (1966) model links structure, process and outcomes of care in order to facilitate quality improvement. Within this model, 'structure' variables relate to the environment in which care takes place including equipment, financial resources, staff qualifications and experience and organisational structure. 'Process' variables within the model relate to what actually happens in the provision and receipt of care, for example practitioner's activities in making a

diagnosis and treatment. Finally, 'outcome' relates to the effects of care on the health status of the client and includes improvement in patient condition and patient satisfaction with care. According to Donabedian (1980), this three-part approach to assessing care quality is possible because good structure increases the likelihood of good process, and good process increases the likelihood of a good outcome.

In line with the process model of care, the I-NMDS (MH) variables were presented in sections according to whether they represented a client problem, a nursing intervention, a coordination and organisation of care activity or an outcome of nursing care. A demographic section was included on the I-NMDS (MH) to capture relevant client demographic information. A unique client identification number was included to protect client identity. See Appendix B (p. 320) for the first draft of the I-NMDS (MH) (Scott et al, 2006b).

6.3 Overview of the Language System for Use with I-NMDS (MH) Variables

Following the selection and organisation of appropriate data variables for the I-NMDS (MH), a language system was developed to accompany each identified variable within the tool (Scott et al 2006c). As the I-NMDS (MH) format was based on a process model of care, definitions of client problems, nursing interventions, coordination and organisation of care activities and outcomes of nursing care were outlined. The I-NMDS (MH) User Manual (Scott et al, 2006c) includes all of the I-NMDS (MH) definitions. See Appendix C*, p. 325.

Further to defining the overarching concepts upon which the process model of care was based, each I-NMDS (MH) data variable was defined and presented with accompanying examples. Variable examples were presented to elaborate on what precisely the variable represented. The variable definitions were based on the language used by nurses uncovered in the focus group and documentary analysis studies, conducted prior to the development of the tool (Hanrahan et al, 2003, Irving et al, 2004, Butler et al, 2004, Corbally et al 2004).

**The User Manual in Appendix C is the final version of the Manual developed by the researchers*

Definition development was also based on corresponding variable definitions contained within the International Statistical Classification of Diseases and Health Related Problems, 'ICD-10' (WHO 2005), the International Classification of Functioning, Health and Disability, 'ICF' (WHO, 2001), the North American Nursing Diagnosis Association (NANDA, 2003), the Nursing Interventions Classification, 'NIC', (Dochterman & Bulechek, 2004), the Nursing Outcomes Classification system, 'NOC' (Johnson and Maas, 2000, Moorhead, Maas, & Johnson, 2004) as well as the WordNet® lexical database (Princeton University, 2005). Variable definitions can be found in the I-NMDS (MH) User Manual (Scott et al, 2006c) in Appendix C.

6.4 Background Information

The background information section of the I-NMDS (MH) tool was designed to collect important client data in order to provide information on the links between client characteristics and the problems that they experience. Information requested on the I-NMDS (MH) background information section of the tool included the client date of birth and sex, reason for admission, date of admission, DSMIV (i.e. Diagnostic and Statistical Manual of Mental Disorders) or the ICD-10 code, medical diagnosis / diagnoses associated with the admission, type of ward or unit in which they were staying, area of residence and date of discharge (if applicable). A unique client identification number was also included. Further to this, there was a section for the nurses completing the I-NMDS (MH) to input his/her initials. This could be used to track change in nurses over the data collection period as well as the date on which the tool was completed for the client.

6.5 Rating Scales

The client problems within the I-NMDS (MH) were accompanied by a problem rating scale to record scores for the degree of severity of the problems experienced by the client. The rating scale was designed to reflect the professional judgement made by the nurse regarding the client's situation or

condition over the previous 24 hours of care (Scott et al, 2006c). In rating the scale, the nurse is asked to use his/her judgement based on the normal clinical information that is used in practice (e.g., a formal rating scale, a qualitative judgement, a gut feeling, professional judgement, the outcome of a case conference or discussion at nursing handover). Each client problem (e.g. pain, mood) is then recorded on a 7-point scale indicating the degree of the problem. The absence of a patient problem is indicated by a score of 0 (problem not present), with four levels of problem status (1-4) from the presence of a minor problem (1) to a severe problem state (4). 'N/A' indicates that the problem was not assessed while 'P' indicates that the problem was absent with an elevated risk of occurring within the next 3 days.

Like the client problems, the nursing interventions set out in the I-NMDS (MH) were accompanied by an intervention rating scale designed to record the intensity of the nursing interventions performed in relation to a particular client over the previous 24 hour period. Intervention ratings indicate the kind of direct nursing care that was given to that client during that time. Each nursing intervention is rated on a four point scale (0-3), which indicates the degree to which nursing interventions were required over the previous 24-hour period. If an intervention was not carried out, then 0 should be recorded. A rating of 1 indicates that an intervention was carried out on a once off basis in a routine manner, a rating of 2 indicates that the intervention was intermittent or regular and/or of a more complex nature. Finally, a rating of 3 indicates that the intervention was continuous or administered on multiple occasions and/or of a more complex nature and/or requiring more than one nurse or specialist nursing skills.

The intervention rating scale was used for rating coordination and organisation of care activities. These are considered to be indirect nursing actions performed in relation to a particular client over the previous 24 hour period. The ratings given indicate the kind of activities that underpinned the delivery of care to that client over the 24 hour period.

A number of difficulties were perceived in the documentary analysis, focus group analysis and the Delphi survey with regard to conceptualisation and identification of outcomes of mental health nursing care (Hanrahan et al, 2003, Corbally et al, 2004, Scott et al, 2006a). As already discussed, outcomes of mental health nursing care in Ireland were identified by Scott et al (2006a) to include general psychological and social indicators of the quality of nursing care provided to the client as well as the effectiveness, or success, of nursing care across a wide range other indicators. In order to capture the effectiveness of nursing care across various relevant indicators, an outcomes scale representing change in the problem presentation of the client was included on the I-NMDS (MH). Within the I-NMDS (MH) outcomes section, instruction is given to rate the outcomes section at the end of a specified client rating period or upon client discharge. The level of change in problem status is determined by comparing the problem rating on Day 1 with that on Day 5. A 'N/A' rating indicates that the client problem was not a focus for care, a rating of -2 indicates a major deterioration in the client s problem status and a rating of -1 indicates a moderate deterioration in the patient's problem status. A rating of -0 indicates no change in the client problem whereby this is a negative outcome, a rating of +0 indicates no change whereby this is a positive outcome, a rating of 1 indicates a moderate improvement while a rating of 2 indicates a major improvement in the clients problem status.

6.6 Conclusion

This chapter outlined the format and content of the first draft of the I-NMDS (MH). The fact that the content of the I-NMDS (MH) was informed by the studies carried out by Hanrahan et al (2003), Corbally et al, (2004) and Scott et al, (2006a) infers that, prior to validation of this new nursing data set tool it had an established level of content validity.

Organisation of the I-NMDS (MH) according to a process model of care was important in terms of highlighting the nursing process. In this way it allowed for the tracking of identification and assessment of a client problem and the administration of appropriate nursing interventions to address that problem, through to the assessment of change in the client's condition following the administration of nursing care.

CHAPTER SEVEN

Research Methodology Development

The overarching aim of this study was to test the validity and reliability of the I-NMDS (MH) through the implementation of a nationally representative study. The research methodology for this study was guided by the adaptation of Higgins and Straubs' (2006) concept map of measurement error, outlined in Chapter Five (p. 78) above. Careful consideration of the design and research methodology was required if systematic and random error were to be minimised.

7.1 A Phased Approach to Study Implementation

Upon consideration of the research methodology, a phased approach to study implementation was developed as follows:

Phase I: A pilot study to prepare the I-NMDS (MH) content and format for large scale validity and reliability testing. This study would involve establishing the content and face validity of the tool and was to be followed by a small scale feasibility study to test the main study research protocol, including proposed procedural and analytical techniques.

Phase II: The main study to test the validity and reliability of the I-NMDS (MH). A number of independent and interrelated studies were planned for this purpose including:

- Study I: A factor analysis of the I-NMDS (MH)
- Study II: A study to test the internal consistency (reliability) of the I-NMDS (MH) factors following factor analysis
- Study III: A study to test the stability of the resulting factor structure for

the I-NMDS (MH)

- Study IV: A discriminative analysis of the I-NMDS (MH) variables per factor
- Study V: An investigation of the interrater reliability of the I-NMDS (MH)

The pilot study phase of the research was designed to prepare the I-NMDS (MH) content and presentation for the main study. In this way it incorporated the I-NMDS (MH) face and content validity studies. In addition the pilot study would involve testing and developing the main study research protocol to ensure good levels of statistical and design validity. The pilot study is outlined in detail in Chapter Eight below. Upon completion of the pilot study, the main study would be implemented to test the construct and discriminative validity as well as the internal consistency (reliability) and stability of the I-NMDS (MH).

The interrater reliability testing of the I-NMDS (MH) was designed as a stand alone study of reliability with a stand alone research methodology. As this study was independent of that to test construct and discriminative validity and internal consistency (reliability) and stability of the I-NMDS (MH), it is outlined and discussed independently in Chapter Eleven below.

Construct validity and reliability studies I to IV above were interrelated in terms of the research design element of their implementation. The differences in these studies were reflected in the data analysis. It is therefore appropriate to outline the overarching methodology planned for studies I to IV before going on to outline the independent analytical techniques proposed for each of these studies.

7.2 Research Methodology Considerations for Studies I to IV

In establishing the construct validity of the I-NMDS (MH) the overarching concern lay with ensuring that the tool was aligned to the biopsychosocial theoretical construct of nursing care. Factor analysis was proposed for this purpose. It is important to note that the design of the studies to test the

construct validity, internal consistency, stability and discriminative validity of the I-NMDS (MH) was dictated by the requirements in conducting a factor analysis of the tool data. It was anticipated that careful consideration of the research design and methodology at the outset would optimise the internal, external and statistical conclusion validity of the study.

Factor analysis consists of a number of statistical techniques and aims to simplify complex sets of data and to define the underlying structure among the variables in the analysis (Kline, 1994, Hair, 2005). As such it was considered an appropriate statistical method to employ for the purpose of establishing the construct validity of the I-NMDS (MH). Implementing a factor analysis would require adherence to a number of strict research design criteria. Because the same data were to be used to test for the construct validity, internal consistency, stability and discriminative validity of the I-NMDS (MH) it was imperative that the research design was carefully thought out and implemented prior to factor analysis.

7.2.1 Factor Analysis

It was decided that Principal Components Analysis (PCA) and Exploratory Factor Analysis (EFA) were appropriate to establish the construct validity of the I-NMDS. Once the theoretical structure of the I-NMDS (MH) was established, the same data set and research design principles would be used to establish the internal consistency, stability and discriminative validity of the tool.

PCA is generally used when the objective of the research is data reduction, while EFA is more appropriate when the research objective is to explore the underlying structure of the data. In line with Tabachnik et al's (2006) recommendation, PCA would be used as a first step in this study to explore the factorability of the data and to decide on how many factors to extract. EFA would then be used to find the best model for the data.

The objective of the factor analysis was two fold:

1. To explore the underlying structure of the data with a view to establishing construct validity for the I-NMDS (MH) and
2. To summarize the I-NMDS (MH) variables into a more composite group of measures without losing the meaning behind the original set of variables

The use of factor analysis as a data summarisation technique is based on having a conceptual basis for any variables analysed. As discussed in Chapter Two above, the draft I-NMDS (MH) was based on a number of nurse informed studies designed to establish the contribution that mental health nurses make to health care. In line with the findings of these studies, the biopsychosocial model of care was the hypothesised factor structure for the I-NMDS (MH).

7.2.2 Sample Size Considerations

For factor analysis, the sample size should be no less than 50 and preferably 100 or larger to ensure reliable correlation coefficients (Hair, et al, 2005). When examining the underlying structure of the data, a ratio of at least 5:1 cases to variables is advisable with a ratio of 10:1 cases to variables being considered more robust. When using EFA, Costello et al (2005) caution researchers that factor analysis is a 'large sample' procedure and that more is better for generalisation of results. According to Tabachnick and Fidel (2006), it is good to have at least 300 cases for factor analysis, but lower sample sizes are appropriate if factor loadings are above .8.

As well as considering the number of cases per variable required for this study, it was important to consider the make-up of the sample. Factor analysis is affected by the homogeneity/heterogeneity of the sample. Homogenous samples have lower variance and therefore lower loadings. Heterogeneous samples have higher levels of variance and therefore have higher loadings (Kline, 1994). Hair et al, (2005) recommend the use of homogenous groups adding that, if there are differences across subjects, they should be separated

and separate factor analyses should be run for each group. Kline (1994) states that, in exploratory factor analysis it is generally better to use properly sampled, heterogeneous groups, while Fabrigar et al (1999) advise avoidance of overly homogeneous groups.

7.2.3 I-NMDS (MH) Scale Analysis

It is important not to analyse independent variables with dependent variables in the same factor analysis, if they are later to be used to analyse dependence (Hair et al, 2005). As the draft I-NMDS (MH) was divided up according to two different scales that could be used in the future to analyse dependence relationships, the analysis of variables on the problems scale would be independent of analysis of variables on the interventions scale.

7.2.4 Number and Relevance of Variables per Factor

It was anticipated that a significant aspect of the study design would be the relevance of variables included in the analysis to mental health nursing. If irrelevant variables were included in the analysis, they would produce unreliable results by way of producing false common factors or obscuring true common factors (Cattell, 1978 in Fabrigar et al, 1999). For this reason, examination of the pattern of responses and participant endorsement of variables on the I-NMDS (MH) scales was required before deciding on whether there was good cause to eliminate some of the variables from factor analysis.

It is recommended that at least 3 to 5 measured variables should represent each of the expected common factors and that only variables that are expected to be influenced by any particular factor should be included in the analysis (Fabrigar, 1999, Hair et al, 2005). There were 36 variables on the draft I-NMDS (MH) problems scale and 27 variables on the I-NMDS (MH) interventions scale prior to variable elimination. These variables were organised according to a biopsychosocial model across both scales. The interventions scale included a further section to account for the coordination and organisational activities of the nurse. There were more than 5 variables considered per physical,

psychological, social and coordination and organisation of care factor, with the exception of the proposed social interventions factor. It was expected that the social interventions section of the interventions scale might be integrated with the psychological interventions on the scale to form a psychosocial interventions factor. As such, prior to analysis, each expected factor was well represented by corresponding measured variables. Tables 2 and 3 below, outline the number of I-NMDS (MH) variables for the hypothesised structure of both the problems and the interventions scales.

Table 2 *Proposed Factors and Associated Number of Variables: The Problems Scale*

Proposed Factor	No. of Variables
Physical Problems	11
Psychological Problems	14
Social Problems	11

Table 3 *Proposed Factors and Associated Number of Variables: The Interventions Scale*

Proposed Factor	No. of Variables
Physical Interventions	5
Psychological Interventions	12
Social Interventions	2
Coordination & Organisation of Care Activities	8

Note that if 'irrelevant' variables were eliminated from the analysis, the ratio of variables to factors on the respective scales would be improved.

7.2.5 Key Indicator Variables

It is advisable to include key indicator variables in the factor analysis as a means of validating the resulting factor structure. As such the I-NMDS (MH) problems scale included a key indicator for each of the hypothesised problems related factors i.e. 'Overall physical well-being' was linked to the 'Physical Problems' factor, 'Overall psychological well-being' was linked with the 'Psychological Problems' factor and 'Overall social-well being' was linked with the 'Social Problems' factor. It was anticipated that these variables would

load according to the relevant factor and consequently introduce a preliminary level of validity for that factor. Subsequent analysis would then be conducted without the 'indicator' variables.

7.2.6 Missing Data

Depending on the amount and type of missing data, missing values could be dealt with by either estimating missing values, deleting cases or simply ignoring missing data (pairwise analysis).

7.2.7 Satisfying the Conceptual Assumptions of Factor Analysis

As already discussed above, the biopsychosocial model was considered an appropriate theoretical structure upon which to base I-NMDS (MH) variables.

7.2.8 Satisfying the Statistical Assumptions of Factor Analysis

Normality, homoscedasticity and linearity: Unlike most other multivariate techniques, meeting the assumptions of departures from normality, homoscedasticity and linearity is not crucial for factor analysis to proceed. If statistical tests are applied to the significance of the factors however, normality is assumed. The Maximum Likelihood (ML) method of factor extraction applies a test of the goodness of fit of the factor model to the data and as such it assumes a relatively normal distribution. The ML method of factor analysis was considered appropriate to establish the construct validity of the I-NMDS (MH) (see section 7.4.1 below). As such it was considered necessary to establish the distribution of the data collected before considering how to deal with skewed variables (should they be observed).

7.2.9 Sampling Frame

As the aim of this study was to test the validity and reliability of the I-NMDS (MH) at a national level, the two main criteria in deciding on a sampling frame were:

- To collect data representing mental health client care across acute inpatient units, community based day hospitals and community based day centres. Representation was also required of clients attached to both day centres and day hospitals who are in receipt of domiciliary based care
- To achieve national geographical representation of mental health client care across acute inpatient units, community based day hospitals and community based day centres

To this end the sites chosen for the study had to offer acute inpatient, day hospital and / or day centre and home based team and/or community mental health nursing services. Sites chosen for the study also had to come from the four Health Service Executive (HSE) designated areas in Ireland i.e. Dublin/Mid Leinster, Dublin/North East, South and West.

The research participants required for this study were nurses engaged in direct client care. Because the unit of analysis was to be the client day, client numbers were considered in estimations of sample size requirements. As such, the sampling frame focused on client representation per site in the first instance. An overview of the population of mental health inpatient clients across the 4 HSE areas in Ireland is presented in Table 4 below. These figures were relevant to the time the study methodology was being developed.

Table 4 Acute Inpatient Based Clients per HSE Area in 2004

HSE AREA	**West**	**South**	**Dublin Mid Leinster**	**Dublin North East**
Number of clients	593	1144	498	490

From: 'Mental Health Commission Annual Report, 2005.

In order to get an approximation of the demographic breakdown of the numbers of mental health clients attending mental health day centres and day hospitals on any given day, the number of client attendances at these services in 2004 (according to the Mental Health Commission, 2006) was divided by 260 for the

day centres and day hospitals (i.e. number for days in a 5 day week per year). The results of these estimate calculations are presented in Table 5 below.

Table 5 Estimations of Community Day Hospital and Day Centre Based Clients per HSE Area

HSE AREA	West	South	Dublin Mid Leinster	Dublin North East
Number of Day Centre Clients	723	267	344	259
Number of Day Hospitals Clients	234	179	143	67.3

Adapted from: 'Community Mental Health Services in Ireland: Activity and Catchment Area Characteristics 2004' Mental Health Commission, 2006

It was estimated that, in order to get a minimum return of 300 I-NMDS (MH) tools to meet the sample size criterion for factor analysis, the sample size requirement for the study was 120 nurses. In order to achieve this, participants would have to complete and return the I-NMDS (MH) for approximately 2.5 clients each. However, if a response rate of at least 50% was assumed, a minimum of 600 I-NMDS (MH) tools needed to be disseminated to participants who would be asked to complete the forms for approximately 5 clients each.

7.3 Proposed Procedure

Prior to rolling out the data collection phase of the study, it was decided that a training and information session should be held with participants to inform them of requirements for I-NMDS (MH) completion. Upon the roll out of the study participants would be asked to:

- Complete one I-NMDS (MH) form for each of their clients every day for the five consecutive days of the study
- Use the same I-NMDS (MH) form for each specific client regardless of change in nursing staff
- Complete the I-NMDS (MH) form retrospectively following 24 hours of care delivery for the client
- Use the variable definitions in the I-NMDS (MH) Users Manual to assist them in completing the form

- Place the I-NMDS (MH) form in a box provided upon completion of the study

It was anticipated that participants would be coordinated to ensure continuity of I-NMDS (MH) completion for each client regardless of change in nursing staff throughout the duration of the study. The procedure for the study would be finalised upon completion of the proposed feasibility study.

7.4 Proposed Analysis for Studies I to IV

7.4.1 Study I Analysis

As already outlined in the above description of the research design adopted for Study I, exploratory factor analysis was proposed to establish the construct validity of the I-NMDS (MH). It was decided that the data representing the client day on each I-NMDS (MH) form, for which most data was collected, would be used in the exploratory factor analysis. This decision was made to ensure the maximum availability of data for analysis. Principal Components Analysis was used to assess the factorability of the data and the number of factors to extract. The Maximum Likelihood (ML) extraction method and the Promax rotation technique were decided on to determine the factor structure for the I-NMDS (MH). The ML extraction method was chosen as it produces statistics to determine the goodness of fit of the resulting factor structure to the data. The Promax rotation was chosen as it does not assume the presence of orthogonal factors and it tends to maximise factor loadings within factors (Betan et al, 2005). Furthermore, Finch (2006) concluded that when the researcher is concerned with identifying a simple structure within the data, Promax is a useful rotation technique to use.

7.4.2 Study II Analysis

A decision was made to use Cronbach's alpha coefficient to examine the internal consistency of the I-NMDS (MH). This would serve to establish the level of correlation among variables within each factor resulting from the

exploratory factor analysis of the I-NMDS (MH).

7.4.3 Study III Analysis

In order to establish whether the factor structure of the I-NMDS (MH) was stable, it was decided that a confirmatory factor analysis should be conducted using data collected on alternative days of the study e.g. Day 2 and/or Day 3. In doing this, it would be important to choose the days with the largest availability of data for analysis. The factor structure resulting from Study I would then be compared with that of Study III to establish the level of factor stability across different analyses.

7.4.4 Study IV

The aim of the study of discriminative validity was to examine the ability of the I-NMDS (MH) to adequately discriminate between the level of problems and interventions across single client groups i.e. acute and community based mental health clients and the reference group (all clients in this study). In line with previous research (e.g. Sermeus et al 1996, Goossen et al 2003), ridit analysis was chosen to establish the discriminative validity of the I-NMDS (MH). The appropriateness of ridit analysis in this regard was based on its use in the description of differences between groups on an ordered categorical (or ordinal) scale as well as the fact that this analytical method makes no assumption about the distribution of the data (Fleiss et al, 2003).

The term ridit analysis relates to the fact that it is 'relative to an identified distribution' i.e. it is based on the observed, empirical distribution of a response variable for a specified set of individuals (Bross, 1958). Because it is appropriate for use with ordinal data and because it is distribution free, ridit analysis could be applied to the data derived from the study to validate the I-NMDS (MH). For the purpose of this study, the unit of analysis was the client day. This is in line with previous research using NMDS data (i.e. Griens et al, 2001, Goossen et al, 2003).

7.4.5 Conclusion

In considering the methodology for the implementation of the validity and reliability testing of the I-NMDS (MH), the focus was on the minimisation of both systematic and random error. A number of analytical techniques were chosen to test the construct and discriminative validity of the tool i.e. to assess the potential for systematic error with the tool. Further techniques were chosen to test the internal consistency and stability of the I-NMDS (MH), in order to assess the potential for random error upon tool implementation.
The design of the studies to test the construct validity, internal consistency, stability and discriminative validity of the I-NMDS (MH) was dictated by the requirements in conducting a factor analysis of the tool data. It was noted that the same data would be used to test for the construct validity, internal consistency, stability and discriminative validity of the I-NMDS (MH) and as such it was important to get the research design right prior to factor analysis.

With this in mind, careful consideration was given to the methodology employed for this study in terms of satisfying the statistical assumptions of factor analysis sample size, representation of the sample, the number of variables per case and dealing with missing data. Furthermore, it was decided that a pilot study to pre-test and further develop the I-NMDS (MH) content and presentation, as well as the larger scale research protocol should be implemented. This would also serve the purpose of assessing the robustness of the data collected using the I-NMDS (MH) prior to the large scale validity and reliability study.

A comparison of the proposed methodology to test the validity and reliability of the I-NMDS (MH) with methodologies used to test other minimum data sets highlights a number of similarities and differences. For example, in line with the methodologies used to test the content validity of the BNMDS an expert panel was proposed to test the content validity of the I-NMDS (MH) (Sermeus et al, 2005). In testing the construct validity of the I-NMDS (MH) exploratory factor analysis and goodness of fit tests were proposed, this contrasts with the Principal Components Analysis used to test the construct validity of the

BNMDS. The internal consistency of the BNMDS scale was tested using Cronbach Alpha scores and this methodology was also proposed to test the internal consistency of the I-NMDS (MH) (Sermeus et al, 2005). Ridit analysis was used to test the discriminative validity of the BNMDS and the NMDSN and was proposed in the methodology plan to test the discriminative validity of the I-NMDS (MH) (Goossen et al, 2003, Sermeus et al, 2005). In line with the NMDSN, the kappa statistic and percentage agreement scores were identified as the statistics of choice to test the interrater reliability of the I-NMDS (MH) (Goossen et al, 2003). Finally, and in contrast to other NMDSs, confirmatory factor analysis was chosen test the stability of the I-NMDS (MH).

CHAPTER EIGHT

The pilot study

8.1 Introduction

A pilot study can be defined as a small scale version of a study undertaken in preparation of a subsequent major study or in order to pre-test a particular research instrument (Baker, 1998, Polit et al, 2001). Furthermore, a pilot study can be used to establish that researchers fully understand the research protocol and that data collectors are consistent in data collection processes (Baird, 2000). The advantage of conducting a pilot study is that it might give advance warning about where the main research project could fail, where research protocols may not be followed, or whether proposed methods or instruments are inappropriate or too complicated (Van Teijlingen et al, 2001). The pilot study is increasingly playing a vital role in the area of health service and clinical research planning due to the demands of associated research environments i.e. technological innovation and practice change, clinician availability and variability in models of care delivery (Gardner et al, 2003). For larger scale studies, a number of pilot studies might be implemented to test various elements of the research protocol as well as implementation issues. These studies can be quantitative or qualitative in design and often combine both methods to assess the quality of data gathered and the research analysis plan.

Van Teijlingen et al (2001) outline the following reasons for conducting a pilot study:

- Developing and testing adequacy of research instruments
- Assessing the feasibility of a (full-scale) study/survey
- Designing a research protocol
- Assessing whether the research protocol is realistic and workable

- Establishing whether the sampling frame and technique are effective
- Assessing the likely success of proposed recruitment approaches
- Identifying logistical problems which might occur using proposed methods
- Estimating variability in outcomes to help determining sample size
- Collecting preliminary data
- Determining what resources (finance, staff) are needed for a planned study
- Assessing the proposed data analysis techniques to uncover potential problems
- Developing a research question and research plan
- Training a researcher in as many elements of the research process as possible
- Convincing funding bodies that the research team is competent and knowledgeable
- Convincing funding bodies that the main study is feasible and worth funding
- Convincing other stakeholders that the main study is worth supporting

8.2 Aims and Objectives of the Pilot Study of the I-NMDS (MH)

The aim of the pilot study was to test the feasibility of the larger scale study to test the validity and reliability of the I-NMDS (MH). The focus of the pilot study was on the content and format of the I-NMDS (MH) and the larger scale study research protocol.

The objectives of the pilot study were to establish whether the I-NMDS (MH) was:

a) Content valid and representative of the core client problems, nursing interventions and coordination and organisation of care activities in which mental health nurses engage

b) Face valid and therefore appropriately presented, comprehensible and practical for use within the clinical setting

A further objective of the pilot study was to establish whether the study design and research plan for the larger scale validity and reliability study was appropriate and to determine the quality and usability of the resulting data.

8.3 Content Validation of the I-NMDS (MH)

Within the literature, content validity is considered 'a matter of judgment, involving two distinct phases: a priori efforts by the scale developer to enhance content validity through careful conceptualization and domain analysis prior to variable generation, and a posteriori efforts to evaluate the relevance of the scale's content through expert assessment' (Polit and Beck, 2006 p.489). With regard to the I-NMDS (MH), a number of separate research studies were used to inform the content of the first draft of the I-NMDS (MH) tool. These studies are outlined in Chapter Two above. Use of the findings of these research studies to inform the content of the I-NMDS (MH) aligns itself with a priori efforts to enhance the content validity of the tool through careful conceptualisation and domain analysis prior to variable generation, as referred to by Polit and Beck (2006).

In order to address the posteriori evaluation of the relevance of the I-NMDS (MH) tool content to mental health practice, a further study of its content validity was conducted as part of the pilot study. This study involved the use of analytical critique of the tool by identified clinical, managerial and educational experts. In order to gain an analytical critique of the I-NMDS (MH), a panel representing these identified experts was set up. This method of establishing the content validity of a research tool is consistent with that used in international studies of the content validity of NMDS tools (e.g. Werley et al 1988, Sermeus et al, 2005).

8.3.1 Sample

The experts identified for participation in testing the content validity of the I-NMDS (MH) were clinical, management and educational experts who were involved in clinical mental health nursing practice and who would potentially

be using the I-NMDS (MH) in the clinical setting. Expert panel members were selected from the different areas of nursing for which the I-NMDS (MH) was designed i.e. acute inpatient and community based mental health services.

The study sample was broken down as follows:

- Four staff nurses attached to an urban mental health hospital operating in the Greater Dublin Area. Two of these staff nurses worked in an acute inpatient mental health unit, one of them worked in a community based mental health day hospital and another one worked in a community based mental health day centre
- Two nurse managers, one of whom was Assistant Director of Nursing in an urban mental health hospital operating in the Greater Dublin Area, with responsibility for the administration and management of both acute inpatient and community based services. The second nurse manager was a Clinical Nurse Manager at level 1 who worked in an acute inpatient mental health unit operating in the same urban mental health hospital in the Greater Dublin Area.
- Two academic staff members from a Dublin based university who were responsible for clinical nurse education within the field of mental health. As part of their role, these academics were based within both the university and the clinical setting and engaged in client care.

Experts invited to participate in the study were chosen based on recommendations by Nunnally & Bernstein (1994). These recommendations state that participants in content validation efforts should be as representative as possible of the types of individuals who will use the instrument.

8.3.2 Procedure

The researcher met with all of the participants on the expert panel in their place of work. Each participant was given a copy of the I-NMDS (MH) (Scott et al, 2006b) and the accompanying User Manual (Scott et al, 2006c). Each member of the expert panel was asked to carefully review the variables representing client problems, nursing interventions and coordination and organisation of care activities listed on the I-NMDS (MH) (Scott et al, 2006b) along with their accompanying definitions outlined in the I-NMDS (MH) User Manual (Scott et al, 2006c). The expert panel members were asked to pay particular attention to variable clarity, relevance to practice and variable omissions from the tool.

The clinical experts were then presented with a 'content validation sheet' which took the format of a questionnaire. This consisted of a number of structured questions relating to the content of the client problems, nursing interventions and coordination and organisation of care activities listed on the I-NMDS (MH) and their accompanying definitions outlined in the User Manual. These specifically addressed the clarity of the I-NMDS (MH) variables, their relevance to mental health nursing work and whether or not any variables had been omitted from the I-NMDS (MH). See Appendix E for a copy of the content validation sheet. Upon completion of the content validation sheet, the expert panel members were thanked for their participation in the content validity testing of the I-NMDS (MH).

8.3.3 Analysis

A content analysis of the experts responses to the questions outlined on the content validation sheet was carried out whereby all responses were analysed according to whether they represented variables relating to client problems, nursing interventions or coordination and organisation of care activities. Any variable that was highlighted by panel participants was considered in terms of a) whether it should be changed to increase clarity b) whether it should be omitted from the I-NMDS (MH) to increase its relevance to mental health nursing practice or c) in the case of variables highlighted as being omitted from

the form, whether it should be included in the I-NMDS (MH). Consideration was then given to whether changes needed to be made to the tool prior to the implementation of the feasibility study.

8.4 Face Validation of the I-NMDS (MH)

In order to establish the face validity of the I-NMDS (MH), cognitive interview methodology was used. The cognitive interview is based on cognitive theory and comprises a number of different techniques, aimed at eliciting information on how respondents interpret questionnaire/tool variables and formulate responses (Knafl et al, 2007). The main techniques used in the cognitive interview process involve a) verbal probing and b) a think aloud protocol. With verbal probing, the respondent is asked to verbalise his/her interpretation of questionnaire variables and comment on variable wording. With the think aloud protocol, respondents are asked to verbalise their thoughts as they move through the questionnaire (Drennan, 2003, Knafl et al, 2007). Cognitive interviews allow the researcher to gain an insight into the cognitive processes that respondents use when completing a measurement tool, by encouraging respondents to verbalise their thoughts (Drennan, 2003). In this way the researcher can establish variables that may be poorly worded or lacking in clarity and can then work to clarify and refine the tool using information gathered through the cognitive interview.

In pilot testing the I-NMDS (MH), the aim of the cognitive interview was to establish the face validity of the I-NMDS (MH). The purpose of this study was to understand how respondents perceived and interpreted the I-NMDS (MH) variables and rating scales and to assess whether the I-NMDS (MH) questions were clearly worded and clear enough to elicit valid and reliable responses. It was anticipated that this study would ultimately allow for the identification and rectification of potential problems that may arise in the clinical field during the national validity and reliability testing of the I-NMDS (MH).

8.4.1 Sample

The sample for this study comprised of community and acute inpatient based mental health nurses. All participants in this study were staff nurses engaged in direct client care. The sample was broken down as follows:

- Two staff nurses working in an acute inpatient unit attached to an urban mental health hospital operating in the Greater Dublin Area
- One staff nurse working in a community based mental health day centre, attached to a rural hospital operating in the Health Service Executive designated North East area
- One staff nurse working in a community based mental health day hospital attached to a rural hospital operating in the Health Service Executive designated North East area

8.4.2 Procedure

The verbal probing cognitive interview technique was used in this study. The cognitive interviews were carried out by the researcher with one participant at a time, in a quiet room with minimal interruption. Participants were given written instruction on how to complete the I-NMDS (MH) (See Appendix E) and encouraged to rate the I-NMDS (MH) and verbalise their thoughts. The researcher sat beside the participant and listened and observed as he/she completed the form for one of his/her clients. The participant was asked to score the I-NMDS (MH) form for a client for whom he/she had directly cared for during their shift that day. While the participant was completing the tool, notes were taken by the researcher with regard to any observations made e.g. verbalised thoughts, body language, skipping variables and time taken on particular sections of the form. Once the I-NMDS (MH) was completed the researcher directly questioned the respondent on his/her perception of the tool, including impressions of the format and difficulties he/she experienced with elements of the I-NMDS (MH). The researcher took notes on the responses made by participants to the interview questions.

8.4.3 Analysis

Researcher notes relating to the respondents verbalised thoughts, body language, variable skipping and time taken to complete the I-NMDS (MH) were categorised according to the different sections of the tool.The cognitive interview responses were analysed according to whether they related to I-NMDS (MH) instructions, variables or scales. Interview data were then combined and analysed in tandem with the researcher notes. The results of this analysis were used to inform the face validity of the I-NMDS (MH) including changes needed to be made to the tool prior to the implementation of the feasibility study.

8.5 National Validity and Reliability Testing Feasibility Study

The aim of the national validity and reliability feasibility study was to pre-test the proposed research protocol for the national validity and reliability testing of the I-NMDS (MH). The objectives of this part of the pilot study were to a) investigate the usability of the I-NMDS (MH) in the clinical setting and b) examine the robustness of the data collected to inform the development of the data analysis plan for the national validity and reliability testing study. Tests used included factor analysis, ridit analysis, confirmatory factor analysis to test the stability of the factor structure and a test of the internal consistency of each factor. Interrater reliability was not included in the pilot stage of the study due to the unique research design required for its investigation.

8.5.1 Sample

A convenience sample of 7 staff nurses working in community and acute inpatient mental health services attached to an urban mental health hospital took part in feasibility study. Representation of the sample across the population of mental health nurses working in direct client care across different community and acute inpatient services/units was established. Respondents came from an acute ward, an assessment unit, a high support hostel, a day hospital and a home based team. A prerequisite to study participation was that

the nurse was engaged in the delivery of direct client care and would be available to complete the I-NMDS (MH) over a five-day study period.

8.5.2 Procedure

Participants were given a training session on the requirements for completion of the I-NMDS (MH). This involved giving them an overview of the tool and accompanying Users Manual and instructing them on how to complete the tool for their clients. This training session also served to give participants an opportunity to address any questions they had in relation to the study.

Participants were asked to:

- Complete one I-NMDS (MH) form for each of their clients every day for the five consecutive days of the study
- Use the same I-NMDS (MH) form for each specific client regardless of change in nursing staff
- Complete the I-NMDS (MH) form retrospectively following 24 hours of care delivery for the client
- Use the variable definitions in the I-NMDS (MH) Users Manual to assist them in completing the form
- Place the I-NMDS (MH) form in the box provided upon completion of the study

A 5 (consecutive) day data collection period was chosen to allow for the collection of data to capture approximately one week of care (based on both community and acute inpatient service opening hours). This data collection period would also serve to minimise the history threat to validity observed in longitudinal research. Participants in the study were coordinated to facilitate them to work together over 5 continuous days to allow for the completion of the form for any client over the 5 days of data collection. In this way, participants either:

- Worked in pairs, whereby one participant completed the I-NMDS (MH) tool for his/her particular clients over 3 days and then handed the form completion task over to another participant to complete the forms for the

following 2 days, or

- The same participant completed all I-NMDS (MH) forms over the 5 days

8.5.3 Analysis

Data collected from the feasibility study was entered into an SPSS file and a number of statistical tests were run to investigate the precision of the I-NMDS (MH), its reliability, validity, and responsiveness. The data were examined in relation to the level of variable ratings, distribution of variable ratings, correlations among variables and change in variable ratings over the 5 days of the study. A factor analysis was carried out to test for construct validity. Cronbach alpha coefficients were examined to investigate the internal consistency of the factors resulting from the factor analysis. Finally, ridit analysis was used to test for discrimination across variables according to nursing specialty i.e. community or acute inpatient based nursing care.

8.6 Findings

8.6.1 Findings of the Content validation of the I-NMDS (MH)

A content analysis of the experts responses to the questions outlined on the content validation sheet was carried out. All responses were analysed according to whether they represented variables relating to client problems, nursing interventions, coordination and organisation of care activities or outcomes of care. See Appendix E for a breakdown of the responses from participants according to these analytic categories. I-NMDS (MH) variables that were highlighted by panel participants were considered in terms of a) whether they should be changed, to increase clarity b) whether they should be omitted from the I-NMDS (MH) to increase overall variable relevance to mental health nursing practice or c) in the case of variables highlighted as being omitted from the form, newly suggested variables were considered in terms of whether they should be included in the I-NMDS (MH). Particular attention was given to those variables mentioned to be lacking clarity and having overlapping meaning with another I-NMDS (MH) variable. Table 6 below outlines the

variables considered for:

a) Change, to increase variable clarity
b) Inclusion in the I-NMDS (MH)
c) Elimination from the I-NMDS (MH) due to overlapping of variable meaning

Table 6 Variables Considered in Redrafting the I-NMDS (MH) Post Content Validation

Variables requiring increased clarification	**Variables suggested for inclusion**	**Variables for deletion due to overlapping meaning**
Client knowledge deficit Thought and cognition Anxiety – longstanding Anxiety or fear in response to current stressors Non- adherence to a treatment or medication Stigma Teaching skills (to include group work) Developing and maintaining trust Care environment Admitting and assessing Facilitating external links Support and management of care delivery	Aggression Violence Risk assessment Escorting clients Encouraging social interaction	Mood Coping & adjustment

Findings related to the outcomes section of the form were given special consideration. In the main, the findings relating to I-NMDS (MH) outcomes measurement identified potential problems with:

a) Variable clarity i.e. problems variables being conceptualised as outcomes
b) The outcomes scale

Respondent confusion around the conceptualisation of problem variables as outcomes was observed. Questions posed in this regard included: (P5) ‘Pain as an outcome, is it physical or emotional?’ ‘How relevant is breathing as an outcome in mental health? Not very’. The variables ‘Care environment’ and ‘Nutrition’ were also found to be ambiguous as outcomes, (P1) ‘I didn’t really understand nutrition as an outcome’. Further confusion came about for one participant who found the outcomes scale difficult to interpret.

More general findings of the I-NMDS (MH) content validation were that the I-NMDS (MH) tool was welcomed by participants as a means of recording nursing related client problems and interventions. From a tool implementation perspective, some useful feedback was received regarding models of care, how nurses coordinate their shifts, the average length of the client stay and where the form should be kept. Comments related to how the nurses coordinated client care included (P3) 'Every client has a primary and associate nurse whereby when the primary nurse is off the associate nurse takes over. Every nurse functions as both a primary and associate nurse'. Comments regarding where the I-NMDS (MH) should be kept included, (P1) 'I thought that the I-NMDS (MH) form should be kept with the clients care plan' (P6) 'The I-NMDS (MH) form would be best kept at the front of the service-user's case notes'.

8.6.2 Findings Relating to Establishing Face Validity of the I-NMDS (MH)

Analysis of the cognitive interview notes was conducted in such a way as to form response categories related to the I-NMDS (MH) instructions, client problems, nursing interventions, coordination and organisation of care activities and the outcomes of nursing care. Findings of the face validation study are outlined in Table 7 below. Interview data were then combined and analysed in tandem with the researcher notes to inform the face validity of the I-NMDS (MH) and whether changes needed to be made to the tool prior to the implementation of the feasibility study.

Table 7 Findings for the Face Validation Study

Participant ID	I-NMDS (MH) TOOL SECTION
	Instructions
P1	For non-acute community MH it would be better to use this form by the week rather than 24 hrs as the nurse in this area of MH would not typically document care over 24hrs, it would be more like every week
P3	Participant was using the interventions scale for the first 5 problems Instructions were fine Found instructions on the cognitive interview instruction sheet easier to follow than those on the I-NMDS (MH) form
	Problems
P1	Problems scale was too detailed. Concepts should be more simple – make wording in explanation of scales more concise for the problems scale The one thing that was problematic, time wise was that it was difficult to refer back to scale when moving down the page. Scale should also go at the bottom of the page Wording of client knowledge deficit – not clear at all – what does it mean, suggest lack of knowledge regarding illness/treatment Column for don't know or not assessed needed Found that negative physical/psychological side effects variables were easy to confuse In definition of care environment – care environment is not defined
P3	Participant was using the interventions scale for the first 5 problems Easy to read but some variables were ambiguous e.g. thought and cognition, care environment Wasn't too happy with the way the rating scales differed from problems to interventions to outcomes
P4	The variables Elimination & Client knowledge deficit regarding illness or treatment were both skipped. This was because the nurse did not understand them and preferred to come back to them after completing the other variables Felt that the word "client" was not only redundant but confusing The nurse tended not to use the User Manual unless she could not figure out a meaning for the phrase, i.e., she tended to put her own interpretation on variables
	Interventions
P1	Intensity scale was very good
P2	Wasn't too happy with the way the rating scales differed from problems to interventions to outcomes
P3	The nurse tended not to use the User Manual unless she could not figure out a meaning for the phrase, i.e., she tended to put her own interpretation on variables Initially the variable "Managing Mood" was interpreted as including the administration of antidepressant medication, on direction towards the User Manual misinterpretation was cleared up

Table 7 Findings for the Face Validation Study Continued

	Coordination/ Organisation of care activities
P2	Variable supporting /managing care delivery unclear
P3	Wasn't too happy with the way the rating scales differed from problems to interventions to outcomes
P4	The nurse tended not to use the User Manual unless she could not figure out a meaning for the phrase, i.e., she tended to put her own interpretation on variables
	Outcomes of care
P1	Outcomes scale very easy to complete Column n/a required for outcomes Started skipping outcomes near the end cause it was taking so long Felt that after scoring the problems and outcomes, there was a disparity between the two. A persons overall well being would not be great because e.g. that person had schizophrenia but this was not reflected in the problems.
P2	Outcomes scale was difficult to interpret
P3	Wasn't too happy with the way the rating scales differed from problems to interventions to outcomes Like outcomes scale layout the best Outcomes variables care environment and pain were not clear
	The nurse tended not to use the User Manual unless she could not figure out a meaning for the phrase, i.e., she tended to put her own interpretation on variables
	Time Taken to Complete I-NMDS (MH)
P1	30 minutes
P2	13 minutes
P3	10 minutes
P4	24 minutes

Table 7 Findings for the Face Validation Study Continued

	General Comments
	You will need the client chart to complete the front page of the I-NMDS (MH)
	Felt that completing this at the end of the shift would not work well. Suggested to complete it at the beginning of the shift for the previous day.
	Would not like to do more than one at the end of a shift
	Variable detail was good – not too general, not too specialised
	Strongly felt that it would be used to help with the documentation
	Felt that it was more like doing an assessment of the client than simply recalling what she had done for the client that day.
	Felt it was easy to understand
	No difficulties with the overlapping
	Felt linkage between problems and outcomes was good but did not necessarily see the link between problems and interventions (this was not a criticism)
	Instructions clear and easy to understand in both manual and on form
	In contents list it refers to client but on form it is client/service user
	Felt that she was recalling cues she was reflecting on the day and making a judgement about whether events, cues etc. occurred that day and ticking form accordingly – again it was like an assessment tool
	Note that client chart was needed to complete front page
	Difficult to see boxes, very small
	Form became easier to complete as time passed
	Looked daunting at first but was in fact very straight forward
	Length of the form was fine
	Used user manual for ambiguous variables (as above)
	Interruptions from client during interview
	Found examples in the user manual very helpful
	Overall perception of the I-NMDS (MH) form was that it took a while to get your head around – looked intimidating
	Felt like doing an aptitude test
	Was ok after a few minutes using it
	Nurse case load is 3 clients in the observation unit and up to 6 in acute unit
	Staff changes every 3 days, management are continuous
	At work it is standard for all documentation to be completed by two nurses for the sake of rigour
	With regard to the purpose of the form, she said that she saw it as a very good assessment tool which would be very useful for recording initial progress in the first five days after admission, a key time period.

8.7 Changes made to the I-NMDS (MH) Prior to Conducting the Feasibility Study

Areas highlighted as posing difficulty with I-NMDS (MH) completion and overall face validity included variable clarity and structure, instructions and interpretation and continuity of the scales on the form. At this point in the pilot study, it was decided not to make any major changes to the form content as further data from the feasibility study would assist in ensuring the appropriateness of potential changes. A small number of changes were made to the I-NMDS (MH) prior to conducting the feasibility study. These changes were introduced to improve the structure and consequently the time taken to complete the form, and to clear up problems relating to perceptions of overlapping variable meaning.

It appeared that the lack of systematic ordering of variables hampered efficient completion of the tool. As such the variables were rearranged to broadly reflect the biopsychosocial model of care, as per the Delphi survey (Scott et al, 2006a). Further to this, variables posing difficulty in terms of perceived overlapping meaning were placed consecutively on the form.

It was noted that some respondents reported that several variables overlapped in meaning. However, because there is a natural overlap in the conceptualisation of e.g. ‘anxiety’ and ‘coping and adjustment’, the instructions (rather than the variables) were amended to indicate to respondents that they may perceive some variables to be closely related. This was done in order to avoid confusion among respondents, i.e. to explain how the participant should complete the interventions when a nurse is e.g. ‘monitoring, observing and evaluating the person’s psychological condition’ but also ‘developing and maintaining trust’ at the same time. It was also concluded that case studies in training nurses in I-NMDS (MH) completion should be used to outline how overlap is inevitable and how variables should be rated when overlap is perceived.

In the problems and outcomes sections, the concept of 'not assessed' was retained to indicate the problem was not assessed in the first place and therefore no outcome should be expected. Finally, on the front page of the I-NMDS (MH), a section for a participant code was introduced to account for the fact that nurses often work opposite each other as primary and associate carer for a client and that some participants would not be completing the form on five consecutive days.

8.8 The Feasibility Study

The aim of the feasibility study was to pre-test the proposed research protocol for the main validity and reliability study of the I-NMDS (MH). The objectives of the feasibility study were to a) investigate the usability of the I-NMDS (MH) in the clinical setting and b) examine the robustness of the data collected to inform the development of the data analysis plan for the main research study.

8.8.1 Sites

The sites used in this study were connected to an urban mental health hospital. Participants came from both community and acute inpatient work settings as follows: An acute ward, an assessment unit, a high support hostel, a day hospital and a home based team. The sites used allowed for the collection of data representing different mental health care services/units to be used in the larger scale national validity and reliability testing study.

8.8.2 Sample

A convenience sample of staff nurses working in community and acute inpatient mental health services attached to an urban mental health hospital was approached to take part in the feasibility study. A prerequisite to participation was that the nurse was engaged in the delivery of direct client care and would be available to complete the I-NMDS (MH) over the five-day duration of the study.

8.8.3 Procedure

Participants were given a training session on the requirements for completion of the I-NMDS (MH). The training session incorporated an overview of the tool and accompanying Users Manual and instructions on how to complete the tool for their clients. The training session also gave participants an opportunity to get answers to any questions they had in relation to the study.
The first draft version of the I-NMDS (MH) was distributed to all participants in the feasibility study. See Appendix B for a copy of the first draft of the I-NMDS (MH).

The sample of participants was chosen in such a way as to coordinate them to work together over 5 continuous days to allow for the completion of the I-NMDS (MH) for any particular client over the 5 study days. In this way, participants either worked in pairs, where either

a) One participant completed the forms for their particular clients over 3 days and then handed the form completion exercise over to another participant to complete the forms for the following 2 days, or

b) The participant completed the forms over the 5 days

Participants were asked to:

- Complete one I-NMDS (MH) for each of their clients every day for the five consecutive days of the study
- Use the same I-NMDS (MH) for each specific client regardless of change in nursing staff
- Complete the I-NMDS (MH) retrospectively following 24 hours of care delivery for the client
- Use the variable definitions in the Users Manual to assist them in completing the form
- Place the I-NMDS (MH) in the box provided upon completion of the study

Upon completion of the I-NMDS (MH), participants in the study were given a gift token to thank them for their participation.

8.8.4 Analysis

Data from the feasibility study were entered into an SPSS file and a number of descriptive, reliability and parametric tests were run to investigate the precision of the I-NMDS (MH) in terms of its reliability and validity.

8.9 Feasibility Study Findings

In total 7 participants took part in the feasibility study. I-NMDS (MH) forms were completed for 22 clients resulting in data representing 110 days of client problems and nursing interventions.

8.9.1 Endorsement of Variables

The endorsement of variables on the I-NMDS (MH) was examined to establish how sensitive the tool was in capturing expected levels of physical, psychological and socially oriented client problems and nursing interventions, as well as coordination and organisation of care activities. Variable mean scores were used for this purpose. Unsurprisingly, those client problem variables that were rated most highly, with mean ratings over 3 (i.e. the problem was present but at the very least had a limited impact on the clients functioning) were generally of a psychosocial nature. These included **'**Client knowledge deficit illness or treatment', **'**Overall psychological well-being', **'**Independent living'**,** **'**Social skills' and 'Social disadvantage'. In contrast, the physical problems 'Pain', 'Fluid balance', 'Breathing', 'Negative physical side effects of treatment or medication', 'Sleep disturbance' and 'Elimination' received the lowest levels of problem ratings. These findings indicated that the I-NMDS (MH) was sensitive to picking up on elevated levels of problems that would be expected to present among a group of mental health clients. The 'potential problem' category was not well endorsed in most cases, and minimally in other cases. This suggested that this category could be deleted from the scale.

Similar findings were noted for the interventions whereby psychologically oriented interventions that nurses carry out were more highly rated than physical interventions. There was however considerable variability in the endorsement of variables. In terms of social interventions, it was found that these variables, particularly relating to family-type care, i.e. 'Supporting the families' and 'Dealing with the information needs of family' did not receive high levels of ratings. The Coordination and Organisation of Care variables received the lowest ratings with half of these variables observing a mean score of less than 1 (indicating that a very low level of, or no intervention at all was carried out). See Table 8 below. The variables receiving the lowest mean ratings were 'Planning discharge' and 'Facilitating links between the family or significant other and the multidisciplinary team'.

8.9.2 Distribution of Scores

Distribution of the data was examined using the skewness scores for all variables rated on Day 1 of the feasibilitiy study. A relatively normal distribution was observed. As can be seen from Table 8, the majority of the variables observed skewness scores of less than 1. Those variables that observed skewness scores over 1 i.e. 'Pain', 'Nutrition', 'Breathing', 'Fluid balance', 'Sleep disturbance', 'Independent living', 'Responding to extreme situations', 'Managing substance dependence or misuse', 'Supporting the families', 'Planning discharge' and 'Facilitating links between the family or significant other and multidisciplinary team' were mainly of a physical nature, indicating their potential lack of relevance to mental health nursing. This finding indicated that these variables should be closely examined in the larger scale study to assess whether or not they should be eliminated from the data set to increase the reliability of the I-NMDS (MH).

Table 8 Mean, Std. Deviation and Skewness Scores for I-NMDS (MH) Variables – Feasibility Study

Cient Problems	N	Mean	Std. Deviation	Skewness	Std. Error
Physical discomfort	15	2.33	1.589	.598	.580
Elimination	13	1.62	.870	.930	.616
Weakness and fatigue	19	2.47	1.307	.648	.524
Pain	17	1.76	1.200	1.249	.550
Nutrition	20	1.80	1.105	1.737	.512
Negative physical side effects from treatments	17	1.88	.928	.789	.550
Dependence with hygiene needs	18	2.17	1.505	.964	.536
Breathing	16	1.31	.873	2.722	.564
Fluid balance	16	1.31	1.014	3.652	.564
Sleep disturbance	18	1.78	1.114	1.065	.536
Overall physical well-being	19	2.42	1.305	.780	.524
Anxiety (longstanding)	20	2.65	1.348	.289	.512
Anxiety or fear	20	2.90	1.210	.012	.512
Spiritual needs	13	2.08	1.038	.882	.616
Trust in those providing care	18	1.83	1.098	.966	.536
Non-adherence to a treatment/meds	18	2.00	1.283	.751	.536
Coping and adjustment	18	2.67	.970	-.531	.536
Low level of motivation	19	2.74	1.195	-.087	.524
Negative psychological side effects from treatments	18	2.17	1.043	.330	.536
Stigma	13	2.38	1.261	.602	.616
Difficulty communicating	19	1.68	.820	.683	.524
Thought and cognition	19	2.42	1.017	.416	.524
Mood	19	2.79	1.134	.460	.524
Client knowledge deficit illness or treatment	19	3.05	1.353	-.406	.524
Overall psychological well-being	18	3.06	.802	-.875	.53
Independent living	18	3.94	.998	-1.076	.536
Social skills	21	3.19	1.289	-.545	.501
Social disadvantage	20	3.10	1.252	-.386	.512
Care environment	21	2.62	1.499	.337	.501
Delayed discharge	16	3.00	1.633	-.210	.564
Level of social support from significant others	18	2.56	1.247	.165	.536
Family knowledge deficit illness or treatment	19	2.21	1.228	.760	.524
Family coping and adjustment	17	2.41	1.278	.528	.550
Overall social well-being	21	3.29	1.146	-.404	.501
General well-being	21	3.05	1.024	-.412	.501

Table 8 Mean, Std. Deviation and Skewness Scores for I-NMDS (MH) Variables – Feasibility Study

Interventions	N	Mean	Std. Dev	Skewness	Std. Error
Administering medication	22	1.00	1.024	.879	.491
Controlling infection	22	.45	.596	.933	.491
Monitoring, observing and evaluating physical condition	22	1.32	1.086	.517	.491
Hygiene	22	1.09	1.151	.632	.491
Controlling infection	22	.45	.596	.933	.491
Monitoring, observing and evaluating physical condition	22	1.32	1.086	.517	.491
Hygiene	22	1.09	1.151	.632	.491
Responding to emergency situations	22	.45	.800	2.001	.491
Developing and maintaining trust	22	1.77	.813	-.126	.491
Encouraging adherence to treatment	22	1.77	.752	.413	.491
Managing anxiety	22	1.55	1.011	-.136	.491
Responding to altered thought and cognition	22	1.09	.868	.294	.491
Providing informal psychological support	22	1.64	.953	-.249	.491
Managing mood	22	1.36	1.093	.143	.491
Monitoring, observing and evaluating psychological condition	22	1.77	.922	-.305	.491
Managing substance dependence or misuse	22	.05	.213	4.690	.491
Teaching skills and promoting health	22	1.32	1.041	.397	.491
Dealing with the person's information needs	22	.95	.722	.069	.491
Advocating	22	.64	.848	.819	.491
Work in relation to social skills	22	1.50	.859	.248	.491
Supporting the families	22	.50	.859	1.239	.491
Dealing with the information needs of family (or significant other)	22	.64	.848	.819	.491
Focused discussion with other nurses	22	1.36	.848	-.303	.491
Documenting and planning the client's care	22	1.45	1.143	.228	.491
Liaising with multidisciplinary team members other than nurses	22	1.09	.921	.611	.491
Admitting and assessing the client	22	.86	1.037	.859	.491
Planning discharge	22	.59	.959	1.319	.491
Facilitating links between the family or significant other and multidisciplinary team	22	.45	.800	1.388	.491
Facilitating external activities	22	.95	.999	.413	.491
Supporting and managing care delivery	22	1.18	1.140	.247	.491

8.9.3 Preliminary Analysis of the Discriminative Validity of the I-NMDS (MH)

In order to test the ability of the I-NMDS (MH) to discriminate across nursing specialty i.e. acute inpatient and community based mental health nursing, a ridit analysis was conducted for the variables ‘Physical discomfort’ and ‘Managing

mood'.

As will be discussed in more detail in Chapter Nine, ridit analysis can be used to illustrate differences in the prevalence of client problems across nursing specialties or wards within a hospital relative to the prevalence of those problems for all clients within that hospital. The results of ridit analysis can be plotted on a graph to produce 'a finger print' of problems and interventions within e.g. a nursing specialty, relative to all problems and interventions carried out across specialties (Sermeus et al, 1996). Because it is appropriate for use with ordinal data and because it is distribution free, ridit analysis was proposed to test the discriminative validity of the I-NMDS (MH) data. Ridit scores are calculated based on the frequency scores for a specified group (See Tables 9 and 11) relative to an overall chosen reference group (See Tables 10 and 12). For the purpose of this study, frequency scores were calculated and entered into an excel macro developed for fast computation of ridit scores (O'Brien, 2006).

Table 9 Frequencies per Day for Physical Discomfort

	Day 1	**Day 2**	**Day 3**	**Day 4**	**Day 5**	**Total**
None	8	12	12	12	8	52
Minor	0	2	2	4	4	12
Limited	3	1	3	3	2	12
Moderate	2	3	2	1	0	8
Severe	2	0	0	0	0	2
N	15	18	19	20	14	86

Table 10 Frequencies per Group for Physical Discomfort

Category	Community		Acute	
None	28	8.47	24	7.26
Minor	5	3.37	7	4.72
Limited	3	2.44	9	7.33
Moderate	2	1.86	6	5.58
Severe	1	0.99	1	0.99
Ridits	39		47	
RIDIT avg.	0.44		0.55	
Final RIDIT (-0.5)	**-0.06**		**0.05**	

Figure 2 Fingerprint Graph for Physical Discomfort

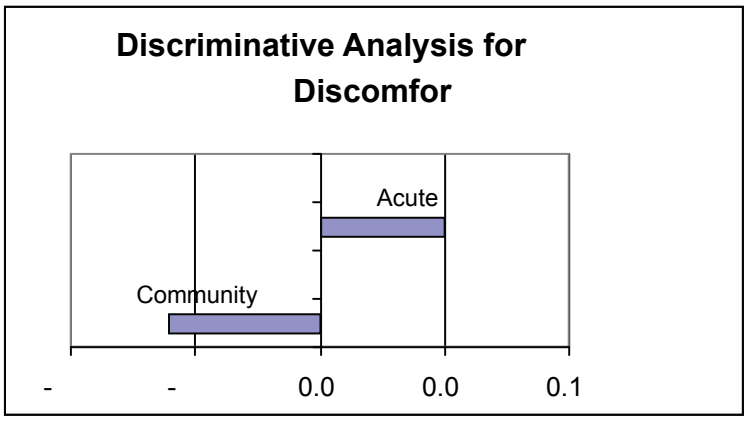


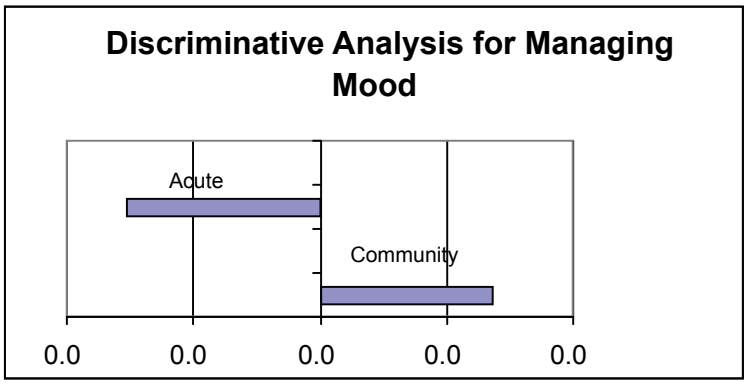
Table 11 Frequencies per Day for Managing Mood

	Day1	**Day2**	**Day3**	**Day4**	**Day5**	**Total**
No intervention	6	3	3	3	3	18
Once off	6	9	9	10	9	43
Intermittent	6	6	8	7	3	30
Continuous	4	3	2	2	0	11
N	22	21	22	22	15	102

Table 12 Frequencies per Group for Managing Mood

Category	Community		Acute	
No intervention	11	0.97	7	0.62
Once off	22	8.52	21	8.13
Intermittent	11	8.20	19	14.16
Continuous	10	9.46	1	0.95
Ridits	54		48	
RIDIT avg.	0.50		0.50	
Final RIDIT (-0.5)	**0.00**		**0.00**	

Figure 3 Fingerprint Graph for Managing Mood



Visual inspection of the graphs in Figures 2 and 3 above illustrated that acute inpatient mental health clients were rated as having higher levels of physical discomfort than their community based counterparts. This was presumed to reflect a real underlying difference in the acuity of problems experienced by the two groups of clients, rather than any difference in response pattern attributable to the nurses. Looking at acute / community differences in intervention intensity, there was also some evidence to indicate little difference in the intensity of managing mood related interventions in both the acute inpatient and community based settings. These findings were encouraging and indicated the suitability of ridit analysis for the larger scale national validity and reliability study.

8.9.4 Outcomes Analysis

Outcomes from the I-NMDS (MH) were analysed in two different ways as follows:

1. by observing the change in problem ratings from Day 1 to Day 5 of the study and
2. by analysing the outcomes scores given by respondents on Day 5 of the study i.e. through a direct assessment of outcomes

Table 13 below gives an overview of the change in client problem ratings from Day 1 to Day 5 of the study, using mean scores as reference points for change analysis. A sample of change scores was used for this purpose. As can be seen, all of the client problems listed in Table 13 improved from Day 1 to Day 5, inferring that over the 5 days of the study an improvement was seen in the physical, psychological and social well being of the client group. This change can be treated as an outcome of nursing care. Measuring outcomes in this way is however, very broad and does not necessarily infer that nursing interventions mediated the change in problem status. Furthermore, outcomes findings using this scale could be confounded if the nurse completing the rating on Day 1 was not the same person completing the Day 5 rating. The rate of change indicated by these mean scores was low. Again this may have been due to confounding or anchoring whereby the participant completing the form referred back to the previous day's ratings to inform the current rating. It was also possible that the rate of change was low due to the fact that mental health client health improvement would typically manifest itself over a period of time in excess of the 5 day study period.

Table 13 Change in Client Problems from Day 1 to Day 5

Problems	Mean D1	Mean D5
Dependence with hygiene needs	2.17	1.57
Overall physical well being	2.42	2
Physical discomfort	2.33	1.57
Pain	1.76	1.29
Nutrition	1.8	1.46
Anxiety or fear linked to current stressors	2.9	2.5
Longstanding anxiety	2.65	2.57
Mood	2.79	2.21
Trust in those providing care	1.83	1.43
Overall psychological well-being	3.06	2.64
Social skills	3.19	2.86
Independent living	3.94	3.21
Social disadvantage	3.1	2.86

Table 14 below outlines the results of the direct evaluative method of outcomes assessment using the outcomes scale on Day 5 of the study. As can be seen from the descriptive statistics for this analysis in Table 1, Appendix E, only 16

out of 22 clients were rated on the outcomes scale. This may infer that participants did not always complete this scale, perhaps due to ambiguities uncovered in the content and face validity studies. For all of the variables outlined in Table 18, on a whole, there was no change in the problem status of the client, be that a positive or a negative outcome. This is at odds with the results of the change scores observed according to observations of the mean, despite the fact that the rate of change was low. However, percentage scores are being compared with mean scores in drawing this conclusion and the two measures of outcomes also differ.

Table 14 Percentage Scores for Direct Evaluation of Outcomes

Problems	N/A	Major deterioration	Moderate deterioration	No change -	No change+	Moderate improvement	Major improvement
Dependence with hygiene	6.3%			25%	50%	18.8%	
Overall physical well being			6.3%	25%	43.8%	25%	
Physical discomfort	6.3%		6.3%	12.5%	56.3%	12.5%	6.3%
Pain	6.3%			25%	62.5%	6.3%	
Nutrition	6.3%		12.5%	18.8%	62.5%		
Anxiety or fear linked to current stressors			6.3%	31.3%	18.8%	37.5%	6.3%
Longstanding anxiety			6.3%	43.8%	25%	25%	
Mood				26.7	13.3	53.3	6.7%
Trust in those providing care			6.3%	6.3%	43.8%	37.5%	6.3%
Overall psychological well-being				13.3%	33.3%	53.3%	
Social skills			12.5%	50%	12.5%	25%	
Independent living	6.3%		6.3%	56.3%	6.3%	18.8%	6.3%
Social disadvantage			6.3%	50%	37.5%	6.3%	

This analysis raised a number of questions regarding whether the outcomes scale outlined within the draft I-NMDS (MH) was appropriate to adequately capture nursing outcomes of care. Consideration would need to be given to conceptualisation and measurement issues in the assessment of nursing

outcomes of care and ultimately whether the outcomes scale within the I-NMDS (MH) should be revised or eliminated from the tool.

Responses by participants to the cognitive interviews indicated that the period of data collection for the study should be increased to capture I-NMDS (MH) ratings over 2 or more days rather than over consecutive days. This would potentially facilitate more accurate reflections of change in the client's health status over time. It was anticipated that the optimal period to capture change in acute inpatient mental health would be the average length of the client stay i.e. approximately 3 weeks. The rate of change in the client's wellbeing within the community setting would be slower, given the more chronic nature of mental illness in community based care. Consideration was therefore given to capturing data on non-consecutive days over a longer time interval.

8.10 Changes Made to the I-NMDS (MH) Post Pilot

The pilot study proved a very useful way of ensuring the face and content validity of the I-NMDS (MH) and of testing the research protocol, including analysis techniques, prior to the national validity and reliability study. Careful consideration was given to the findings of all 3 studies and a number of changes were made to the I-NMDS (MH) format, instruction, scales and variables. These changes are outlined below.

Instructions: One of the most significant changes made to the I-NMDS (MH) was the instruction to complete the form for each client every second day rather than every consecutive day. This change was made as a result of concerns raised by participants that rating the client every day may not pick up on real change in the client's problem status. For respondents who worked primarily in domiciliary based care, it was decided that they should complete the I-NMDS (MH) per client upon each client visit, which tended to be once a week.

Format: The pilot study raised questions relating to the potential for anchoring or confounding of ratings due to the close proximity of each days rating scale to the next. It was suggested by pilot study participants that they might use the

previous day ratings to assist in making I-NMDS (MH) ratings for the following day. As such, the format of the tool was changed from consisting of five days per page to one day per page, with a divider page per day to increase the distance of e.g. day 1 ratings from day 2 ratings. In this way, all pages of the I-NMDS (MH) were combined into one booklet of five I-NMDS (MH) tools to be completed by the nurse respondent for each of his/her clients. See Appendix F for a copy of the revised I-NMDS (MH).

Front page: A further suggestion relating to the I-NMDS (MH) was that the instructions on the tool should be more explicit. More complete instructions were therefore included on the front of the I-NMDS (MH) to ensure a better understanding of how the I-NMDS (MH) should be completed. Again, see Appendix F.

The *Background Information* section was placed at the front end of the I-NMDS (MH) booklet and a small number of mental health specific demographic questions were added. These included questions relating to the expected length of the client's stay, whether he/she was a temporary or a voluntary admission client, whether it was his/her first admission and when he/she was discharged from the ward/unit. The demographic question relating to the client's place of residence was omitted from the I-NMDS (MH) for sensitivity reasons.

Researcher contact details: were included on the front page of the tool so that participants could contact the researcher for clarification on any aspect of the study.

A section for the participant to write in the client name was also included on the front page of the I-NMDS (MH) for filing purposes. For the sake of client anonymity, the participant was asked to tear off and destroy the section containing the client's name, before handing it back to the researcher. In addition, a section for the nurse respondent's initials and date of form completion was included on the front page so that the researcher could track how often and by whom the tool was completed.

Scale: A number of important changes were made to the problems, interventions and outcomes scales. It was clear that the problem scale configuration was confusing participants and that the section 'N/A' i.e. *not assessed* and 'P' i.e. *problem is absent but there is an elevated risk of it becoming a problem within 3 days*, were being perceived as ambiguous and therefore were not being completed by participants. In order to address respondents' concerns relating to inconsistencies across the problems and interventions scales, it was decided that both scales should be 5 point Likert scales whereby ratings would relate to either 'degree of problem' or 'intervention level'. In this way, the scale attached to the problem variables was changed from

N/A = Not assessed
0 = Problem is not present
1 = Minor problem no impact on functioning
2 = Problem has limited impact on functioning
3 = Moderate problem, significant impact on functioning
4 = Severe problem, severe impact on functioning
P = Problem is absent, with an elevated risk of it happening within three days

To a more straight forward Likert scale, where each client problem (e.g. pain, mood etc.) would be recorded on a five-point scale (0-4), indicating the degree of the problem. The absence of a problem state was indicated by a score of 0 (problem not present), with four levels of problem status (1-4) from the presence of a minor problem (1) to a severe problem state (4). Furthermore, each problem was rated every second day on the I-NMDS (MH). The new problems scale took the following format:

0 = Problem not present.
1 = Minor problem; no impact on functioning. The person can currently cope with the challenge without formal assistance.
2 = Moderate problem, limited impact on functioning. Comparatively minor levels of formal assistance are likely to be required.
3 = Major problem; significant impact on functioning.
4 = Severe problem; severe impact on functioning.

In order to increase the clarity of the variable labels, a number of changes were made, many of these involved taking out double negatives i.e. 'problems' in relation to 'negative side effects' etc. The following changes were made:

Physical problems in relation to:

1. 'Physical discomfort' was changed to 'Physical comfort'
2. 'Negative physical side effects of treatment and/or medication' was changed to 'Physical side effects of treatment and/or medication'
3. 'Dependence with hygiene needs' was changed to 'Hygiene'
4. 'Sleep disturbance' was changed to 'Sleep'

Psychological problems in relation to:

1. 'Anxiety longstanding' was changed to 'Longstanding anxiety'
2. 'Coping and adjustment' was changed to 'Coping and adjustment to condition or change in circumstances'
3. 'Challenging behaviour' was added to the problems variables list
4. 'Difficulty communicating' was changed to 'Communication'
5. 'Low level of motivation' was changed to 'Level of motivation'
6. 'Trust in those providing care' was changed to 'Trust in others'
7. 'Non-adherence to treatment or medication' was changed to 'Adherence to treatment or medication'
8. 'Negative psychological side effects of treatment or medication' was changed to 'Psychological side effects of treatment or medication'

Social problems In relation to:

1. 'Care environment' was changed to 'Appropriateness of the care environment'
2. 'Family coping and adjustment' was changed to 'Family coping'
3. 'Stigma' was changed to 'Social stigma'

All I-NMDS (MH) problem variables included on the form were accompanied by examples to outline the broad meaning of the variable to the respondent. This was done to increase variable clarity and to avoid confusion.

As with the problems scale, changes were made to the interventions scale to increase ease of use and consistency with the problems scale. The definition of intensity of the intervention was addressed in order to more appropriately operationalise the concept. In line with definitions of intensity outlined in the literature (e.g. Prescott et al, 1991), the definition of intensity used for the purpose of the I-NMDS (MH) interventions scale ensured that the concept was defined according to nurse skill mix, the time taken to administer the intervention and task complexity. The scale itself was changed from:

0 = No intervention undertaken
1 = Once off or minimal intervention in a routine way
2 = Intermittent or regular interventions and/or of a more complex nature
2= Continuous or multiple interventions and/or of a more complex nature

and/or requiring more than one nurse or specialist nursing skill
To

0 = The intervention was not carried out during the time period.
1= Minimal intervention intensity level; e.g., routine performance of a task, uncomplicated procedure, intervention performed only once or presents minimal time demand.
2 = Moderate intervention intensity level; e.g., relatively complex task performance, procedure was tailored to the person, intervention carried out on several occasions or requires significant time commitment.
3 = High level of intensity in performance of the intervention; e.g., highly complex task performance, extensive work was needed to respond to the person's specific needs, intervention carried out often or continuously, required extensive commitment of time and resources
4 = intensive level of intervention

Changes were also made to the interventions scale as follows:

Physical nursing interventions:

1.'Hygiene' was changed to 'Attending to hygiene'
2.'Responding to emergency situations' was changed to 'Responding to extreme situations'

Psychological nursing interventions:

1.'Monitoring, observing and evaluating psychological condition' was changed to 'Informally monitoring, observing and evaluating psychological functioning' and 'Structured observation'
2.'Advocating' was included as a psychological rather than a social intervention as was 'Teaching skills and promoting health'
3.'Dealing with the person's information needs' was included as a psychological intervention

Social nursing interventions:

1.'Supporting families' was changed to 'Supporting the family' and
2.The variable 'Dealing with the information needs of family or significant other' was eliminated in its own right and included in this variable description

Coordination and organisation of care activities…

1. 'Admitting and assessing the patient' was changed to 'Admitting and initial assessment of the patient'

A number of difficulties were found with the outcomes scale. These included difficulties relating to how outcomes had been conceptualised and measured in the draft I-NMDS (MH). Participants clearly had difficulties rating problems as outcomes at the end of the study period. Furthermore, the findings of the feasibility study indicated that outcomes might be better measured as change in

the client problem status over time. As such, it was decided that outcomes should be conceptualised and tested in a post hoc manner, in the same way as they have been by a number of outcomes researchers, in particular (Doran et al, 2006). This meant that outcomes should be conceptualised and investigated as change in the client's problem state over time, mediated by nursing interventions. Measurement or operationalisation of outcomes in this way would require a regression analysis, preferably using structural equation modelling to control for error in measurement. This decision led to the elimination of the outcomes scale from the I-NMDS (MH).

An additional section was added to the I-NMDS (MH) to capture any significant events that occurred for the client that might have impacted on his/her problem state and a change in the intensity of interventions administered for that client. These included any major clinical events such as an ECT (Electro Convulsive Therapy) or a consultant's review or an event of another kind e.g. an assault of/by another client or the client absconding.

8.11 Conclusion

The results of the pilot study, including the content validity, face validity and feasibility studies, revealed useful information regarding the validity, reliability and usability of the I-NMDS (MH). The 3-part pilot study was invaluable in preparing for the larger scale national validity and reliability testing of the I-NMDS (MH) and optimising the validity of the research design. Following the pilot study, the research methodology was finalised. This is described in Chapter Nine in tandem with the preliminary research findings regarding descriptive statistics, data distribution and missing values analysis for the main research study.

SECTION III

Study Findings

CHAPTER NINE

Study Implementation, Preliminary Findings and Discussion

9.1 Introduction

The aim of this chapter is to report on the methodology and procedure adopted for the large scale validity and reliability testing of the I-NMDS (MH). In addition the descriptive statistics and missing values analysis for the I-NMDS (MH) are reported. The chapter commences with a description of the study procedure and an initial overview of the findings relating to the descriptive statistics before going on to describe the results of the missing data analysis. The missing data analysis represents an important preliminary check on the data to identify problem cases to be deleted prior to commencing the validity and reliability testing. Upon deletion of problem cases from the data set, a further breakdown of the findings of the descriptive statistics is given. Following this, the findings of the analysis of the distribution of the data is outlined and consideration is given to data transformation.

This chapter concludes with a discussion on the findings of this preliminary, preparatory analysis. Chapter Ten then goes on to outline the findings of the construct validity, internal consistency, stability and discriminative validity of the I-NMDS (MH). This is followed by a detailed description of the independent study to establish the interrater reliability of the I-NMDS (MH) in Chapter Eleven. Finally, Chapter Twelve outlines the post hoc study to evaluate the usability of the I-NMDS (MH) in the study of nursing sensitive outcomes.

9.2 Method

9.2.1 Sites and Sample Size Requirements

The sites chosen for inclusion in this study had to be geographically representative of the 4 HSE designated areas and they had to offer the following services:

- Acute inpatient mental health services
- Day Hospital and / or Day Centre services
- Home based team and/or community mental health nursing

A convenience sample of nurse participants was selected across the participating study sites. All participants had to be engaged in direct client care. In order to achieve a minimum of 300 I-NMDS (MH) forms required for the study, the nurse participant sample size requirement was calculated to be 120 nurses. These participants were required to complete I-NMDS (MH) forms for approximately 2.5 clients each. In order to achieve an assumed minimum response rate of 50%, a total of 600 I-NMDS (MH) were disseminated to participants who were asked to complete the forms for 5 clients each. 300 I-NMDS (MH) forms were distributed among community based facilities and 300 were distributed among acute inpatient units.

9.2.2 Procedure

Prior to commencing the study, the ethical approval was granted from all participating hospitals and services. A convenience sample of staff nurses and clinical nurse managers involved in direct client care were recruited to the study to complete the I-NMDS (MH) forms. Before the study commenced, the researcher went out to the site with training information to inform nurses of the background to the study. Further information was given on the relevance of the study to nursing and the I-NMDS (MH) tool. Finally case study examples were used to ensure that participants understood how to complete the I-NMDS (MH)

correctly.

This session provided the nurses with an opportunity to ask questions. Nurses were assured that the research was both voluntary and confidential and that data would be kept in a secure locked area, accessible only to the researcher.

9.2.3 Data Collection

Approximately one week after the training session, the data collection began. All participants were asked to randomly select up to five of their clients for whom 5 I-NMDS (MH) forms should be completed. Participants were asked to complete the I-NMDS (MH) for as many clients as possible, without compromising their nursing work commitments. Participants working in acute inpatient units, day hospitals and day centres, were asked to complete one form per client every second day for which the unit/service was operational. Participants working in domiciliary care i.e. those working as part of a home-based team or community mental health nurses, who did not meet their clients on a daily or second daily basis, were asked to complete one I-NMDS (MH) form for each client at each client encounter such that 5 I-NMDS forms per client were completed. Client encounters for these participants generally occurred once a week.

Whenever possible, the researcher was on site to answer questions relating to data collection. On the days the researcher was not on site, a telephone call was made to the service to offer any necessary support to participants. When the nurse was not available to complete all of the I-NMDS (MH) for his/her clients (due to work shift and leave arrangements), the nurse who took over the care of those clients completed the tool on his/her behalf.

Data collection in inpatient units, day hospitals and day centres ran for a total of 10 days per client. This time period excluded weekends for day hospitals and day centres. Data collection for home based team and community mental health participants ran for approximately 5 weeks. At the end of the data collection period the nurses left the completed I-NMDS (MH) in a box provided.

9.2.4 Analysis

The analysis carried out is outlined below according to the study it represents i.e. to establish the construct validity of the I-NMDS (MH), to determine whether it is internally consistent, stable or to establish whether it possesses discriminative validity.

Prior to conducting analysis to establish the validity and reliability of the I-NMDS (MH), a number of preliminary analyses were carried out including:

a) A missing data analysis, to establish the completeness of the data collected prior to implementing the validity and reliability testing analysis

b) An analysis of participant attrition rates over the 5 day duration of the study, again to establish the completeness of the data collected prior to implementing the validity and reliability analysis

c) An analysis of the distribution of the data, to determine skewness, kurtosis and outliers within the data and to establish whether the statistical tests to determine validity and reliability of the I-NMDS (MH) were applicable with a normal/non-normal distribution

d) A demographic breakdown analysis i.e. according to geographic, nursing and client demographics

e) A descriptive analysis of the data to assess the level of variable endorsement across the sample as a whole and across community mental health and acute inpatient mental health nursing specialties

9.3 Demographic Findings

A total of 11 hospitals from across the 4 HSE areas participated in the national validity and reliability testing of the I-NMDS (MH). Data were collected for 367 mental health clients by a total of 184 nurse participants. The data collected for the 367 clients represented 1,612 days of client data. See Table 15 below.

Table 15 Number of Client Days of Data

	Day	n
	Day 1	367
	Day 2	339
	Day 3	326
	Day 4	293
	Day 5	287
Total	Days	1,612

Data were collected for 207 clients attending community based mental health services and 160 clients attending acute inpatient mental health services, representing corresponding response rates of 69% and 53% respectively. Of the clients attending community based services, 11% were attending day hospitals, 19% were attending day centres, 21% were in receipt of home based care and 9% were attending community health centres (which could indicate attendance at either a day hospital or a day centre as these tend to be based within HSE health centres). A total of 43% of the overall sample was based in acute inpatient units. See Tables 16 and 17 for a breakdown of these findings.

Table 16 Breakdown of Sample per Specialty

Specialty	Community Mental Health	Acute Inpatient Mental Health
n	207	160
%	56.4	43.6

Table 17 Breakdown of Sample per Ward/Unit Type

Ward or Unit Type	***n***	**%**
Day hospital	42	11
Day centre	71	19
Home based community care	77	21
Health centre	9	3
Acute inpatient units	158	43
Other	3	1
Missing	7	2
Total	367	100%

When considered in terms of the breakdown of the sample per hospital it can be

seen that the majority of community based mental health clients were attending services attached to Hospital H* (23%), while the minority of these clients were attending services attached to Hospitals G and D (both at 4%). The majority of clients in acute inpatient care facilities were attached to Hospital B (22.5%) while only 1%, 1% and 2% of clients respectively were based in Hospitals D, F and G. See Table 18 for a breakdown of the sample per hospital and per specialty.

Table 18 Breakdown of Sample per Hospital & Specialty

Specialty	Hospital	*n*	%
Community Mental Health	A	24	11.6
	B	29	14.0
	C	20	9.7
	D	8	3.9
	E	2	1.0
	F	25	12.1
	G	8	3.9
	H	47	22.7
	I	27	13.0
	J	17	8.2
	Total	207	100.0
Acute Inpatient Mental Health	A	19	11.9
	B	36	22.5
	C	19	11.9
	D	1	.6
	E	7	4.4
	F	2	1.3
	G	3	1.9
	H	12	7.5
	I	12	7.5
	J	25	15.6
	K	24	14.9
	Total	160	100.0

The majority of clients for whom data were collected came from the HSE West area (i.e. 31% of the community based client sample and 38% of the acute inpatient client sample). The HSE North East area was represented by 35% of the community based client sample and 31% of the acute inpatient client sample.

** The identity of participating hospitals is protected for confidentiality purposes*

Approximately 23% of the community based client sample and 19% of the acute inpatient client sample came from the HSE Mid-Leinster area while 12% of the community based client sample and 12% of the acute inpatient client sample came from the HSE South area. See Table 19 below.

Table 19 Breakdown of Sample per HSE Area & Specialty

HSE Area	Community Mental Health	Acute Mental Health
HSE North-East	72 (35%)	49 (31%)
HSE Mid-Leinster	47 (23%)	31 (19%)
HSE South	24 (12%)	19 (12%)
HSE West	64 (31%)	61 (38%)

9.4 Missing Values Analysis

Missing data were examined in order to understand its potential impact on future analysis and so that appropriate remedies could be applied. Checks for cases and variables with high levels of missing data were carried out and the random/non-random nature of missing data was examined. The first check for missing data involved inspection of specific cases to see if individual respondents had failed to complete the form. This type of missing data is classified 'not ignorable' (Hair et al, 2005). A total of 7 cases were found to have high levels of missing data, i.e. approximately 40% or more. These cases were subsequently deleted from the data set. All of these cases were from the community mental health specialty. The decision to delete these cases resulted in a sample breakdown as per Table 20 below.

Table 20 Breakdown of Sample According to Nursing Specialty

Specialty	Frequency	Percent
Community Mental Health	200	56
Acute Mental Health	160	44
Total	360	100.0

A missing values analysis was run in SPSS to examine the level of missing data per variable. Examination of the missing values indicated that only one variable, 'Overall physical wellbeing', had over 10% missing values. The variable 'Delayed discharge' had missing values of 5.3% and all other variables had less that 5% missing data. The results of the missing data analysis can be found in Appendix G, Table 1 (p 381).

The missing values for the variables 'Delayed discharge' and 'Overall physical well being' were examined to see if data could be considered 'ignorable missing data'. It was deduced that the variable 'Delayed discharge' was likely to have missing values due to sampling error i.e. it was more applicable to clients in acute inpatient care than to those in community mental health care. Therefore community based mental health nurses were less likely to answer the questions relating to this variable. Table 21 shows that 15 nurses from the community did not answer questions relating to 'Delayed discharge'. There was a high proportion of both community and acute inpatient mental health nurses who did not answer questions relating to 'Overall physical wellbeing'. It was deduced that this was because, by definition of their specialty, mental health nurses are less concerned with the 'physical' wellbeing of the client than they are with the 'mental' or 'psychological' wellbeing of the client. Furthermore, psycho-geriatric clients were not included in this study. Had they been included, physical wellbeing would most likely have been of increased relevance.

Table 21 Missing Values for Variables across Specialty

Nursing Specialty			**Overall physical well-being**	**Delayed discharge**
Community Mental Health	N	Valid	178	185
		Missing	22	15
Acute Inpatient Mental Health	N	Valid	137	156
		Missing	23	4

Mann Whitney U tests were carried out to see if the level of difference in missing data across these variables was significant. See Appendix G, Table 2

for the results of the Mann Whitney U test. Results of the Mann Whitney U indicated that, as expected, nursing specialty had an impact on the missing data for the variable 'Delayed discharge' (Sig = .000). There were more missing data for community mental health than for acute inpatient mental health nursing. Missing data for the variable 'Overall physical wellbeing' however, was not significant (Sig = .354), indicating that specialty did not impact on missing data for this variable. By examining the pattern of the missing data is was determined that data for the variable 'Delayed discharge' were 'missing at random' MAR, while data for the variable 'Overall physical wellbeing' were 'missing completely at random' MCAR. This indicated that there was no specific underlying pattern to the missing data for the variable 'Overall physical wellbeing' (according to specialty). This is most likely due to the nature of the sample i.e. mental health clients rather than those in receipt of care in e.g. a general medical ward.

According to Tabachnik and Fidell (2006), if only a few data points (e.g. 5% or less) are missing at random from a large data set, the effects on analysis are not very serious and most methods of dealing with missing data yield similar results. As the data set was larger than the critical n = 200, to qualify as a 'large' data set (Hair et al, 2005, Field, 2005), this rule was applied to all variables falling at or below the 5.5% point. In this way, the only variable of concern was 'Overall physical well being'. Missing values analysis and subsequent examination of the pattern of missing data for this variable indicated that it was MCAR and as such, a wide variety of options were available in terms of dealing with missing data in future analysis e.g. pairwise, listwise, replace with mean and use of the EM algorithm (Hair et al 2005, Tabachnik et al, 2006).

In concluding on the missing data analysis, it can be said that the level of impact of missing data on subsequent analysis was minimised as a result of deleting problem cases. Furthermore, because missing data for all of the variables except for 'Overall physical wellbeing' were MAR and/or because only 5.5% or less of the data were missing, this was not considered serious in terms of potential threats to analysis. The variable 'Overall physical wellbeing'

had MCAR data and therefore a number of ways of dealing with the missing data in future analysis were appropriate. The result of the missing values analysis was the deletion of a total of 7 cases from the data set. This brought the usable sample size for analysis to 360, representing data for 160 clients from acute inpatient mental health and 200 clients from community mental health settings. A further result of the case deletion was the observation of a case to variable ratio of at least 10:1 for both the problems and interventions scales of the I-NMDS (MH). In addition the sample size of 350 or more allowed for the use of a factor loading cut off point of approximately .35 in the interpretation of factor analysis results (Hair et al, 2005).

9.5 Breakdown of the Demographic Statistics Post Missing Data Analysis

Of the 360 clients included in the analysis, 117 were admitted to the mental health service pre-2006, 168 were admitted between January and June 2006 (i.e. over the period of the study data collection), while no date of admission was given for 75 of clients. The majority of clients came from Hospital B, Hospital H, Hospital A and Hospital J (17%, 16%, 12% and 11% respectively). A full breakdown of the numbers of clients per hospital is outlined in Table 22 below. The majority of clients based within the community mental health setting came from Hospital H i.e. 24%, while 13% of community based clients were from Hospitals B, F and I. Of the clients based in the acute inpatient setting, the majority of these came from Hospitals B, J and K (23%, 16% and 15% respectively). See Tables 23, for a full breakdown of the numbers of clients per hospital and per specialty.

When considered in terms of HSE area representation, it is noted that 11% of clients came from the HSE South area, 21% came from the Dublin, Mid-Leinster area, 33% came from the Dublin North East area and 34% came from the HSE West area. Of the community based client group, 12% came from the HSE South area, 23% came from the Dublin Mid-Leinster area, 34% came from the Dublin North East area and 32% came from the HSE West area. Of the acute inpatient based client group, 12% came from the HSE South area, 19% came from the Dublin Mid-Leinster area, 31% came from the Dublin North East area and 38% came from the HSE West area.

Table 22 Number of Clients per Hospital

Hospital	Frequency	Valid Percent
A	42	11.7
B	62	17.2
C	39	10.8
D	9	2.5
E	9	2.5
F	27	7.5
G	11	3.1
H	59	16.4
I	37	10.3
J	41	11.4
F	24	6.7
Total	360	100.0

Table 23 Number of Clients per Hospital and per Specialty

Nursing Speciality	Hospital	Frequency	Valid Percent
Community Mental Health	A	23	11.5
	B	26	13.0
	C	20	10.0
	D	8	4.0
	E	2	1.0
	F	25	12.5
	G	8	4.0
	H	47	23.5
	I	25	12.5
	J	16	8.0
	Total	200	100.0
Acute Inpatient Mental Health	A	19	11.9
	B	36	22.5
	C	19	11.9
	D	1	.6
	E	7	4.4
	F	2	1.3
	G	3	1.9
	H	12	7.5
	I	12	7.5
	J	25	15.6
	K	24	15.0
	Total	160	100.0

Approximately 44% of clients were based in the acute inpatient setting while 55% were based in the community setting. Of the community based clients, 19% were attending day hospitals, 38% were attending day centres, 39% were in receipt of home based care and 4% were attending health centres. See Table 24 below.

Table 24 Number of Clients per Ward/Unit Type

Ward/Unit Type	***Frequency***	***Percentage***
Day hospital	37	10.3
Day centre	75	20.9
Acute ward	158	44.0
Home based community care	77	21.4
Health centre	9	2.5
Other	3	.8
Missing	1	.002
Total	359	100.0

Of the clients for whom data were collected, 55% were female and 45% were male. When broken down according to care setting, it was noted that within the community setting there was equal representation of males to females while in the acute inpatient setting 62% of the sample was female, while 38% of the sample was male. Tables 25 and 26 outline the gender breakdown.

Table 25 Client Gender

Gender	Frequency	Percent
Female	197	55.5
Male	158	44.5
Missing	5	-
Total	360	100

Table 26 Client Gender per Specialty

Nursing Speciality		Frequency	Percent
Community Mental Health	Female	99	50.0
	Male	99	50.0
	Missing	2	-
	Total	200	100
Acute Inpatient Mental Health	Female	98	62
	Male	59	37.6
	Missing	3	-
	Total	160	100

Approximately 52% of the sample was in the 41 to 65 age group, of these 48% came from the community mental health setting, while 58% came from the acute inpatient mental health setting. Less than 2% was between the age of 16 and 20, approximately 31% of the sample was between the age of 21 and 40 and approximately 15% of the sample was over 65 years of age. See Tables 27 and 28 below for a more complete breakdown of the client age group in general and per mental health setting.

Table 27 Client Age Group

Age Group	Frequency	Valid Percent
Over 65	47	14.9
51-65 yrs	92	29.1
41-50 yrs	74	23.4
31-40 yrs	52	16.5
21-30 yrs	46	14.6
16-20 yrs	5	1.6
Missing	44	
Total	360	100

Table 28 Client Age Group per Specialty

Nursing Speciality		Frequency	Valid Percent
Community Mental Health	Over 65	33	18.6
	51-65 yrs	46	26.0
	41-50 yrs	39	22.0
	31-40 yrs	27	15.3
	21-30 yrs	29	16.4
	16-20 yrs	3	1.7
	Missing	23	
	Total	200	100
Acute Inpatient Mental Health	Over 65	14	10.1
	51-65 yrs	46	33.1
	41-50 yrs	35	25.2
	31-40 yrs	25	18.0
	21-30 yrs	17	12.2
	16-20 yrs	2	1.4
	Missing	21	
	Total	160	100

The majority of clients had a diagnosis of mood disorder and schizophrenia, schizotypal and delusional disorders i.e. 38% and 31% respectively. Approximately 7% were diagnosed with behavioural and related disorders, while 18% had no diagnostic code entered for them. Almost 40% of community based clients had a mood disorder diagnosis, while 36% had schizophrenia, schizotypal and delusional disorders. Of the clients within the acute inpatient setting, approximately 37% had mood disorder related

diagnoses and 26% had schizophrenia, schizotypal and delusional disorders. Tables 29, 30 and 31 below give the client diagnosis breakdown.

Table 29 Client Medical Diagnosis

Diagnostic Category	Frequency	Valid Percent
Mood disorders	135	38.2
Schizophrenia, schizotypal and delusional disorders	111	31.4
Behavioural and related disorders	26	7.4
Other	22	6
Not specified/missing	66	18
Total	360	100

Table 30 Client Medical Diagnosis for Community Based Clients

Diagnostic Category	Frequency	Valid Percent
Mood disorders	77	39.5
Schizophrenia, schizotypal and delusional disorders	70	35.9
Behavioural and related disorders	13	6.7
Other	9	4
Not specified/Missing	31	15
Total	200	100

Table 31 Client Medical Diagnosis for Acute Inpatient Based Clients

Diagnostic Category	Frequency	Valid Percent
Mood disorders	58	36.7
Schizophrenia, schizotypal and delusional disorders	41	25.9
Behavioural and related disorders	13	8.2
Other/not specified	13	8.2
Not specified/Missing	35	21.8
Total	160	100

9.6 Problem and Intervention Variable Endorsement

Before conducting the factor analysis of the I-NMDS (MH), some preliminary analysis was carried out in order to determine the relevance of the variables included in the study. This was important in order to avoid the inclusion of

outlying variables and risking problems with scale reliability (Tabachnik and Fidel, 2006). As such, the level of endorsement given to each I-NMDS (MH) variable by way of a problem being rated 'not present', 'minor', 'moderate', 'major' or 'severe' or an intervention being rated 'not carried out', 'minimal level', 'moderate level', 'high level' or 'intensive level' was examined. Particular attention was given to the percentage scores for the rating 'problem not present' or 'intervention not carried out', as it was felt that these ratings were good indicators of relevance or irrelevance of the variable to mental health nursing activity. A benchmark of 75% 'problem not present' or 'intervention not carried out' was introduced to weed out variables with relatively high levels of irrelevance to this particular area of nursing activity. This benchmark was consistent with that used in the preceding Delphi study to identify variables for inclusion in the first draft of the I-NMDS (MH) (Scott et al, 2006a). Further it was considered high enough to determine variables that were not well endorsed by participants. This was considered an important benchmark to set given that it was likely that some variables included in the tool may have been more relevant to a general nursing context.

This analysis resulted in the identification of six variables that received 'problem not present' and one variable that received 'intervention not carried out' ratings of 75% or more. These included the variables 'Elimination' (78% 'problem not present'), Breathing (81% 'problem not present'), 'Fluid balance' (85% 'problem not present'), Spiritual needs (82% 'problem not present'), 'Psychological side effects of Treatment or medication' (77% 'problem not present'), 'Communication' (75%), 'Delayed discharge', (82% 'problem not present') and 'Controlling infection' (79% 'intervention not carried out'). See Appendix G Tables 3a and 3b for a full breakdown of the percentage and frequency scores per rating per variable.

9.7 Examination of the Distribution of the Data

Before any major analysis of the data for the I-NMDS (MH) was carried out, it was necessary to examine the distribution of the data. A deviation from normality could have impacted on future statistical analysis so the data were

examined for skewness, kurtosis and outliers. Corrective measures were explored where the data were found to violate normality.

Univariate normality was tested as a first step in meeting the assumptions underlying multivariate tests to be used in the validity and reliability testing of the I-NMDS (MH). The large sample size for this analysis *(n* = 360), after problem cases were deleted, indicated that the detrimental effects of non-normality should be diminished to some extent. For samples of 200 or more, the effects of departures from normality may be negligible (Hair et al, 2005). Analysis of univariate normality was carried out using a number of different statistical tests and graphical illustrations of the data. These were as follows:

- The skewness statistic, which is based on examination of the symmetry of the data. A skewed variable, is a variable whose mean is not at the centre of the distribution (Tabachmik and Fidell, 2006)
- The Kurtosis statistic, which is based on an assessment of the peakedness or flatness of the data. When the data is either too peaked or too flat, variance tends to be under estimated
- P-Plots and Detrended P-Plots, to illustrate deviations from normality
- Histograms with the normal curve
- Z-Scores to identify outliers
- Box-Plots to identify outliers

9.8 Skewness and Kurtosis of the Data

Skewness (kurtosis) values falling outside the +1 to –1 range indicate a substantially skewed (peaked/flattened) distribution (Hair et al, 2005). Under normal circumstances, one would divide the skewness/kurtosis score by the standard error of skewness/kurtosis in order to examine the significance of the skewness/kurtosis in the data. However, large sample sizes, typically over 200 (Hair et al, 2005, Field, 2005), result in low standard error scores which give rise to significant results, even when there are small deviations from normality. With large samples, the significance of the skewness of the variable is not as

important as the actual size of the skewness and visual appearance of the distribution. Similarly with kurtosis, the effects of kurtosis on the distribution of the data disappear with samples of 100+ (for negative kurtosis) and 200+ (for positive kurtosis) (Waternaux, 1976, Field, 2005, Hair et al, 2005).

Tables 4 to 9 in Appendix G illustrate the amount of skewness and kurtosis observed for each variable for DAY 1 of the I-NMDS (MH). Day 1 was used for analysis of distribution as it had the maximum amount of data to work with. Using any other day would have been inappropriate given the increasing amount of missing data for days 2, 3, 4 and 5 of data collection. Furthermore Day 1 data were to be used in the subsequent factor analysis of the data, again due to the volume of data available for this particular study day.

Examination of tables 4 to 9 in Appendix G indicated that there was skewness and kurtosis observed for physical problems i.e. 8/11 variables were positively skewed and 5/11 variables were peaked. Particularly high levels of skewness and kurtosis were observed for the problems 'Pain' (S=2.01, K=3.8), 'Elimination' (S=2.3, K=4.98) 'Breathing' (S=2.68, K=7.07) 'Fluid balance' (S=3.1, K=10) 'Communication' (S=2.17, K=4.01), 'Spiritual needs' (S=2.97, K= 8.9), 'Psychological side effects of treatment or medication' (S=2.69, K=7.78) and 'Delayed discharge' (S=2.61, K=5.65). Similarly, intervention and coordination of care problems also displayed high levels of skewness and kurtosis, in particular the variables Controlling infection (S=2.497, K=5.877), Structured observation (S=1.783, K=1.829), 'Facilitating external activities' (S=1.935, K=2.892). Skewness was predominantly positive, i.e. there was a high prevalence of low ratings across variables while there was a mix of peaked (positive) and flat (negative) levels of kurtosis.

In order to test the construct validity of the I-NMDS (MH), the use of maximum likelihood extraction in exploratory factor analysis was proposed. This test is dependent on a normal distribution and can produce misleading results when assumptions of multivariate normality are severely violated (Curran et al, 1996, Fabrigar et al, 1999). For this particular type of factor analysis, the guideline for deciding on the severity of skew/kurtosis used is

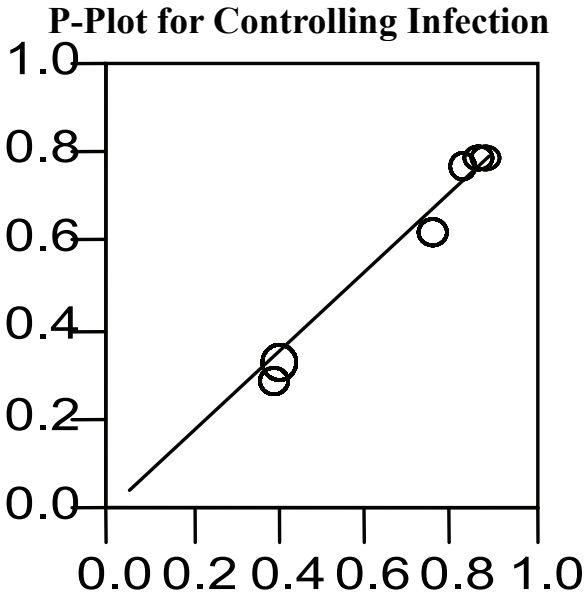
skew > 2; kurtosis >7 (West, Finch and Curran, 1995). Upon implementation of this guideline, it was noted that the majority of skewed and kurtotic variables had already been highlighted for exclusion from future analysis, due to low endorsement by mental health nurses. See section 8.6 above.

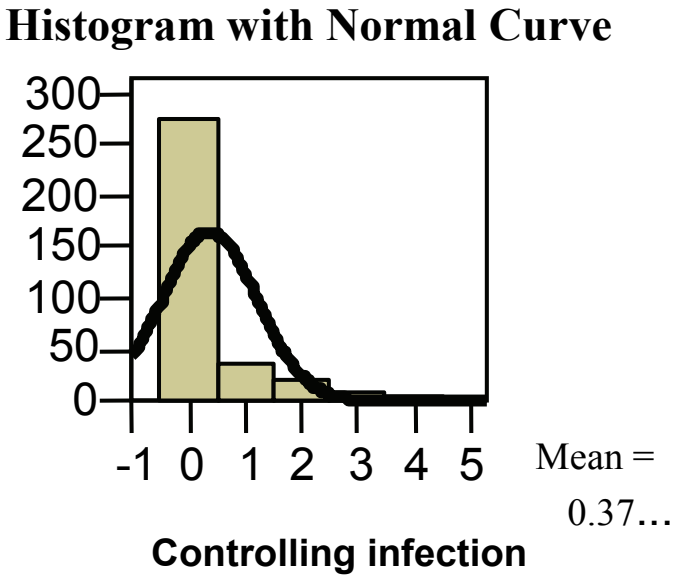
9.9 P-Plots and Detrended P-Plots

As discussed, examination of the levels of skewness and kurtosis in the data pointed to a relatively non-normal distribution. Normally one would examine the significance of this non-normality but due to the large size of the sample, significance (z) scores for both kurtosis and skewness would yield invalid findings. Hair et al (2005) and Tabachnik et al, (2006) recommend using Normal Probability Plots (P-Plots) in the place of histograms to examine the data visually. Normal P-Plots 'compare the cumulative distribution of actual data values with the cumulative distribution of a normal distribution' (Hair et al, 2005, p.81). Data values cluster around and are compared with the normal distribution, which forms a straight diagonal line. SPSS also produces 'Detrended' P-Plots, which illustrate values that move away from the diagonal rather than those values along the diagonal line.

The P-Plot for the variable 'Controlling infection' is outlined below along with the corresponding histogram with normal curves for this skewed I-NMDS (MH) variable. When the plotted line on the normal P-Plot falls below the normal distribution line i.e. unbroken diagonal line, the kurtosis is flatter and more skewed than the normal distribution. When the plotted line falls above the normal distribution line, the kurtosis is more peaked and skewed than the normal distribution. In the P-Plot for the variable below, there is an S shaped curve whereby the distribution is skewed and peaked. Starting below the line, the plotted line moves above the diagonal and ends up in a downward direction. See Appendix G (p.394) for an expanded sample of P-Plots and Detrended P-Plots.

Skewness and kurtosis were also noted in the histograms with normal curves outlined for all variables in Appendix G (p 398). The only variable that pointed to a normal distribution was 'Coping and adjustment', all other variables displayed positive skewness. The Detrended P-Plots illustrated skewness and kurtosis by displaying a lack of evenly distributed values above and below the horizontal line at zero, which Tabachnik and Fidell (2006) describe as 'the line of zero deviations from expected normal values' (p. 81).





9.10 Examining the Data for Outliers

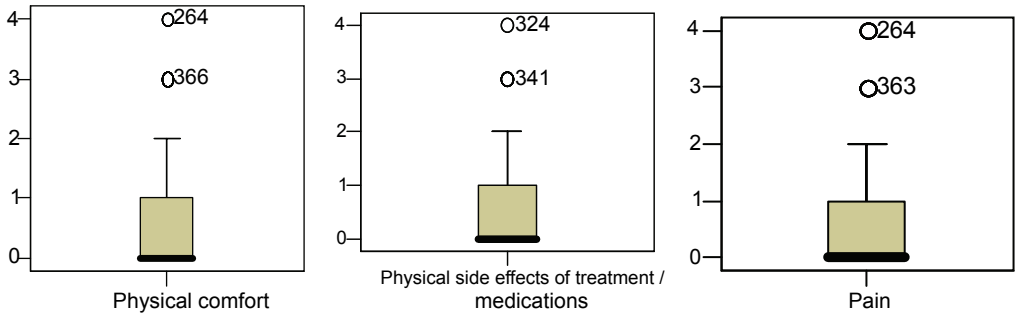
The data were examined for outliers i.e. scores that differ greatly from other comparable scores, using standardised z-scores and boxplots. The general recommendation for continuous variable analysis is that the statistical z-score should be used in conjunction with some graphical illustration to explore the incidence of outliers in the data. In a normal distribution, approximately 5% of the z-scores would be greater than 1.96 and 1% would be greater than 2.58, while no z-score would be greater than 3.29 (Field, 2005). However, the level of the z-score is dependent on the sample size and in a very large sample, z-scores in excess of 3.29 are expected to be observed (Tabachnik et al, 2006). In terms of visual inspection of the data, the boxplot is useful as it outlines the lowest and highest scores given for the variable for which it is plotted. These are illustrated by means of the horizontal line in the plot, where the top line indicates the highest scores and the bottom line indicates the lowest scores. The shaded area of the plot is indicative of the interquartile range and the distance between the top (bottom) edge of the shaded area. The top (bottom) horizontal line indicates the range between which the lowest 25% of scores fall i.e. the top (bottom) quartile (Field, 2005). The median is represented by the thick black line and if it lies at one end of the plot, skewness in the opposite direction is implied.

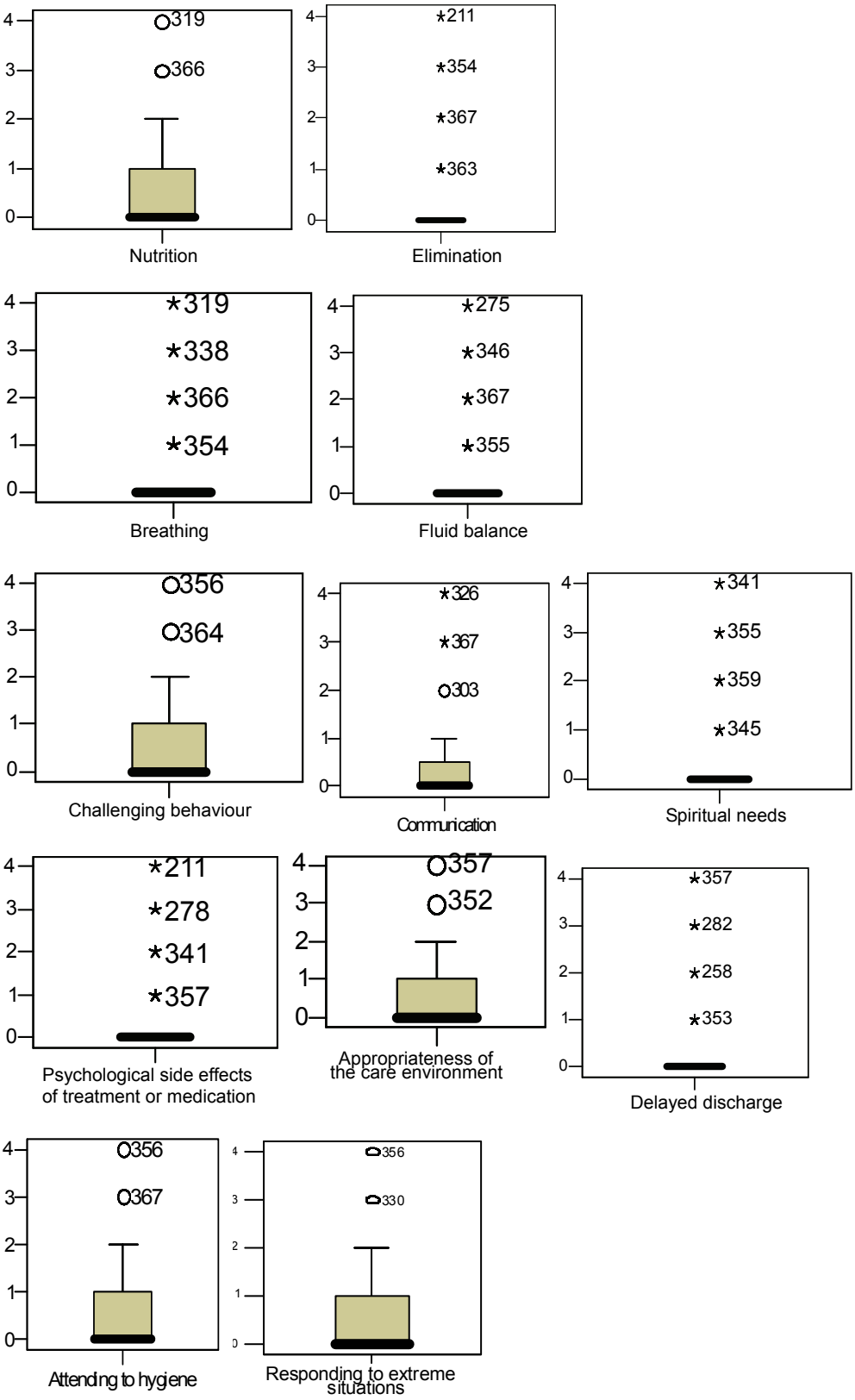
The z-scores for Day 1 of the I-NMDS (MH) were calculated and examined for extreme values. Table 32 below outlines the variables that observed z-scores above the 3.29 cut off point.

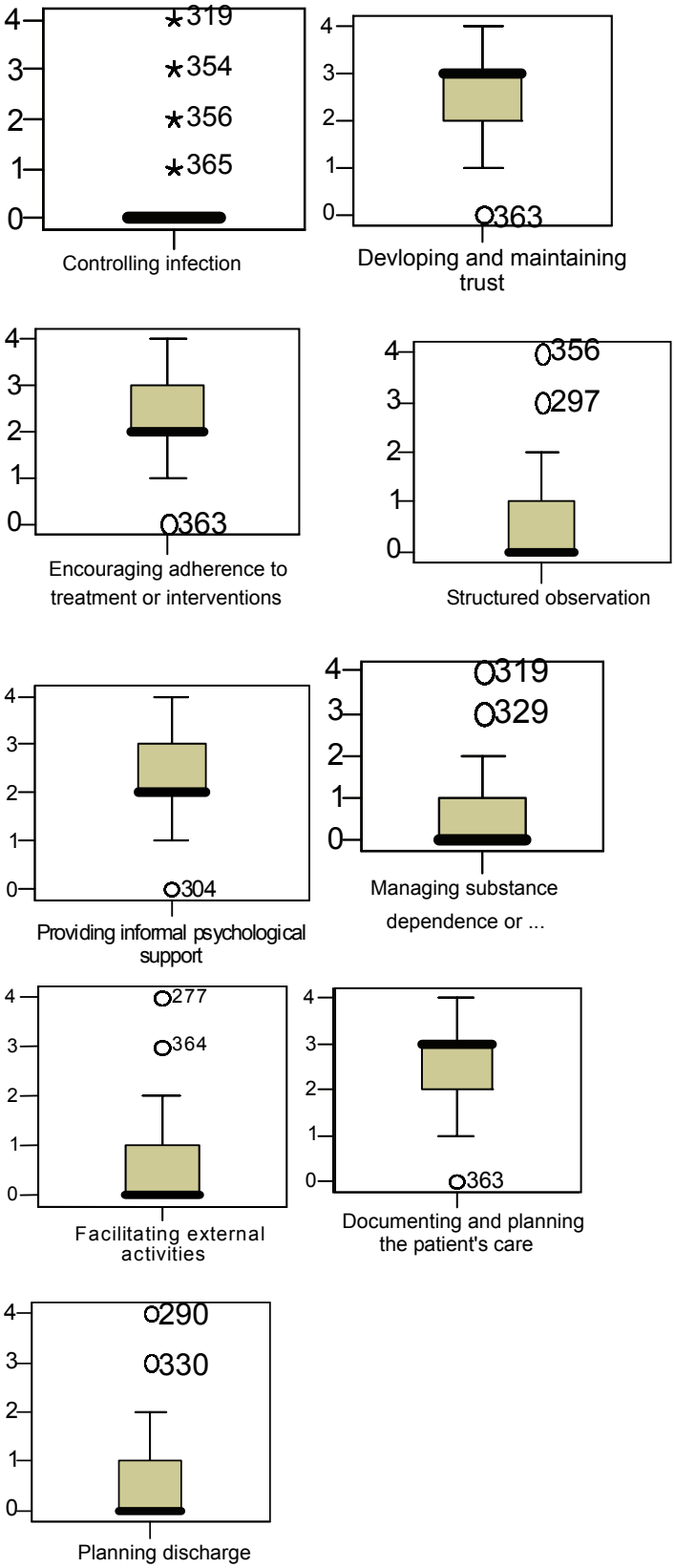
Table32 Significant Z-Scores Observed in Detecting Outliers

Variable	Z-Score
Physical side effects of treatment or medication	3.9
Pain	3.9
Elimination	4.1
Breathing	4.8
Fluid Balance	5.26
Communication	3.7
Spiritual Needs	4.96
Psychological side effects of treatment or medication	4.88
Delayed discharge	3.49
Controlling Infection	4.3

Examination of the z-scores clearly illustrated that there were a number of significant outliers within the data set for the variables 'Physical side effects of treatment or medication', 'Pain', 'Elimination', 'Breathing', 'Fluid balance', 'Communication', 'Spiritual needs', 'Psychological side effects of treatment or medication', 'Delayed discharge' and 'Controlling infection'. Further examination of outliers using boxplots indicated that many more variables had associated outliers, although not as significant as those outlined in Table 32 above. The majority of the variables represented by the boxplots below had a skewed distribution. As can be seen, there were a relatively large number of outliers in the data.




Nutrition
Elimination
Breathing
Fluid balance
Challenging behaviour
Communication
Spiritual needs
Psychological side effects of treatment or medication
Appropriateness of the care environment
Delayed discharge
Attending to hygiene
Responding to extreme situations



The boxplots indicated the extreme cases resulting in the outliers for each variable. It was evident, that most of these cases were from the same data

collection site i.e. those with ID codes 300 plus. These were mainly from the HSE West area and it may be that the higher ratings (resulting in the outliers) were due to organisational or other factors unique to this area. It was not appropriate to delete these cases as they were a legitimate part of the sample under investigation.

Because of the skewed and peaked/flatted nature of the data as well as the number of outliers, there was a chance that future analysis would be compromised unless data were altered in some way to improve distribution. On the other hand, it was also possible that the sample size for the analysis would cancel out problems arising from non-normality in the data. Because deletion of the cases outlined in the boxplots was not appropriate, transformation of the data was considered. While transformation of data can lead to problems in interpretation of findings, examining the distribution of the data post transformation is recommended (Tabachnik and Fidel, 2006).

9.11 Transformation of the Data

Tabachnik et al (2006) and Field (2005) recommend transforming data in all situations where there is non-normality, unless there is good reason not to do so e.g. when transformation makes interpretation of the results difficult. Transformation is appropriate for skewed data where the mean is not a good indicator of central tendency. Transformation is carried out for all scores for the variable being transformed. Transforming the data doesn't change the relationship between variables rather it changes the differences between variables as it serves to change the units of measurement (Field, 2005). A decision was made to transform the data, keeping in mind that the majority of the variables that deviated severely from normality were already highlighted for exclusion from future analysis. See Appendix G (p. 398) for a detailed overview of the decision process in the transformation of skewed variables and the resulting variable skewness and kurtosis scores.

Upon on transformation, it was found that, on a whole, transforming the data brought it more in line with a normal distribution. Skewness for some variables

was significantly reduced, e.g. for the variable 'Delayed discharge' skewness was reduced from S=2.608 to S=.256, post transformation. Similarly transformation had a positive effect on the kurtosis of many of the variables e.g. kurtosis for the variable 'Elimination' was reduced from K=4.977 to K=.419 post transformation. A number of the variables still had high levels of skewness and kurtosis after transformation, but there was a large reduction in the original skewness and kurtosis scores e.g. K=10.037 for 'Fluid balance' prior to transformation and K=to 2.84 post transformation.

For some variables, namely 'Longstanding anxiety', 'Family knowledge deficit', 'Independent living', 'Administering medication' and 'Supporting and managing care delivery', transformations failed to improve the distribution of the data. This was not considered a serious disadvantage as skewness and kurtosis scores for these variables were either below or only slightly above +/- 1. However, as indicated in the plots in Appendix G, after transformation a number of outliers remained. Nineteen cases in total were responsible for these outliers, four were noted to distort the distribution in more than one variable i.e. cases 207, 349, 351 and 361. Examination of the z-scores for these variables indicated that only the variable 'Spiritual needs' had outliers that were of particular concern i.e. z-score > 3.29 concern. See Table 33 below.

Table 33 Z-Scores for Transformed 'Problem Variables'

Variable	Z-Score	Percentage
Elimination	2.57	1.4
Breathing	2.87	.8
Fluid Balance	3.25	.8
Communication	2.38	2.2
Spiritual Needs	3.81	1.1
Psychological side effects of treatment or medication	2.77	1.1
Delayed discharge	3.06	4.4
Controlling Infection	2.69	1.4

Further examination of the frequencies of 'problem not present' and 'intervention not carried out' ratings for these variables indicated that if the 75% or more rule for elimination of variables in factor analysis was applied,

almost all of these variables would be eliminated from the data set. These ratings are outlined in Appendix G, Tables 3a and 3b. Frequencies observed included 'Elimination', 78% 'problem not present', 'Breathing', 81% 'problem not present', 'Fluid balance', 85% 'problem not present', 'Communication', 75% 'problem not present', 'Spiritual needs', 82% 'problem not present', 'Psychological side effects of treatment or medication', 77% 'problem not present', 'Delayed discharge', 82% 'problem not present' and 'Controlling infection', 79% 'intervention not carried out. The variable 'Communication' was just at the 75% cut off point for elimination and could therefore be justifiably removed. The majority of these variables were more relevant to general nursing and clients with physical ailments (e.g. problems with breathing, elimination, fluid balance and interventions related to controlling infection), while the variable 'Delayed Discharge' was only really applicable in the acute inpatient mental health setting. A decision to remove these variables from the data set merited looking at the skewness and kurtosis that they present with pre and post transformation as per Table 34 below.

Table 34 Skewness of Variables Considered for Elimination

Variable	Original S	Original K	Transformed S	Transformed K
Elimination	2.34	4.98	-1.48	0.419
Breathing	2.68	7.07	-1.71	1.21
Fluid balance	3.14	10.04	-2.13	2.84
Communication	2.17	4.01	-1.31	-0.05
Spiritual needs	2.96	8.99	-1.30	1.79
Psychological side effects of treatment or medication	2.69	7.78	-1.47	0.46
Delayed discharge	2.61	5.65	0.26	-1.50
Controlling infection	2.5	5.88	-1.61	0.826

Removal of these variables would have resulted in a cleaner data set bringing the distribution of the data closer to normality. Examination of Table 35 details the new levels of skewness and kurtosis in the data when data were transformed and the aforementioned offending variables were removed.

Table 35 Skewness and Kurtosis of Rectified Data Set

Variable	Skewness	Kurtosis
Physical comfort	0.93	-0.702
Physical side effects of treatment	0.92	-0.646
Pain	-1.25	-0.24
Nutrition	0.67	-1.07
Hygiene	0.69	-1.076
Longstanding anxiety	0.37	-1.16
Mood	-0.74	-0.727
Client knowledge deficit regarding illness	-0.57	-0.99
Challenging behaviour	0.98	-0.62
Appropriateness of the care environment	0.998	-0.64
Family knowledge deficit illness or treatment	1.0	0.01
Independent Living	0.46	-1.05
Administering medication	0.40	-1.23
Attending to hygiene	0.81	-0.85
Responding to extreme situations	-1.01	-0.779
Managing substance dependence or misuse	-0.91	-0.98
Supporting and managing care delivery	0.398	-1.03
Facilitating external activities	-1.04	-0.69
Liaising with multidisciplinary team members	-0.73	-0.82
Planning discharge	1.004	-0.69

9.12 Discussion

A total of 367 I-NMDS (MH) tools were returned over the course of the study data collection period. It is important to stress the convenience nature of the sample and the impact this can have on the generalisation of results. In situations where random sampling is not possible, maximising the size of the sample should be prioritised in order to attain representation of the population under investigation. A relatively large and representative sample was used in this study with a view to ensuring the generalisability of results.

In order to minimise the effects of missing data, outliers and deviations from assumptions underlying multivariate analysis, a data cleaning exercise was carried out prior to any further analysis. This involved examining the data for missing values, establishing the level of relevance of variables to mental health nursing, investigating the distribution of the data, identifying outliers on a case by case basis and consideration of the transformation of skewed and peaked variables prior to factor analysis. Day 1 data were used for analysis as it represented the largest volume of data collected and as such it would be used in the factor analysis of the I-NMDS (MH).

A missing values analysis was conducted to identify missing data in the I-NMDS (MH) data set and to facilitate the reliability and generalisability of results for future analysis. Examination of the 'not ignorable' missing data revealed a total of 7 I-NMDS (MH) tools with more than 40% missing data. This represented approximately 2% of the 367 tools collected. It is notable that all of the I-NMDS (MH) tools with 40% or more missing data represented nurses and clients from the community mental health setting. Within this group, missing data were by and large attributed to non-completion of the physical problems and interventions sections of the form. This reinforces the idea that medically oriented models of care are not entirely suited to the community based mental health nursing approach, highlighted in recent research in Ireland (Scott et al, 2006a).

While the amount of data identified as 'not ignorable' was small relative to the

overall sample, this problem should be highlighted in any future content and face validation studies for the tool. Close attention should be paid to the scale variables with the largest volume of missing data and respondents should be probed on reasons for non-completion, so that this type of missing data can be minimised in the future.

Examination of missing data on a per variable basis led to the conclusion that missing data for the variable 'Delayed discharge' was most likely due to sampling error, as client discharge activity is more relevant to inpatient care than community based care. Missing data for all of the variables except for ‘Overall physical wellbeing’ were missing at random, 'MAR'. Because only 5.5% or less of the data were found to be missing, these variables were not considered serious in terms of potential threats to analysis. The variable ‘Overall physical wellbeing’ was found to have data missing completely at random, 'MCAR', indicating a number of appropriate ways of dealing with the missing data in future analysis e.g. pairwise, listwise, replace with mean.

The result of the missing values analysis was the deletion of a total of 7 cases from the data set. This brought the usable sample size for analysis to 360, representing data for 160 clients from the acute inpatient mental health setting and 200 clients from the community mental health setting. This sample size was found to be favourable for factor analysis in that it led to a ratio of cases to variables of at least 10:1. In addition, this sample size pointed to the applicability of a factor loading cut off point anywhere between .3 and .35 in the interpretation of future factor analysis results (Hair et al, 2005).

As noted, 200 clients represented in this study were attending community based mental health services and 160 clients were attending acute inpatient mental health services. While this sample breakdown appears straightforward and sensible for analytic purposes, it poses problems due to the lack of definition across community based mental health services in Ireland. As discussed in Chapter One above, it is important to recognise that in mental health nursing in Ireland there is a lot of cross over between acute and non-acute community care. Many clients who are cared for in the community are considered to be

‘acute’ clients but acute inpatient care is not considered appropriate for these clients. Across the country there is a lack of definition of acute and non-acute community care. Day hospitals, by definition, are intended to provide acute care for community based clients. However, day hospitals do not exist in many of the HSE catchment areas where ‘day centres’ provide ‘day hospital’ appropriate care. Similarly, home based or domiciliary based care can be delivered to acute clients in one area and chronically ill clients in another (Mental Health Commission, 2006). As such, data were analysed according to ‘acute inpatient’ and ‘community based’ mental health nursing services, while recognising the existence of these sampling ambiguities.

Another important point relates to the lack of available demographic data collected for community mental health services nationally. This makes it very difficult to comment on how the community based sample compares with nationally collated figures. As such, comparisons within this discussion are mainly made with inpatient services.

At the time of data collection approximately 3,389 clients were attending mental health inpatient units in Ireland, indicating that the sample attending inpatient units represented approximately 5% of the total population. At this time, a total of 58 day hospitals in Ireland provided 1,022 client places. Data were collected for 37 clients attending day hospitals, representing approximately 4% of the overall population of day hospital clients in Ireland (Mental Health Commission, 2006). There were 106 day centres in Ireland providing a total of 2,486 places to approximately 9,000 clients when this study was conducted. Data were collected for 75 clients attending mental health day centres. This represents approximately 3% of the overall population of day centre clients in Ireland. A total of 77 clients for whom data were collected were receiving care in their homes. Unfortunately, it is not possible to indicate the percentage of the population that these participants represent as there is no comparable data in the public domain. Finally, 9% of clients for whom data were collected were attending community health centres. These clients could have been attending either a day hospital or a day centre as these services tend to be based within HSE health centres.

The potential for respondents to indicate that clients were attending health centres rather than day centres or day hospitals was not picked up during the content validation or piloting of the I-NMDS (MH) tool. The lack of information regarding the exact nature of the service that this 9% of clients were attending impeded a small part of the demographic description of the sample. However, it did not impede analysis relating to differences across the community based sample visa vie the acute inpatient based sample. This element of the demographic section of the I-NMDS (MH) however, should be clarified.

When examined according to HSE area, it was clear that the sample was representative of mental health nurses working across community and acute services nationally. The majority of the I-NMDS (MH) data represented clients and nurses in the HSE West area. It is proposed that this was due to the high level of interest nurse managers from hospitals in this region took in the study. A large number of I-NMDS (MH) tools were also returned from the HSE Dublin North East area. This may have been because this hospital and its services were affiliated with the university within which the research took place.

The majority of clients for whom data were collected had a diagnosis of mood disorder and schizophrenia, schizotypal and delusional disorders i.e. 38% and 31% respectively. Approximately 7% were diagnosed with behavioural and related disorders while diagnosis was not specified on 18% of the returned tools. Almost 40% of community based clients had a mood disorder diagnosis while 36% had schizophrenia, schizotypal and delusional disorders. Upon follow up telephone conversations with participants, it was found that mental health nurses were not familiar with the use of the ICD-10 diagnostic coding system in their everyday work. This finding was not uncovered in the feasibility/pilot phase of the study. As participants were asked to enter either the client diagnosis or ICD-10 code on the demographic section of the I-NMDS (MH), it is suggested that this question be revised prior to further use of the tool.

Of the clients within the acute inpatient setting, approximately 37% had mood disorder related diagnoses and 26% had schizophrenia, schizotypal and delusional disorders. These figures are not entirely in line with the national picture of inpatient diagnoses. At the time this study was carried out, approximately 34% of all inpatients had a diagnosis of schizophrenia and approximately 23% had a diagnosis of depressive or mania related disorder (Daly et al, 2006). Another interesting finding was that 62% of participants attending inpatient units were female while only 38% were male. In early 2006, the actual figure for males attending inpatient mental health units in Ireland was approximately 55%. It is difficult to explain the differences in the sample findings when compared to the overall national picture. It appears, for reasons unknown, that there was a tendency for nurses working in female only units to participate in the study over those working in male only units. Unit staffing and management factors may have been influential here.

Approximately 10% of the acute inpatient sample was over the age of 65 years and this compares with a national statistic of 33%. This finding is attributed to the fact that data were not collected from psychogeriatric units or services. Nationally, 63% of mental health clients are between the ages of 25 and 54 years. This compares well to the finding that approximately 55% of the sample were aged between 20 and 50 years.

Comparisons for the community based sample could not be made due to the lack of available data. The development of the WISDOM system to collect data for both inpatient and community mental health services, is under way within the Irish Health Research Board. It is anticipated that this system will bridge the obvious gap in basic, yet very important information regarding community mental health service use.

In preparation for future analysis, frequencies and percentage scores for each of the I-NMDS (MH) variables were examined. The main purpose of this exercise was to identify potentially irrelevant client problems and nursing interventions in the context of mental health nursing. As already stated, the I-NMDS (MH)

was developed using a sample of nurses working in both general and mental health care settings which indicated that some variables on the tool may have been more relevant to a general nursing context. According to Tabachnik et al (2006), the inclusion of redundant or irrelevant variables in any analysis can render the results
of that analysis unreliable. As such, a benchmark of 75% ‘problem not present’ or ‘intervention not carried out’ was used to identify variables with relatively high levels of irrelevance in mental health nursing. Again, variables highlighted as problematic or 'irrelevant' in the context of mental health nursing related to the more physical and medical aspects of healthcare e.g. ‘Elimination’, 'Breathing', ‘Fluid balance’, ‘Psychological side effects of treatment or medication’, 'Controlling infection'.

The I-NMDS (MH) development process led to the identification of client problem and nursing intervention variables that were both shared across general and mental health specialties and unique to mental health nursing. The variables outlined above were all found to be shared across general and mental health nursing and were therefore included in the first draft of the I-NMDS (MH) (Scott et al, 2006b). Another variable found to be irrelevant in the context of mental health nursing was 'Spiritual needs'. This may be due to the subjective nature of spirituality and resulting ambiguity in defining an individual's spiritual needs. Variable clarity is essential in tool design as lack of clarity impacts on reliability and validity of the tool. Finally, it is proposed that the variables ‘Delayed discharge’ and 'Psychological side effects of treatment or medication' are relevant to the acute inpatient group over and above the community based group. This is because client turnover and medication administration are more prevalent in inpatient care. In order to ensure that variables with high relevance to either acute inpatient or community based care are not excluded from the factor analysis of the I-NMDS (MH), examination of variable endorsement across groups will be important.

Before any major analysis of the data for the I-NMDS (MH) was carried out, the distribution of the data was examined. Skewness, kurtosis, boxplots, z-scores and histograms were used for this purpose. Boxplots (and P-plots) were

depended on to indicate data distribution due to the sample size distortion of skewness, kurtosis and z-scores. A number of variables were noted to have outliers and a non-normal distribution. While factor analysis generally does not depend on a normal distribution, normality is preferential when implementing a factor analysis that utilises goodness of fit tests (Hair et al, 2005). The variables 'Pain' (S=2.01, K=3.8), 'Elimination' (S=2.3, K=4.98) 'Breathing' (S=2.68, K=7.07) 'Fluid balance' (S=3.1, K=10) 'Communication' (S=2.17, K=4.01), 'Spiritual needs' (S=2.97, K= 8.9), 'Psychological side effects of treatment or medication' (S=2.69, K=7.78) 'Delayed discharge' (S=2.61, K=5.65) and 'Controlling infection' (S=2.497, K=5.877), were noted to be severely skewed or peaked i.e. S>2 and K>7, as per the guidelines from Curran et al, (1996).

It was proposed that goodness of fit tests be used in the factor analysis of the I-NMDS (MH). In this type of factor analysis, as with structural equation modelling, as data deviate more from assumptions of normality the ratio of cases to variables needs to be increased. While being mindful of the fact that a sample size of 360 resulted in a case to variable ratio of more than 10:1, a decision was made to transform skewed and peaked variables as there was potential for them to be included in factor analysis (i.e. if they were not eliminated over the course of a step-by-step approach to finding a final factor structure). Using the original data however would be preferable given controversies surrounding the use of transformed data in scale interpretation (Pallant, 2005, Tabachnik et al, 2006).

Following the examination of the distribution of the data it was proposed that exploratory factor analysis using the maximum likelihood extraction method and resulting goodness of fit statistics should proceed. The main reasons for this proposal were a) the variables considered to be severely skewed/peaked according to West et als' (1995) guidelines (skew > 2; kurtosis >7) would not be included in the analysis due to their irrelevance to mental health nursing b) the variables 'Pain' and 'Communication' only slightly exceeded the guideline of West et al (1995) and c) fit statistics are very useful in assessing how well the data actually fits the resulting factor model, therefore increasing the likelihood of acceptance of a valid structure for the scale.

9.13 Conclusion

Overall, data collected for the national validity and reliability testing of the I-NMDS (MH) represented approximately 4% of the mental health service user population in Ireland. Services across each of the 4 Health Service Executive areas were included in the study to ensure national representation. A small number of cases were deleted from the data set due to high levels of missing data. I-NMDS (MH) variables that were found not to be integral to the work of mental health nurses were highlighted for possible exclusion from further analysis to maximise the validity of future study findings. Finally, examination of the distribution of the data indicated problems with skewness, kurtosis and outliers for some study variables. In particular, it was noted that the majority of cases with outliers came from one community mental health facility. The retention of these cases was supported as it was possible that outliers resulted from the unique organisational aspects of this particular service. Furthermore, they came from legitimate and important participants in the study.

While it was anticipated that the large sample size would diminish potential problems with non-normal data, transformation of these variables was carried out for investigative purposes. While transformation improved the distribution of some study variables, it did not result in improved distribution for a number of other variables. The intention at this stage of the study was to use transformed variables in future analysis only if skewed variables were not eliminated from the data set through a step-by-step approach to factor analysis.

Finally, throughout this early analysis it was important to be mindful of the ambiguous definition of various services within community mental health in Ireland. For example, while the official function of the community mental health day centres in Ireland is to provide 'social care for service users, with an emphasis on rehabilitation and activation services' (Mental Health Commission, 2006), the function and activities of day centres go beyond this definition. It is not unusual for a combination of day hospital type services to be delivered within day centres and vice versa. Further to this, the very obvious deficit of community mental health service related information served to impede more comprehensive comparisons across study and national findings.

This problem served to further enforce the argument for the development of a reliable and valid Irish Nursing Minimum Data Set for mental health, to ensure the provision of quality and timely data to better manage mental health services in Ireland.

CHAPTER TEN

Findings:

Construct validity and reliability of the I-NMDS (MH)

10.1 Aim and Reporting Structure

The overall aim of this study was to establish the scale construct validity and reliability of the I-NMDS (MH). Scale construct validity testing was carried out to establish whether the I-NMDS (MH) measured the constructs it was designed to measure. If the I-NMDS (MH) was found to be aligned with the biopsychosocial model of care (Engel, 1980) and if it could significantly differentiate across client presentations and nursing interventions then construct validity would be inferred. The construct validity of the tool was established using exploratory factor analysis with maximum likelihood extraction of factors and direct oblimon PROMAX factor rotation. Discriminative analysis using ridit scores was also carried out for this purpose. Reliability of the scale was carried out by way of establishing the internal consistency of the subscales resulting from the factor analysis using Cronbach alpha scores. The Interrater reliability of the I-NMDS (MH) was also tested using weighted kappa and percentage agreement scores. As the interrater reliability research design and methodology differed from that used to test the construct and discriminative validity as well as the internal consistency and test retest reliability of the I-NMDS (MH), it is described independently in the Chapter Eleven below.

Ensuring that the I-NMDS (MH) had acceptable levels of validity and reliability was an important part of the development of this new nursing data collection tool. It was important both in terms of establishing its usability in the nursing setting and the reliability of data collected. While the tests used to infer validity reported herein were purely statistical, conceptual considerations were also emphasised in implementing decisions regarding variable elimination. The findings of this study are lengthy and are broken down according to:

- Preliminary examinations of the data using principal components analysis (PCA) to establlish the factorability of the data
- Examination of the factor structure of the I-NMDS (MH) problems and interventions scales using exploratory factor analysis (EFA)
- Establishing the internal consistency of the resulting problems and interventions scale factors
- Discriminative analysis of the I-NMDS (MH)

10.2 Preliminary Examination of the Data using Principal Components Analysis (PCA)

As already discussed in Chapter Nine (p. 154), the data were examined for variables that received low endorsement from respondents. Appendix G, Tables 3a to 3f detail the frequency scores observed for each variable on the I-NMDS (MH) scale. A benchmark of 75% or more 'problem not present' ratings was used to deal with outlying or 'irrelevant' and potentially unreliable variables. The variables that adhered to this cut off were examined across acute inpatient and community settings to see if there were differences in levels of variable endorsement across specialty. It was found that ratings for the variables 'Breathing', 'Fluid balance' 'Elimination' and 'Spiritual needs' adhered to the 75% or more 'problem not present' criteria across both acute inpatient and community mental health settings and were therefore considered appropriate for elimination from analysis. Examination of the ratings for the variables 'Psychological side effects of treatment or medication', 'Delayed discharge' 'Communication' and 'Controlling infection' indicated that they should be retained for further analysis due to the fact that they received 'problem not present' ratings of 70%, 67%, 71% and 66% respectively in the acute inpatient setting. See Appendix G, Tables 3c to 3f for a breakdown of variable frequencies per specialty.

The elimination of variables 'Breathing', 'Fluid balance', 'Elimination' and 'Spiritual needs' improved the ratio of cases to variables and therefore made the sample size more desirable for factor analysis.

In line with the recommendations proposed by Tabachnik et al, (2006) prior to conducting exploratory factor analysis, data were explored using principal components analysis (PCA) with the oblique VARIMAX rotation. This was done in order to verify the factorability of the data and to establish the number of factors to extract for both the problems and interventions scales. Missing values were dealt with using the EM algorithm. The findings of this analysis are outlined independently for the problems and the interventions scales in sections 10.3 and 10.4 below.

10.3 Findings of PCA for the I-NMDS (MH) Problems Scale

10.3.1 Correlation among Variables

In order to ensure the applicability of factor analysis to the I-NMDS (MH) data, there must be sufficient correlations between the variables. Examination of the correlation matrix resulted in the observation of a number of correlations of r=0.3 or greater, indicating appropriate factorability of the data (Pallant, 2005). The correlation matrix was also examined for any variables that correlated with no other variable on the scale. If these are found, they should be eliminated from the data set. As such, the significance value for each correlated variable was examined. If the majority of significance values for a variable are above the .05 level, that variable should be deleted (Field, 2005). No such variables were found in the correlation matrix, although 'Pain' did have a high incidence of significance values over .05. The correlation matrix can be found in Table 1, Appendix H.

The data were also checked for singularity across variables. No variables correlated above .9, indicating that singularity was not a problem within the data. The highest correlating variables were 'Longstanding anxiety' and 'Anxiety or fear linked to current stressors', which correlated at .734 and 'General well-being' and 'Overall social well-being' which correlated at .78 and 'Overall social well-being' and 'Social skills' which had a correlation of .736.

Bartlett's Test of Sphericity results were examined to further investigate the significance of correlations among the variables. The results of this test should be statistically significant at the p< .05 level for the data to be appropriately correlated for the purpose of factor analysis. As can be seen from Table 36, below Bartlett's Test of Sphericity indicated a significant number of correlations among variables in the data. It should be noted that this test is sensitive to sample size and that the size of the study sample (n=360) may have caused an increase in the significance of the correlations. However, a number of parallel examinations of correlations were carried out and the overall findings indicated that the data were well suited to factor analysis.

10.3.2 Sampling adequacy

The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy is also indicated in Table 36. This measure is indicative of sampling adequacy for the data set as a whole. As can be seen, the KMO value for the data set was .875. A KMO value of .8 and above is considered good, with the cut off for acceptable factorability of the data set at .5 or more (Hair et al, 2005). Examination of the measures of sampling adequacy for individual variables was carried out using the Anti-image correlation matrix. As no value along the diagonal was below .5, good sampling adequacy on a per variable basis was found to exist.

Table 36 KMO and Bartlett's Test: Problems

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.875
Bartlett's Test of Sphericity	Approx. Chi-Square	5461.837
	df	496
	Sig.	.000

All of the above tests established that it was appropriate to proceed with factor analysis for the I-NMDS (MH) problems scale. These tests also served to maximise the design and statistical conclusion validity of the research study.

10.3.3 PCA to Decide on the Number of Factors to Extract

Deciding on the number of factors to extract is a controversial area in factor analysis, given that Kaiser's criterion can over or under-estimate the number of factors to extract and the scree test criterion can be difficult to interpret. Parallel analysis is a more recent test to help decide on the number of factors to extract for analysis (O'Connor, 2000). This involves extracting eigenvalues from random data sets that parallel the actual data set with regard to the number of cases and variables. A random score matrix of the same rank of the actual data is created with scores of the same type represented in the data set. The eigenvalues derived from the actual data are then compared with the eigenvalues of the random data and factors retained are based on the *i-th* eignvalue from the actual data being greater than the *i-th* eignvalue of the random data (O'Connor, 2000). With the controversies surrounding factor extraction in mind, it was appropriate to establish the number of factors to extract from the data using Kaiser's criterion, the scree test criterion and parallel analysis.

When using Kaiser's criterion, examination of the communalities can assist in determining the number of factors to extract. As per Table 2, Appendix H (p. 418), it can be seen that 77% and 78% of variance for the variables 'Anxiety or fear linked to current stressors' and 'Overall social well-being' respectively was shared variance, while only 41% of the variance associated with the variable 'Communication' was shared variance. Almost all of the problem variables on the I-NMDS (MH) had a high level of shared variance, i.e. above .5. This is important when considering exploratory factor analysis. Only variance for 'Communication', 'Adherence to treatment or medication' and 'Psychological side effects of treatment or medication' fell below this level (but above the .4 level), indicating that there was a relatively high amount of error and /or unique variance at play for these variables. Because the sample size exceeded 250 and the average communality was above .6 (.62) Kaiser's criterion could be used to decide on number of factors to extract (Field, 2005).

Using Kaiser's criterion, the 'Total Variance Explained Table' pointed to 7

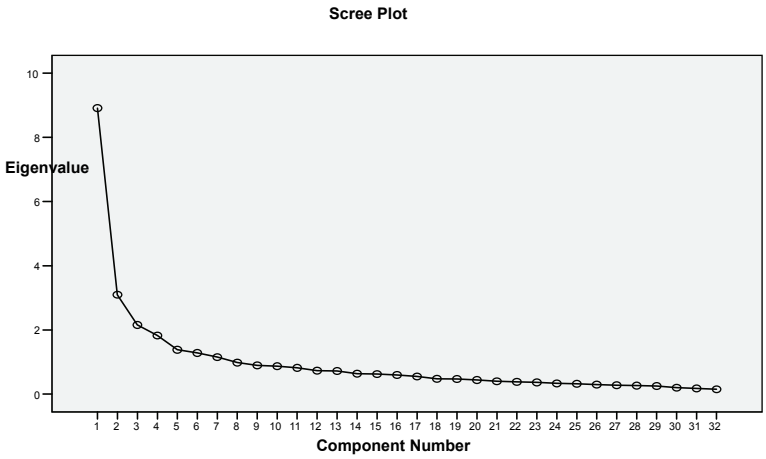
factors, explaining 62% of the variance in the data, (See Table 37).

Table 37 *Total Variance Explained: Problems*

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	8.9	27.85	27.85	8.91	27.84	27.85	3.52	11.00	11.00
2	3.09	9.67	37.52	3.09	9.67	37.52	3.49	10.91	21.91
3	2.15	6.73	44.25	2.15	6.73	44.25	3.27	10.23	32.14
4	1.82	5.67	49.95	1.82	5.69	49.95	3.25	10.16	42.30
5	1.38	4.31	54.27	1.38	4.32	54.27	2.5	7.81	50.11
6	1.28	4.01	58.27	1.28	4.01	58.27	2.05	6.42	56.52
7	1.15	3.60	61.87	1.15	3.60	61.87	1.71	5.35	61.87

In addition to using Kaiser's criterion, the scree plot was used to establish the number of factors to extract from the problems scale data. As per Figure 4 below, the scree plot pointed to the extraction of approximately 4 factors i.e. according to those points above the elbow of the plot.

Figure 4 Scree Plot (B) for I-NMDS (MH) Problems Scale



Parallel analysis was run using the syntax outlined by O'Connor (2000). Table 38 below outlines the results and decisions on factor retention as per the parallel analysis.

Table 38 Results of Parallel Analysis

Actual PCA Analysis	Parallel Analysis	Decision
8.911	1.603	Accept
3.095	1.523	Accept
2.154	1.463	Accept
1.824	1.410	Accept
1.382	1.363	Accept
1.282	1.32	Reject
1.152	1.28	Reject

The scree plot and parallel analysis suggested the extraction of 4 or 5 factors from the data while Kaiser's criterion suggested the extraction of 7 factors. Looking at the component matrix in Table 4, Appendix H, the decision to retain 4 - 5 factors appeared to be supported i.e. most variables loaded quite strongly on the first 4 components but a high number of variables also loaded above .3 on the 5th component.

The findings of the principal components analysis indicated that there were sufficient levels of correlations in the data and that the sample size was appropriate for factor analysis to proceed. Furthermore, it indicated that approximately 5 factors should be extracted from the problems scale data.

10.4 Findings of PCA for the I-NMDS (MH) Interventions Scale

In line with analysis of the I-NMDS (MH) problems scale, the data collected using the I-NMDS (MH) interventions scale was explored using PCA with a VARIMAX rotation. This was done in order to explore the factorability of the data and to establish the number of factors to be retained for factor analysis.

10.4.1 Correlation among Variables

Examination of the correlation matrix resulted in the observation of a number of correlations at or above r=.3, indicating appropriate factorability of the data (Pallant, 2005). All variables correlated with other variables in the correlation matrix. Upon examination of the significance value for each correlated variable, it was noted that no single variable had a high incidence of significance values above .05. The highest correlations in the matrix were between the psychological intervention 'Encouraging adherence to treatment or medication' and 'Developing and maintaining trust' (.665) as well as 'Informally monitoring psychological condition' (.695). High correlations were also noted between the coordination and organisation of care variables 'Focused discussion with other nurses' and 'Documenting and planning care' (.675). As no variables correlated above .9, singularity was not deemed to be a problem within the data set. See Table 3, Appendix H.

Bartlett's test of sphericity was examined to further investigate the significance of correlations among the variables. As per Table 39 below Bartlett's test of sphericity indicated a significant number of correlations among variables in the data for factor analysis to be considered appropriate.

Table 39 KMO and Bartlett's Test: Interventions

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.919
Bartlett's Test of Sphericity	Approx. Chi-Square	4853.422
	df	351
	Sig.	.000

10.4.2 Sampling adequacy

The KMO measure of sampling adequacy indicated that the KMO value for the data set was .919. As already discussed, a KMO value of .8 and above is considered good, with the cut off for acceptable factorability of the data set at above .5. Further to this, the sampling adequacy was examined at an individual

variable level using the Anti-image correlation matrix. As no value along the diagonal was below .5, good sampling adequacy on a per variable basis was observed.

10.4.3 PCA to Decide on the Number of Factors to Extract

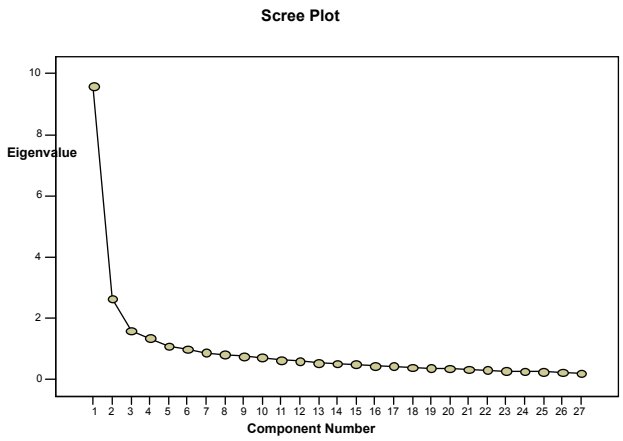
In examining how many factors should be extracted from the data, Kaiser's criterion indicated the extraction of 5 factors, explaining 60% of the variance in the data. See Table 40 below.

Table 40 *Total Variance Explained: Interventions*

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	9.59	35.53	35.53	9.59	35.53	35.53	5.31	19.68	19.68
2	2.63	9.74	45.27	2.63	9.74	45.27	3.27	12.13	31.81
3	1.59	5.90	51.18	1.59	5.90	51.18	2.79	10.32	42.13
4	1.35	5.00	56.18	1.35	5.00	56.18	2.62	9.69	51.82
5	1.08	4.01	60.19	1.08	4.01	60.19	2.26	8.37	60.19

The scree plot inferred the extraction of approximately 3 factors from the data. See Figure 5 below.

Figure 5 *Scree Plot for I-NMDS (MH) Interventions Scale*



As per the analysis of the I-NMDS (MH) problems scale, parallel analysis was run using the syntax outlined by O'Connor (2000). Table 41 below outlines the results and decisions on factor retention using parallel analysis. In line with the scree plot, this inferred the retention of 4 factors.

Table 41 Results of Parallel Analysis

Actual PCA Analysis	Parallel Analysis	Decision
9.593	1.54	Accept
2.630	1.46	Accept
1.594	1.396	Accept
1.351	1.344	Accept
1.082	1.299	Reject
.992	1.26	Reject

The findings of the principal components analysis indicated that there were sufficient levels of correlations in the data and that the sample size was appropriate for factor analysis to proceed. Furthermore, it indicated that between 3 and 5 factors should be extracted from the interventions scale data.

10.5 Examination of the Factor Structure of the I-NMDS (MH) Problems Scale Using Exploratory Factor Analysis.

Exploratory factor analysis of the I-NMDS (MH) problems scale was carried out using the maximum likelihood extraction method and the oblimon, PROMAX rotation. The decision to accept and report on the maximum likelihood (ML), PROMAX analysis was based on the fact that ML goes some way to establish confirmation of the fit of the data to the factor model (Fabrigar 1999). Furthermore, it supports statistical methodologies used to determine the number of factors to be retained for further analyses e.g. confirmatory factor analysis (Alguire et al 1994). The direct oblimon PROMAX rotation assumes correlations between variables, tends to result in a simple factor structure and maximises factor loadings within factors. As the aim of the exploratory factor analysis was to obtain theoretically meaningful factors behind the scale variables, PROMAX rotation was appropriate.

A step-by-step approach to the exploratory factor analysis procedure was adopted. This analysis and reanalysis endorsed the view that deciding on the most appropriate number of factors to represent a data set is both a substantive and empirical issue (Fabrigar et al. 1999, Hair et al. 2005). Between 4 and 6 factors were extracted from the data to establish the most appropriate number of factors for the final model. The 4 factor model was rejected in favour of the 5 factor model. This was because the goodness of fit score for the 4 factor model was poor, with a Normed X^2 goodness of fit score of .35, and a borderline acceptable RMSEA score of .083. The 6 factor model was rejected in favour of the 5 factor model as, despite its favourable goodness of fit scores (Normed X^2 goodness of fit score = .026 and RMSEA = .07), this model appeared to be over extracted with only 2 variables loading on factor 6. Both statistically and conceptually the 5-factor model was found to be the best suited to the data. The 5-factor model produced a good fit of the model to the data and it led to the acceptance of the hypothesised biopsychosocial model of care. As will be discussed, this model resulted in acceptable levels of internal consistency for each of the resulting subscales and was found to be stable when examined with data collected on Day 2 of the study.

In order to achieve a simple factor structure for the 5 factor model, the step-by-step approach to analysis was continued. The communalities observed for the 5 factor model are outlined in Table 42 below.

As can be seen, a number of the extracted values fell below the desirable communality score of .5 or above. This indicates that some variables in the problems scale had relatively low levels of common variance. While this was something to be concerned about, it is recommended that such variables are left within the initial factor model and highlighted for examination in future studies using the scale (Tabachnik et al, 2006). For this reason, these variables were not immediately eliminated from the analysis. However, specific attention had to be paid to the variables ‘Physical side effects of treatment or medication’, ‘Psychological side effects of treatment or medication’, ‘Communication’ ‘Hygiene’, ‘Sleep disturbance’, ‘Challenging behaviour’ and ‘Delayed discharge’. These variables resulted in communality values close to 0. See

Table 42 below.

Table 42 Table of Communalities - ML PROMAX 5-Factor Model

Variable	Initial	Extraction
Physical comfort	.562	.529
Physical side effects of treatment / medications	.318	.171
Weakness and fatigue	.536	.514
Pain	.496	.364
Nutrition	.391	.345
Hygiene	.384	.267
Sleep disturbance	.432	.267
Overall physical well-being	.651	.629
Anxiety or fear linked to current stressors	.675	.780
Longstanding anxiety	.642	.624
Mood	.553	.526
Thought and cognition	.438	.427
coping and adjustment	.533	.509
Client knowledge deficit regarding illness or treatment	.483	.508
Challenging behaviour	.359	.282
Communication	.352	.193
Level of motivation	.443	.332
Trust in others	.456	.425
Adherence to treatment or medication	.344	.308
Psychological side effects of treatment or medication	.277	.122
Overall psychological well-being	.661	.670
Social disadvantage	.432	.368
Appropriateness of the care environment	.500	.331
Delayed discharge	.420	.193
Level of social support from significant others	.549	.558
Family knowledge deficit illness or treatment	.622	.652
Family coping	.575	.614
Independent Living	.545	.458
Social Stigma	.566	.511
Social skills	.639	.620
Overall social well-being	.792	.874
General well-being	.712	.700

A factor loading cut off of .35 was applied to the analysis as it was appropriate for a sample size greater than 350 (Hair et al, 2005). The pattern matrix for the ML PROMAX 5-factor model of the I-NMDS (MH) problems scale indicated that, at a factor loading cut off of .35, the following variables were unreliable and should be considered for deletion from the data set: 'Overall psychological well being' (cross-loaded at .388), 'Social disadvantage' (cross-loaded at .36)

'Psychological side effects of treatment or medication' (failed to load above .35), 'Delayed discharge' (failed to load above .35), and 'Physical side effects of treatment / medications' (failed to load above .35). See Tables 43a and 43b below. Note that Table 43a outlines all factor loadings, while Table 43b outlines the factor loadings above .3. Variables are organized according to the factors into which they fall. This reporting structure is replicated throughout.

Table 43a Pattern Matrix ML PROMAX 5-Factor Model

	Factor				
Problem Variable	**1**	**2**	**3**	**4**	**5**
Client knowledge deficit regarding treatment	.789	.089	-.092	.006	-.124
Thought and cognition	.653	-.122	-.062	-.043	.132
Trust in others	.585	.144	.057	-.036	-.042
Adherence to treatment or medication	.577	.109	-.063	-.022	-.059
Challenging behaviour	.503	.055	-.120	-.059	.103
coping and adjustment	.481	-.121	.339	-.017	.072
Overall psychological well-being	.478	-.113	.388	.052	.130
Communication	.353	-.084	-.206	.102	.219
Family knowledge deficit illness or treatment	.120	.781	.088	.021	-.126
Level of social support from significant others	-.006	.721	.015	.002	.040
Family coping	.171	.678	.050	.021	-.013
Appropriateness of the care environment	-.052	.464	-.077	.096	.201
Social disadvantage	-.193	.436	-.020	.001	.360
Anxiety or fear linked to current stressors	-.157	.031	.976	-.041	-.041
Longstanding anxiety	-.287	.033	.854	.065	.051
Mood	.238	-.018	.643	-.043	-.106
Sleep disturbance	.090	.025	.387	.192	-.108
Physical comfort	-.210	.046	.052	.740	-.009
Overall physical well-being	.047	.018	.102	.731	-.028
Pain	-.096	.018	-.088	.649	-.011
Weakness and fatigue	.037	-.044	.184	.633	-.059
Nutrition	.183	.020	-.055	.494	.071
Hygiene	.105	-.016	-.235	.358	.338
Physical side effects of treatment / medications	.082	.054	.018	.338	.029
Psychological side effects of treatment	.187	.047	-.017	.189	.058
Overall social well-being	-.036	.092	.109	-.078	.874
Independent Living	-.024	.047	-.180	.073	.700
Social skills	.123	.054	-.002	-.092	.695
General well-being	.112	.100	.198	-.018	.601
Social Stigma	.039	.230	.113	-.068	.498
Level of motivation	.131	-.150	.189	.136	.377
Delayed discharge	.058	.246	-.164	-.018	.267

Table 43b Pattern Matrix ML PROMAX 5-Factor Model

Problem Variable	**Factor**				
	1	**2**	**3**	**4**	**5**
Client knowledge regarding treatment/illness	.789				
Thought and cognition	.653				
Trust in others	.585				
Adherence to treatment or medication	.577				
Challenging behaviour	.503				
Coping and adjustment	.481				
Overall psychological well-being	.478		.388		
Communication	.353				
Family knowledge deficit illness or treatment		.781			
Level of social support from significant others		.721			
Family coping		.678			
Appropriateness of the care environment		.464			
Social disadvantage		.436			.360
Anxiety or fear linked to current stressors			.976		
Longstanding anxiety			.854		
Mood			.643		
Sleep disturbance			.387		
Physical comfort				.740	
Overall physical well-being				.731	
Pain				.649	
Weakness and fatigue				.633	
Nutrition				.494	
Hygiene				.358	
Physical side effects of treatment/medication					
Psychological side effects of treatment					
Overall social well-being					.874
Independent Living					.700
Social skills					.695
General well-being					.601
Social Stigma					.498
Level of motivation					.377
Delayed discharge					

In line with previous analysis, the variables highlighted for potential elimination from the data set were considered in terms of their valid percentage scores i.e. whether or not they were considered client problems that were sufficiently encountered in mental health nursing. The results of the examination of the valid percentage scores are outlined in Table 44 below.

Table 44 Valid Percentage Score for Rating of Problem Variables

Variable	Overall Psychological Well being	Psychological Side Effects	Physical Side Effects	Delayed Discharge	Social Disadvantage
% Problem not present	19%	77%	63%	82%	52%

As already discussed in Chapter Seven above (pg 95) indicator variables were included in initial analysis to facilitate the early indication of construct validity. As can be seen from the pattern matrix, Table 43b, all indicator variables loaded according to their relevant factors i.e. the variable 'Overall physical well-being' loaded with other physical variables, the variable 'Overall social well-being' loaded with social variables and the variable 'Overall psychological well-being' cross-loaded across two psychologically oriented factors. Finally the variable 'General well-being' loaded with social problem variables which was deemed to be appropriate given that overall wellbeing is associated with being able to function well in everyday life and in society in general.

A number of different analyses were next run in an effort to get a statistically robust yet conceptually sensible factor structure for the data. This involved running the analysis with the elimination and retention of various statistically 'unreliable' variables. In previous analyses to eliminate irrelevant variables, the variables 'Psychological side effects of treatment or medication' and 'Delayed discharge' were considered for elimination but retained due to their level of endorsement across the acute inpatient and community settings. However, at this stage of the analysis, the same two variables were being highlighted as unreliable variables within the data set and as such, previous suspicions regarding their lack of reliability were largely validated. Furthermore, these variables observed very low communality scores, both below 2.

Although they appeared to be problematic within the structure of the scale, the elimination of the variables 'Physical side effects of treatment or medication' and 'Social disadvantage' were not considered appropriate at this stage of the

analysis due to their level of clinical relevance. In progressing with the analysis, it was decided to eliminate indicator variables as they had served their early validation purpose and were overly generic for inclusion in the final factor structure of the scale.

Following analysis without the indicator variables and the variables 'Delayed discharge' and 'Psychological side effects of treatment and/or medication' the pattern matrices outlined in Tables 45a and 45b below were observed.

Table 45a Pattern Matrix ML PROMAX 5-Factor Model

Problem Variable	Factor				
	1	2	3	4	5
Physical comfort	-.127	.035	.041	.870	.054
Physical side effects of treatment/medication	.139	.059	.072	.243	.005
Weakness and fatigue	.108	-.034	.240	.481	-.026
Pain	.028	.001	-.097	.745	-.015
Nutrition	.221	.035	.052	.277	.112
Hygiene	.112	-.015	-.115	.205	.486
Sleep disturbance	.138	.032	.417	.047	-.146
Anxiety or fear linked to current stressors	-.117	.034	.928	.003	-.077
Longstanding anxiety	-.310	.015	.901	.026	.142
Mood	.248	-.048	.636	-.023	-.107
Thought and cognition	.678	-.138	-.002	-.061	.080
coping and adjustment	.494	-.097	.349	-.025	.031
Client knowledge deficit regarding illness..	.702	.034	-.048	.015	-.026
Challenging behaviour	.539	.037	-.104	.016	.016
Communication	.491	-.094	-.176	.130	.123
Level of motivation	.233	-.112	.272	.027	.340
Trust in others	.569	.098	.080	-.001	-.048
Adherence to treatment or medication	.530	.082	-.029	-.022	-.051
Social disadvantage	-.131	.528	-.013	-.049	.230
Appropriateness of the care environment	-.087	.467	-.036	.069	.259
Level of social support from significant other	-.093	.779	-.020	.021	.044
Family knowledge deficit illness or treatment	.080	.846	.031	.019	-.201
Family coping	.135	.727	.013	.043	-.075
Independent Living	-.009	.107	-.058	-.073	.786
Social Stigma	.212	.362	.115	-.100	.178
Social skills	.291	.206	.025	-.105	.404

As can be seen in the Pattern Matrix in Table 45b below, (i.e. the pattern matrix where variables are organised on a per factor and factor loading basis), a relatively clean factor structure resulted when a factor-loading cut off of .35 was applied. This factor-loading cut off was applied to maximise variable retention and clinical utility of the I-NMDS (MH).

Table 45b Pattern Matrix ML PROMAX 5-Factor Model Without 'Indicator' and 'Unreliable' Variables

	Factor				
Problem Variable	**1**	**2**	**3**	**4**	**5**
Client knowledge deficit regarding illness..	.702				
Thought and cognition	.678				
Trust in others	.569				
Challenging behaviour	.539				
Adherence to treatment or medication	.530				
coping and adjustment	.494				
Communication	.491				
Family knowledge deficit illness or treatment		.846			
Level of social support from significant others		.779			
Family coping		.727			
Social disadvantage		.528			
Appropriateness of the care environment		.467			
Social Stigma		.362			
Anxiety or fear linked to current stressors			.928		
Longstanding anxiety			.901		
Mood			.636		
Sleep disturbance			.417		
Physical comfort				.870	
Pain				.745	
Weakness and fatigue				.481	
Nutrition					
Physical side effects of treatment/medications					
Independent Living					.786
Hygiene					.486
Social skills					.404
Level of motivation					

Because the variables ‘Nutrition’ and ‘Physical side effects of treatment and / or medication’ loaded onto factor 4 below the .35 factor loading cut off, it was statistically advisable to remove them from the factor structure. These variables were relatively well endorsed by mental health nurses with observations of 63% and 56% of respondents rating them as ‘problem not present’. However, a decision was made to eliminate them from the final factor model in order to ensure that the scale was statistically reliable.

A final run of the analysis was carried out and resulted in a simple factor structure for the I-NMDS (MH) problems scale. This factor structure can be found in Tables 46a and 46b below. While the variable ‘Coping and adjustment’ cross loaded across the two psychologically oriented factors 1 and 3, the score of .36 on factor 3 is only slightly above the .35 cut off point. As this variable was considered integral to mental health client presentation and rehabilitation, it was retained in the final factor structure (the percentage ‘problem not present’ score for this variable was a very low 19%).

Table 46a Pattern Matrix Final ML PROMAX 5-Factor Model

Problem Variable	**Factor**				
	1	**2**	**3**	**4**	**5**
Physical comfort	-.080	.042	.060	.871	.069
Weakness and fatigue	.091	-.016	.271	.437	-.008
Pain	.080	.006	-.080	.743	-.009
Hygiene	.116	-.010	-.107	.198	.485
Sleep disturbance	.113	.043	.432	.026	-.138
Anxiety or fear linked to current stressors	-.111	.033	.924	.003	-.076
Longstanding anxiety	-.293	.011	.889	.027	.137
Mood	.249	-.049	.639	-.019	-.104
Thought and cognition	.672	-.137	.005	-.052	.083
coping and adjustment	.478	-.092	.360	-.024	.040
Client knowledge deficit regarding illness	.692	.039	-.035	.018	-.022
Challenging behaviour	.551	.033	-.102	.029	.016
Communication	.500	-.096	-.167	.134	.131
Level of motivation	.215	-.107	.281	.017	.350
Trust in others	.564	.100	.089	.002	-.045
Adherence to treatment or medication	.513	.088	-.018	-.026	-.047
Social disadvantage	-.139	.525	-.015	-.050	.237
Appropriateness of the care environment	-.080	.463	-.037	.068	.263
Level of social support from significant other	-.088	.777	-.022	.025	.046
Family knowledge deficit illness or treatment	.075	.847	.037	.013	-.197
Family coping	.144	.726	.015	.046	-.075
Independent Living	-.010	.103	-.066	-.068	.780
Social Stigma	.193	.361	.118	-.101	.186
Social skills	.289	.199	.021	-.092	.41

Table 46b Pattern Matrix Final ML PROMAX 5-Factor Model

Problem Variable	**Factor**				
	1	**2**	**3**	**4**	**5**
Client knowledge deficit regarding illness	.692				
Thought and cognition	.672				
Trust in others	.564				
Challenging behaviour	.551				
Adherence to treatment or medication	.513				
Communication	.500				
Coping and adjustment	.478		.360		
Family knowledge deficit illness..		.847			
Level of social support from significant other		.777			
Family coping		.726			
Social disadvantage		.525			
Social Stigma		.361			
Anxiety or fear linked to current stressors			.924		
Longstanding anxiety			.889		
Mood			.639		
Sleep disturbance			.432		
Physical comfort				.871	
Pain				.743	
Weakness and fatigue				.437	
Independent Living					.780
Hygiene					.485
Social skills					.412
Level of motivation					.350

This factor model explained 58% of the variance in the data (see Table 47) and was found to fit the data well. Both the Normed X^2 and RMSEA goodness of fit scores for this model were desirable at 2.6 and .067 respectively. Generally a Normed X^2 score of 3 or less is associated with well fitting models, while an RMSEA score below .1 is considered acceptable, with better fitting models producing RMSEA scores below .08 (Hair et al, 2005). See Tables 47 and 48 below for the results of the variance explained and goodness of fit for this factor model.

Table 47 Total Variance Explained Table, Final Problems 5 Factor Model

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rot Sums Squared Loadings
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	6.52	27.160	27.16	5.84	24.33	24.33	4.57
2	2.47	10.276	37.44	2.08	8.67	33.00	4.28
3	1.90	7.921	45.36	1.45	6.02	39.02	3.87
4	1.73	7.200	52.56	1.26	5.24	44.25	1.85
5	1.27	5.288	57.84	.795	3.31	47.57	3.11
6	.968	4.03	61.88				
7	.890	3.71	65.59				
8	.843	3.51	69.1				
9	.784	3.27	72.36				
10	.735	3.06	75.43				
11	.695	2.9	78.32				
12	.604	2.52	80.84				
13	.561	2.34	83.18				
14	.531	2.21	85.39				
15	.488	2.03	87.42				
16	.485	2.02	89.44				
17	.406	1.69	91.14				
18	.389	1.62	92.76				
19	.382	1.59	94.35				
20	.325	1.35	95.70				
21	.298	1.24	96.94				
22	.282	1.17	98.12				
23	.245	1.02	99.14				
24	.207	.86	100.00				

Table 48 Goodness of Fit Test Results

Chi-Square	df	Sig.
438.407	166	.000

10.6 Internal Consistency of the I-NMDS (MH) Problems Scale

The internal consistency of the resulting sub scales was examined using the Cronbach alpha scores. This was done with a view to establishing sub scale reliability. The observed results for this were as follows:

Factor One observed a Cronbach alpha score of .74. This score could not have been improved by the deletion of any variable within the factor.
Factor Two observed a Cronbach alpha score of .829. This score could not be improved upon with deletion of any variables from the sub scale.
Factor Three observed a Cronbach alpha score of .796. This score could have been improved upon, to a score of .821, with the deletion of the variable 'Sleep disturbance'. This was not advisable given the high level of reliability observed for this sub scale.
Factor Four observed a Cronbach alpha score of .731. This score could have been improved upon with the deletion of the variable 'Weakness and fatigue'. The deletion of this variable would have increased the reliability score to .782. The deletion of this variable was not advised given the good level of reliability observed for this factor and the fact that only three variables were included in this section of the I-NMDS (MH). At least 3 variables needed to be included in this and any sub-scale for meaningful results from future analysis to come about (Hair et al, 2005, Tabachnik et al, 2006).
Factor Five observed a Cronbach alpha score of .716. Again, this could not have been improved upon with the deletion of any other variable within this factor.

All of the resulting factors were found to have acceptable levels of internal consistency i.e. above the cut off point of an alpha score of .7. It is accepted that co-efficient scores for each sub-scale should be 0.7 or above to indicate good internal consistency (Nunnally & Bernstein 1994, Pallant, 2005). This indicated that the I-NMDS (MH) problems scale possessed good internal reliability i.e. the variables within the sub scales were well placed together. Further to this, examination of the factor correlation matrix below indicated

that the factors on the problems scale were independent of one another and therefore served to measure different types of client problems (See Table 49 below). The fact that the factor correlations were at or below .5 indicated that they were not high enough to cause concern with singularity across 2 or more factors. Correlations rising significantly above .5 would generally indicate factorial dependence.

Table 49 *Factor Correlation Matrix*

Factor	1	2	3	4	5
1	1.000	.506	.461	.046	.463
2	.506	1.000	.372	.083	.447
3	.461	.372	1.000	.240	.255
4	.046	.083	.240	1.000	.112
5	.463	.447	.255	.112	1.000

A factor naming system was applied to the final I-NMDS (MH) factorial model. This naming system was as follows:

Factor 1: Client insight
Factor 2: Social support
Factor 3: Emotional health
Factor 4: Physical health
Factor 5: Social independence

10.7 Examination of the Factor Structure of the I-NMDS (MH) Interventions Scale Using Exploratory Factor Analysis.

In line with the analysis of the I-NMDS (MH) problems scale, exploratory factor analysis of the interventions scale was carried out using the maximum likelihood extraction method and the oblimon, PROMAX rotation. Again, a step-by-step approach was taken to the factor analysis. Preliminary exploratory factor analysis of the I-NMDS (MH) interventions scale included all interventions, both direct and indirect (i.e. all interventions plus 'Coordination and Organisation of Care Activities'). While endorsement of the variable 'Controlling infection' was over the 75% cut off point, 66% of respondents

considered it to be a ‘problem not present’ within the acute inpatient setting and it was therefore retained for analysis. In total, between 2 and 4 factors were extracted from the data. The 2 factor model for the interventions data explained only 45% of the variance in the data and observed a poor 3.9 Normed X^2 goodness of fit score. The RMSEA score for this model was a borderline .09. The 4 factor model observed better goodness of fit scores with a Normed X^2 score of .026 and an RMSEA score of .067. Conceptually, the 4 factor model appeared to lack clarity in terms of biopsychosocial distinctions across factors.

This model had a number of high cross loading variables that were important in the area of psychosocial care i.e. ‘Providing informal psychological support’, ‘Documenting and planning the patients care’ and ‘Facilitating links between the family and significant other and the multi-disciplinary team’. When considered in terms of both conceptual and statistical implications of model acceptance, this model was rejected in favour of the 3-factor model.

The 3-factor model was accepted over the 2 and 4 factor models as it was conceptually sensible, it was in line with the hypothesised biopsychosocial model of care (Engel, 1980) and it was a statistically good fit to the interventions data. Table 52b below outlines the resulting ML PROMAX 3-factor model for the interventions data.

In line with the analysis of the problems scale, a number of variables observed communality scores below .5. See Table 50 below for an outline of the communality scores. The variables causing most concern included 'Responding to extreme situations', 'Responding to altered thought and cognition', 'Managing substance dependence or misuse' and 'Work in relation to social skills'. As already outlined, all of the variables with low communalities could be retained for analysis, but should be treated with caution in future analysis.

Table 50 Table of Communalities - ML PROMAX 3-Factor Model

Intervention Variable	*Initial*	*Extraction*
Administering medication	.470	.505
Monitoring, assessing and evaluating physical condition	.507	.530
Attending to hygiene	.474	.435
Responding to extreme situations	.321	.219
Controlling infection	.336	.315
Developing and maintaining trust	.625	.649
Encouraging adherence to treatment or interventions	.640	.656
Informally monitoring or evaluating psych functioning	.659	.687
Structured observation	.385	.315
Responding to altered thought and cognition	.332	.275
Providing informal psychological support	.635	.664
Managing mood	.617	.579
Managing Anxiety	.485	.422
Teaching skills and promoting health	.618	.544
Dealing with the person's information needs	.598	.588
Advocating	.523	.443
Managing substance dependence or misuse	.295	.206
Supporting the family	.510	.386
Work in relation to social skills	.393	.289
Supporting and managing care delivery	.527	.519
Facilitating external activities	.443	.312
Facilitating links between the family or significant other & MDT	.614	.614
Focused discussion with other nurses	.611	.509
Documenting and planning the patient's care	.629	.484
Liaising with multidisciplinary team members other than nurses	.561	.499
Admitting and initial assessment of the patient	.472	.269
Planning discharge	.475	.314

As can be seen in Table 51 below, this model explained 45% of the variance in the data. In keeping consistent with the problems scale analysis, the .35 factor loading cut off was applied to this model.

Table 51 Total Variance Explained: Interventions 3-Factor Model

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings Total
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	
1	9.59	35.53	35.53	9.02	33.41	33.41	7.58
2	2.63	9.74	45.27	2.15	7.97	41.38	7.41
3	1.59	5.90	51.18	1.05	3.91	45.28	4.56
4	1.35	5.00	56.18				
5	1.08	4.01	60.19				
6	.99	3.68	63.86				
7	.87	3.22	67.09				
8	.81	2.99	70.07				
9	.76	2.81	72.88				
10	.71	2.64	75.52				
11	.63	2.34	77.86				
12	.60	2.21	80.07				
13	.54	1.99	82.07				
14	.52	1.92	83.98				
15	.50	1.83	85.82				
16	.44	1.63	87.44				
17	.43	1.60	89.04				
18	.39	1.44	90.48				
19	.36	1.3	91.83				
20	.35	1.30	93.13				
21	.33	1.22	94.35				
22	.30	1.11	95.47				
23	.28	1.02	96.49				
24	.26	.98	97.46				
25	.25	.92	98.39				
26	.23	.87	99.25				
27	.20	.75	100.00				

As can be seen from the pattern matrix, Table 52a below, the variables 'Teaching skills and promoting health' and 'Managing anxiety' cross-loaded at .419 and .358 respectively. The cross loading of .358 for the variable 'Managing anxiety' was not considered a serious deviation from the .35 cut off and this variable was retained for further analysis. The higher cross loading of .419 for the variable 'Teaching skills and promoting health' was deemed to be serious and as such, it was excluded from any further analysis. The retention of this variable was considered prior to its elimination due to its relevance to mental health nursing i.e. only 12% of participants rated this intervention as 'not carried out'. Scale utility was prioritised at this point and it was not included in any further analysis. Furthermore, it was felt that other more reliable variables in the data set were conceptually similar to 'Teaching skills and promoting health'. For example, while singularity across variables was not observed, 'Providing informal psychological support' and 'Dealing with the persons information needs' did conceptually cross over with this particular nursing intervention. This point is addressed further in section 10.14 below. Tables 52a and 52b outline the pattern matrix for this factor structure, organised on a per factor and factor loading basis.

The variable 'Responding to extreme situations' was also excluded from further analysis as it failed to load above the .35 factor loading cut off point.

Table 52a Pattern Matrix ML PROMAX 3-Factor Model

Intervention Variable	***Factor***		
	1	***2***	***3***
Administering medication	.056	-.094	.731
Monitoring, assessing and evaluating physical condition	.238	-.060	.649
Attending to hygiene	-.139	.077	.662
Responding to extreme situations	.000	.247	.301
Controlling infection	-.121	.136	.530
Developing and maintaining trust	.945	-.282	.057
Encouraging adherence to treatment or interventions	.809	-.082	.134
Informally monitoring or evaluating psych functioning	.864	-.096	.071
Structured observation	.096	.165	.412
Responding to altered thought and cognition	.396	.005	.232
Providing informal psychological support	.840	.010	-.117
Managing mood	.583	.307	-.184
Managing Anxiety	.429	.358	-.268
Teaching skills and promoting health	.470	.419	-.249
Dealing with the person's information needs	.315	.582	-.156
Advocating	.231	.456	.069
Managing substance dependence or misuse	.058	.398	.034
Supporting the family	.072	.525	.091
Work in relation to social skills	.143	.410	.046
Supporting and managing care delivery	.122	.416	.335
Facilitating external activities	-.199	.416	.350
Facilitating links between the family or significant other & MDT	-.098	.784	.119
Focused discussion with other nurses	.395	.226	.257
Documenting and planning the patient's care	.520	.154	.138
Liaising with MDT members other than nurses	.185	.486	.155
Admitting and initial assessment of the patient	.050	.431	.100
Planning discharge	-.231	.647	.074

Table 52b Pattern Matrix ML PROMAX 3-Factor Model

Intervention Variable	**Factor**		
	1	**2**	**3**
Developing and maintaining trust	.945		
Informally monitoring or evaluating psych functioning	.864		
Providing informal psychological support	.840		
Encouraging adherence to treatment or interventions	.809		
Managing mood	.583		
Documenting and planning the patient's care	.520		
Teaching skills and promoting health	.470	.419	
Managing Anxiety	.429	.358	
Responding to altered thought and cognition	.396		
Focused discussion with other nurses	.395		
Facilitating links between the family or significant other & MDT		.784	
Planning discharge		.647	
Dealing with the person's information needs		.582	
Supporting the family		.525	
Liaising with MDT members other than nurses		.486	
Advocating		.456	
Admitting and initial assessment of the patient		.431	
Supporting and managing care delivery		.416	
Facilitating external activities		.416	
Work in relation to social skills		.410	
Managing substance dependence or misuse		.398	
Administering medication			.731
Attending to hygiene			.662
Monitoring, assessing and evaluating physical condition			.649
Controlling infection			.530
Structured observation			.412
Responding to extreme situations			

In continuing the step-by-step approach, analysis was re-run without the variables 'Teaching skills and promoting health' and 'Responding to extreme situations'. The resulting factor structure indicated a very slight cross-loading of the variable 'Facilitating external activities' at .351 and failure of the variable 'Work in relation to social skills' to load above the .35 cut off point. This variable was only slightly off the cut off at .344 (a difference of .06). However, the goodness of fit scores for this factor structure were not definitive. The Normed X^2 goodness of fit score was a borderline 3.4, while the RMSEA

was a more acceptable .076.

In order to ensure the development of a scale that was valid for clinical use, the analysis was run, this time without the variable ‘Facilitating external activities’. This variable endorsement was low among mental health nurses with an observation of 70% ‘problem not present’ ratings. The variable ‘Work in relation to social skills’ was retained as it observed 35% ‘intervention not carried out’ ratings and was considered therefore to be integral to mental health nursing work. This final analysis resulted in a simple 3-factor structure for the data with no cross loading variables and no variables failing to load above the .35 factor loading cut-off point. See the pattern matrices in Table 53 and Table 54.

Table 53 Final Pattern Matrix ML PROMAX 3-Factor Model

Interventions	**Factor**		
	1	**2**	**3**
Administering medication	.034	-.078	.710
Monitoring, assessing and evaluating physical condition	.217	-.077	.678
Attending to hygiene	-.169	.026	.744
Developing and maintaining trust	.946	-.251	.019
Encouraging adherence to treatment or interventions	.812	-.064	.097
Informally monitoring or evaluating psych functioning	.876	-.098	.049
Structured observation	.091	.177	.373
Responding to altered thought and cognition	.400	.002	.209
Providing informal psychological support	.844	-.002	-.117
Managing mood	.584	.307	-.199
Managing Anxiety	.455	.315	-.271
Dealing with the person's information needs	.306	.582	-.169
Advocating	.208	.476	.058
Managing substance dependence or misuse	.050	.425	-.006
Supporting the family	.029	.603	.041
Work in relation to social skills	.147	.361	.071
Supporting and managing care delivery	.084	.448	.320
Facilitating links between family or signific antother & MDT	-.127	.829	.068
Focused discussion with other nurses	.370	.260	.224
Documenting and planning the patient's care	.483	.227	.089
Liaising with MDT team members other than nurses	.150	.563	.082
Admitting and initial assessment of the patient	.019	.520	.021
Planning discharge	-.245	.707	-.015
Controlling infection	-.159	.148	.549

Table 54 Final Pattern Matrix ML PROMAX 3-Factor Model

Interventions	Factor		
	1	2	3
Developing and maintaining trust	.946		
Informally monitoring or evaluating psych functioning	.876		
Providing informal psychological support	.844		
Encouraging adherence to treatment or interventions	.812		
Managing mood	.584		
Documenting and planning the patient's care	.483		
Managing Anxiety	.455		
Responding to altered thought and cognition	.400		
Focused discussion with other nurses	.370		
Facilitating links between family or significant other & MDT		.829	
Planning discharge		.707	
Supporting the family		.603	
Dealing with the person's information needs		.582	
Liaising with MDT members other than nurses		.563	
Admitting and initial assessment of the patient		.520	
Advocating		.476	
Supporting and managing care delivery		.448	
Managing substance dependence or misuse		.425	
Work in relation to social skills		.361	
Attending to hygiene			.744
Administering medication			.710
Monitoring, assessing and evaluating physical condition			.678
Controlling infection			.549
Structured observation			.373

This simple 3-factor model served to explain 46% of variance in the data. See Table 55 below.

The Normed X^2 goodness of fit score for this model was an acceptable 3 while the RMSEA also indicated an acceptable fit at .075 (Hair et al, 2005). The raw results of the goodness of fit test are outlined below in Table 56.

Table 55 Total Variance Explained, Final 3-Factor Model

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	
1	8.863	36.930	36.930	8.321	34.672	34.672	7.093
2	2.303	9.595	46.525	1.822	7.591	42.263	7.005
3	1.557	6.488	53.013	1.042	4.343	46.606	4.344
4	1.231	5.129	58.142				
5	.996	4.148	62.291				
6	.863	3.594	65.884				
7	.801	3.336	69.220				
8	.763	3.180	72.401				
9	.707	2.946	75.347				
10	.624	2.600	77.947				
11	.578	2.409	80.356				
12	.531	2.211	82.567				
13	.524	2.181	84.748				
14	.445	1.856	86.604				
15	.416	1.732	88.336				
16	.410	1.707	90.043				
17	.383	1.594	91.637				
18	.352	1.469	93.106				
19	.336	1.400	94.506				
20	.324	1.352	95.858				
21	.284	1.183	97.040				
22	.263	1.094	98.135				
23	.238	.993	99.128				
24	.209	.872	100.00				

Table 56 Goodness of Fit Test Results

Chi-Square	df	Sig.
627.182	207	.000

10.8 Internal Consistency of the I-NMDS (MH) Interventions Scale

The internal consistency of the resulting sub scales was examined using the Cronbach alpha scores. In line with the analysis of the I-NMDS (MH) problems scale, this was done with a view to establishing sub scale reliability.

The observed results for this were as follows:

Factor 1 observed a Cronbach alpha score of .891 with a slight increase to .896 with the deletion of the variable 'Responding to altered thought and cognition'. The deletion of this variable was not considered appropriate given the high level of internal consistency already found for this factor.

Factor 2 observed a Cronbach alpha score of .861. The level of internal consistency for this factor could not be improved with the deletion of any further variables.

Factor 3 observed a Cronbach alpha score of .768. Again this score could not be improved upon further variable deletion from the factor.

All of the factors were found to have acceptable levels of internal consistency i.e. above the cut off point of an alpha score of .7 to indicate good internal consistency (Nunnally & Bernstein 1994, Pallant, 2005). This finding indicated that the I-NMDS (MH) interventions scale possessed good internal reliability.

Further to this, examination of the factor correlation matrix for this model indicated factorial independence between factors 1 and 3 and factors 2 and 3. However, a correlation of .675 between factors 1 and 2 indicated that there was some dependence between these factors at play. This was not entirely surprising given the psychological nature of the variables in factor 1 and the social and supporting nature of the variables in factor 2. See Table 57 below for the results of the factor correlations.

Table 57 Factor Correlation Matrix

Factor	1	2	3
1	1.000	.675	.390
2	.675	1.000	.512
3	.390	.512	1.000

A factor naming system was devised for the resulting factorial model as follows:

Factor 1: Psychological care

Factor 2: Client and family support

Factor 3: Physical care

10.9 An illustration of the Variables and Factors in the Construct Validated I-NMDS (MH)

In deciding on the final factor structure for the I-NMDS (MH), relative factorial independence was observed, stability over time was observed and internal consistency was observed. Furthermore, clinical relevance of the scale variables was maintained, in so far as it was possible to do so, while obtaining a statistically and conceptually appropriate factor structure for the scale. A decision was made to accept the initial 3-factor nursing interventions model i.e. including direct and indirect interventions, as it observed acceptable levels of statistical fit and was thought to be conceptually sensible for the purpose of categorising nursing intervention based activities. It is important to note that continued validity and reliability studies of the I-NMDS (MH) will be required in the future to get a more comprehensive understanding of the scales overall usability and reliability within the clinical setting. The resulting factor structure and corresponding naming system for the I-NMDS (MH) was as follows:

Problems Scale

Factor 1: Client insight
Client knowledge deficit regarding illness or treatment
Thought and cognition
Trust in others
Challenging behaviour
Adherence to treatment or medication
Communication
Coping and adjustment

Factor 2: Social support
Family knowledge deficit illness or treatment
Level of social support from significant others
Family coping
Social disadvantage
Appropriateness of the care environment
Social Stigma

Factor 3: Emotional health
Anxiety or fear linked to current stressors
Longstanding anxiety
Mood
Sleep disturbance

Factor 4: Physical health
Physical comfort
Pain
Weakness and fatigue

Factor 5: Social independence
Independent Living
Hygiene
Social skills
Level of motivation

Interventions Scale

Factor 1: Psychological care
Developing and maintaining trust
Informally monitoring or evaluating psychological functioning
Providing informal psychological support
Encouraging adherence to treatment or interventions
Managing mood
Documenting and planning the patient's care
Managing anxiety
Responding to altered thought and cognition
Focused discussion with other nurses

Factor 2: Client and family support
Facilitating links between the family or significant other and multidisciplinary team
Planning discharge
Supporting the family
Dealing with the person's information needs
Liaising with multidisciplinary team members other than nurses
Admitting and initial assessment of the patient
Advocating
Supporting and managing care delivery
Managing substance dependence or misuse
Work in relation to social skills

Factor 3: Physical care
Attending to hygiene
Administering medication
Monitoring, assessing and evaluating physical condition
Controlling infection
Structured observation

The naming system was derived according to the higher loading variables per factor. The factor names were then considered by a mental health nursing professional for verification purposes.

10. 10 Confirmatory Factor Analysis

A post hoc test to assess the stability of the factor structure and to confirm the factor structure observed in exploratory factor analysis was carried out. Day 2 data collected for the validation of the I-NMDS (MH) was used to confirm the fit of the problems data to the proposed model, post exploratory factor analysis. As this data set consisted of the same participants as the Day 1 data set used for the exploratory factor analysis of the scale, the results should be interpreted with caution. The 5 factor model, resulting from exploratory factor analysis, was specified for the I-NMDS (MH) problems scale using the AMOS statistical package with maximum likelihood estimation. The factor loadings that resulted from this analysis are outlined in Table 58 below.

Table 58 Factor Loadings I-NMDS (MH) Problems Scale

Problem Variable	Factor	Loading
Sleep	Emotional Health	.438
Anxiety or fear linked to current stressors	Emotional Health	.834
Longstanding anxiety	Emotional Health	.802
Mood	Emotional Health	.670
Physical comfort	Physical Problems	.760
Pain	Physical Problems	.686
Weakness and fatigue	Physical Problems	.579
Independent living	Social Independence	.746
Hygiene	Social Independence	.486
Social skills	Social Independence	.812
Motivation	Social Independence	.634
Family knowledge deficit regarding illness	Social Support	.742
Level of social support from family or significant other	Social Support	.775
Family coping	Social Support	.779
Social disadvantage	Social Support	.612
Appropriateness of the care environment	Social Support	.624
Social stigma	Social Support	.623
Client knowledge regarding treatment or illness	Client Insight	.772
Thought and cognition	Client Insight	.700
Trust	Client Insight	.704
Challenging behaviour	Client Insight	.606
Adherence to treatment or medication	Client Insight	.613
Coping and adjustment	Client Insight	.667
Communication	Client Insight	.440

All factor loadings were significant at the .001 level

As can be seen from these results, all of the variables, except for 'Sleep disturbance', 'Hygiene' and 'Communication' loaded onto their respective factors above the recommended .5 factor loading cut off point for confirmatory factor analysis (Hair et al, 2005). At a minimum, all factor loadings should be significant for a variable to be associated with a corresponding factor (Hair, 2005). As all the factor loadings were significant and because they deviated only marginally from the .5 cut off, these findings were encouraging and inferred the factor strucutre of the tool was relatively stable.

The Normed X^2 goodness of fit for this model was 3.1, just at the recommended 3:1 ratio of the chi:df (Hair et al, 2005). The RMSEA goodness of fit score observed for this model was acceptable .077, while the CFI goodness of fit score was .837, under the .9 cut off point for a good fit to be observed (Hu and Bentler, 1999, Hair et al, 2005).

The same procedure was carried out to confirm stability and the factor structure of the I-NMDS (MH) interventions scale. Day 3 data collected for the validation of the I-NMDS (MH) for mental health was used to confirm the fit of the interventions data to the proposed 3 factor model resulting from exploratory factor analysis and to determine the stability of the factor structure. The factor loadings that resulted from this analysis are outlined in Table 59 below.

Table 59 Factor Loadings I-NMDS (MH) Interventions Scale

Intervention Variable	Factor	Loading
Developing and maintaining trust	Psychological Interventions	.767
Encouraging adherence to treatment and medication	Psychological Interventions	.794
Informal monitoring /evaluating psychological condition	Psychological Interventions	.830
Informal psychological support	Psychological Interventions	.784
Responding to altered thought and cognition	Psychological Interventions	.553
Managing mood	Psychological Interventions	.754
Managing anxiety	Psychological Interventions	.614
Documenting and planning care	Psychological Interventions	.732
Focused discussion with other nurses	Psychological Interventions	.640
Facilitating link between family/significant other and the MDT	Client and Family Support	.745
Planning discharge	Client and Family Support	.515
Dealing with the person's information needs	Client and Family Support	.683
Supporting the family	Client and Family Support	.603
Liaising with MBT members other than nurses	Client and Family Support	.672
Advocating	Client and Family Support	.732
Managing/supporting care delivery	Client and Family Support	.734
Admitting and assessing	Client and Family Support	.642
Work in relation to social skills	Client and Family Support	.584
Managing substance dependence or misuse	Client and Family Support	.554
Attending to hygiene	Physical Interventions	.563
Administering medication	Physical Interventions	.689
Monitoring, assessing and evaluating physical condition	Physical Interventions	.788
Structured observation	Physical Interventions	.577
Controlling infection	Physical Interventions	.446

All factor loadings were significant at the .001 level

As can be seen from these results, all of the variables, except for 'Controlling infection' loaded onto their respective factors above the recommended .5 factor loading cut off point for confirmatory factor analysis (Hair et al, 2005). All of the factor loadings were significant. 'Controlling infection' had previously been found to be relatively poorly endorsed by nurses inferring that it should be further investigated in future studies using the I-NMDS (MH) interventions scale. The goodness of fit results for this analysis were mixed. The Normed X^2 goodness of fit for this model was an unacceptable 3.9, and the RMSEA score for the interventions scale was .091, just under the more liberal .1 level of acceptability according to Hair et al, (2005). The CFI score observed for this model was .805 and therefore below the .9 benchmark for an acceptable fit (Hu

and Bentler, 1999). Again these findings were encouraging in terms of the stability of the structure of the tool.

10.11 Findings of the Discriminative Validity Test of the I-NMDS (MH)

Discriminative validity is essentially a form of construct validity. The discriminative validity of the I-NMDS (MH) was carried out using ridit analysis (Bross, 1958). As already described in Chapter Seven, the aim of the study of the discriminative validity was to examine the ability of the I-NMDS (MH) to adequately discriminate between the level of problems and interventions across single client groups (acute inpatient and community based mental health client groups) and the reference group (all clients in this study).

In total, 1578 days of client data were collected and used in the calculation of ridit scores. Individual ridit scores were calculated for each of the variables on the I-NMDS (MH). Ridit scores were calculated according to Griens et al's directions (2001). In reporting on the discriminative validity of the I-NMDS (MH), it was decided that focus should be given to client problems and nursing interventions according to factors that resulted from the previous study to factor analyse the I-NMDS (MH).

It was hypothesised that problems within the 'Client Insight' factor and those within the 'Emotional Health' factor would be more highly rated for the acute inpatient mental health clients. This was because they were in receipt of 'acute' inpatient care and would be expected to have more severe psychological problems than those clients attending community based mental health services. Ridit scores for all of these problem/ intervention factors were calculated and graphed and are discussed below. Because previous research found that self-care is significantly associated with high levels of psychiatric client hospital readmissions, it was hypothesised that the client problem variables within the 'Social Independence' factor would be more severe in the acute inpatient setting (e.g. Lyons et al 1997). It was also hypothesised that interventions within the 'Psychological Care' factor would be more intensive for acute inpatient clients than for corresponding community based clients.

Frequency scores per rating i.e. ‘problem not present’, ‘minor problem’, ‘moderate problem’, ‘severe problem’ etc. were calculated for the reference group for each of the 5 days for which data were collected. Then the frequency scores for respective acute inpatient and community client groups were calculated as a total score for the 5 days of data collection. An excel macro was developed for fast computation of ridit scores (O'Brien, 2006). All of the frequency scores were entered into an excel sheet and the macro produced ridit scores for the individual client groups.

Ridits per I-NMDS (MH) factor are depicted below in the form of the fingerprint. The ‘0’ point on the fingerprint graphs below represents the point against which the individual group scores are compared i.e. the reference group (Sermeus et al 1996). Interpretation of the fingerprints, according to Goossen et al (2001) is as follows: When the bar is positioned to the right of the ‘0’ point, it infers that clients in this unit or ward have a higher chance of having the client problem or being in receipt of the nursing intervention compared, to the average of all wards or units (i.e. community and acute inpatient units). Conversely, when the bar is positioned to the left of the ‘0’ point, clients in this ward or unit type will have a lower chance of having the client problem or be in receipt of the nursing intervention compared with the average of all wards and units.

Figures 6 to 10 below detail the fingerprint graphs for the I-NMDS (MH) problems scale factors. As was hypothesised, clients in the acute inpatient setting experienced more severe levels of problems related to client insight, emotional health and social independence than those in the community based setting. Specifically, the ridits and fingerprints illustrated that clients in the acute inpatient setting were more likely to experience problems related to mood, thought and cognition and independent living. Note that the physical health problems relating to sleep and weakness obtained ridit values of 0. For this reason they are not visible on the fingerprint graph.

Figure 6 *Fingerprint Graph for Emotional Health*

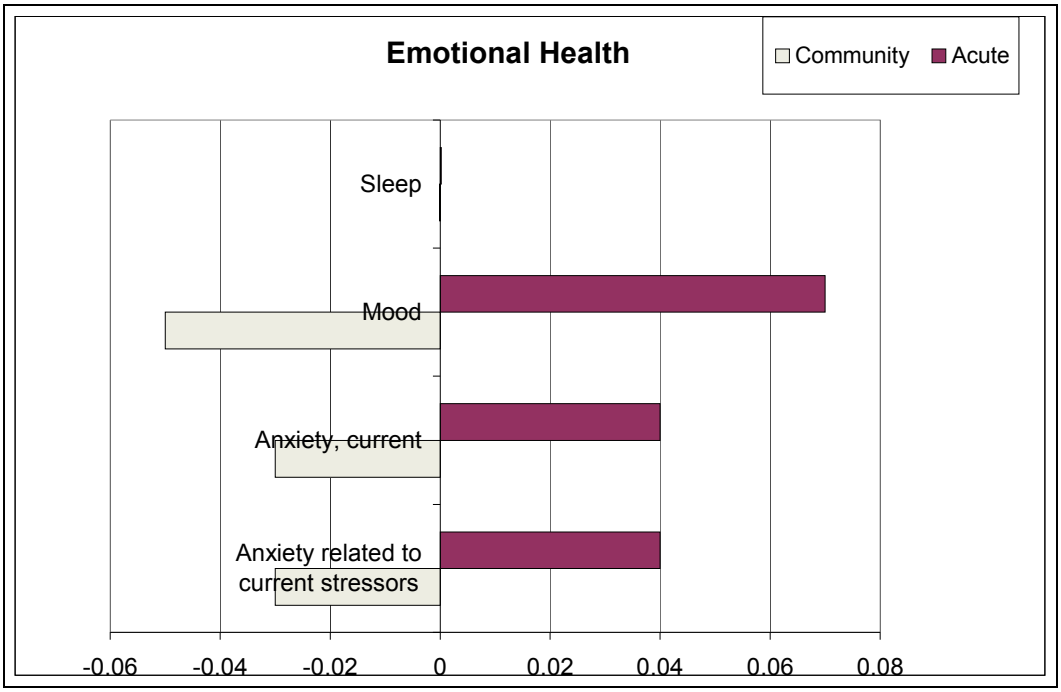


Figure 7 *Fingerprint Graph for Client Insight*

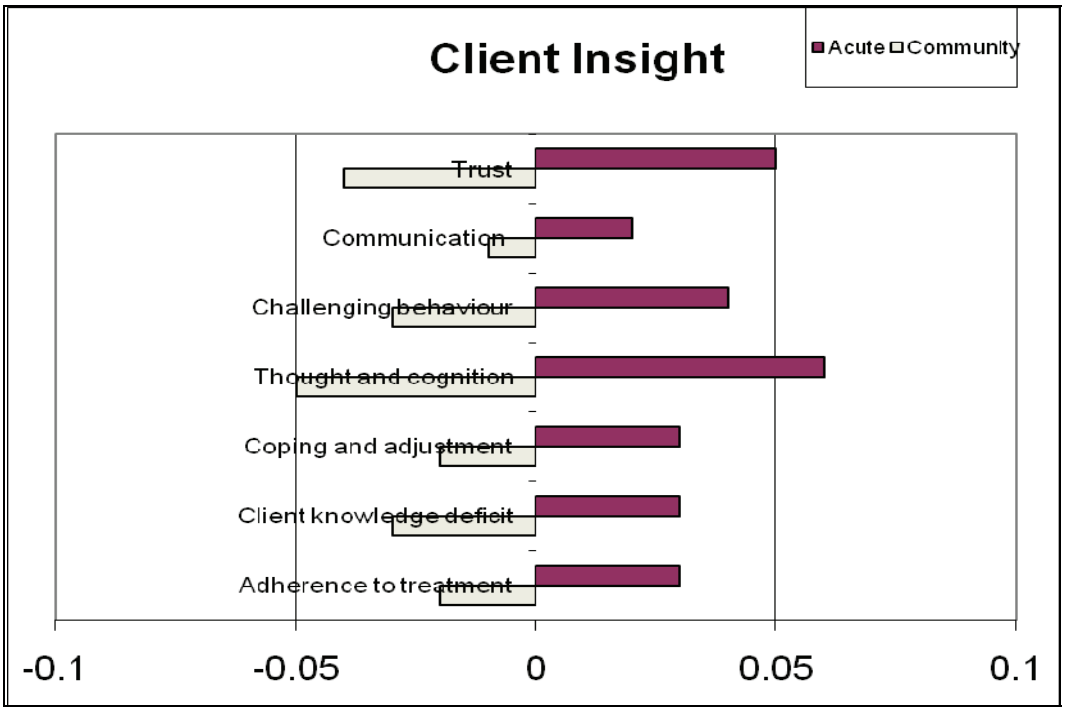


Figure 8 *Fingerprint Graph for Social Support*

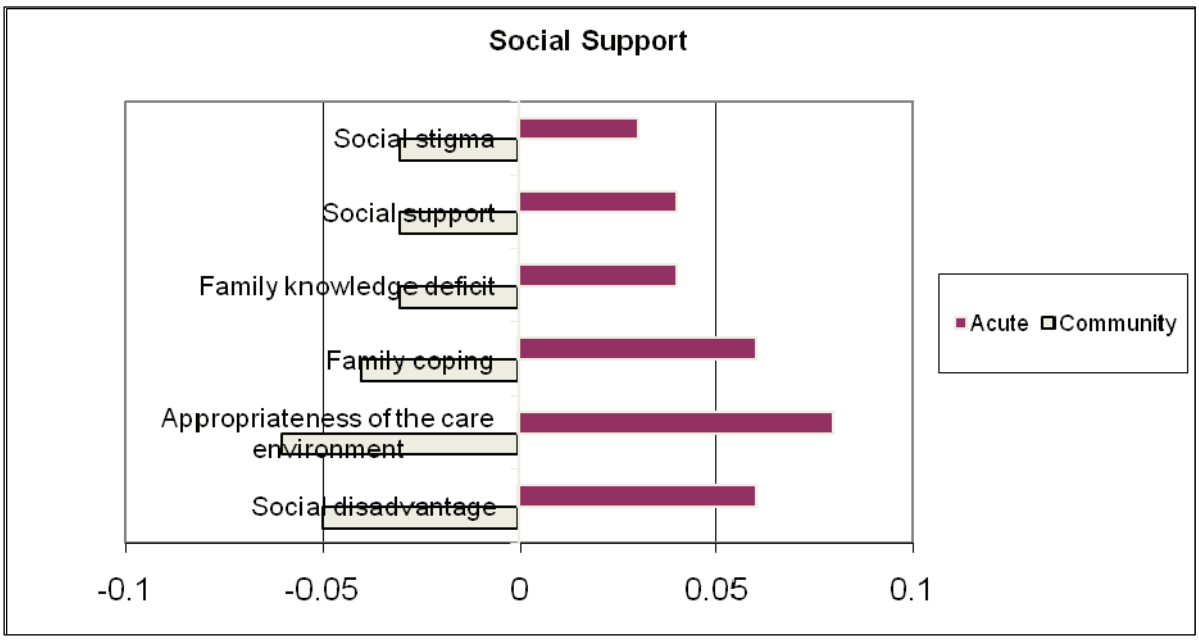


Figure 9 *Fingerprint Graph for Social Independence*

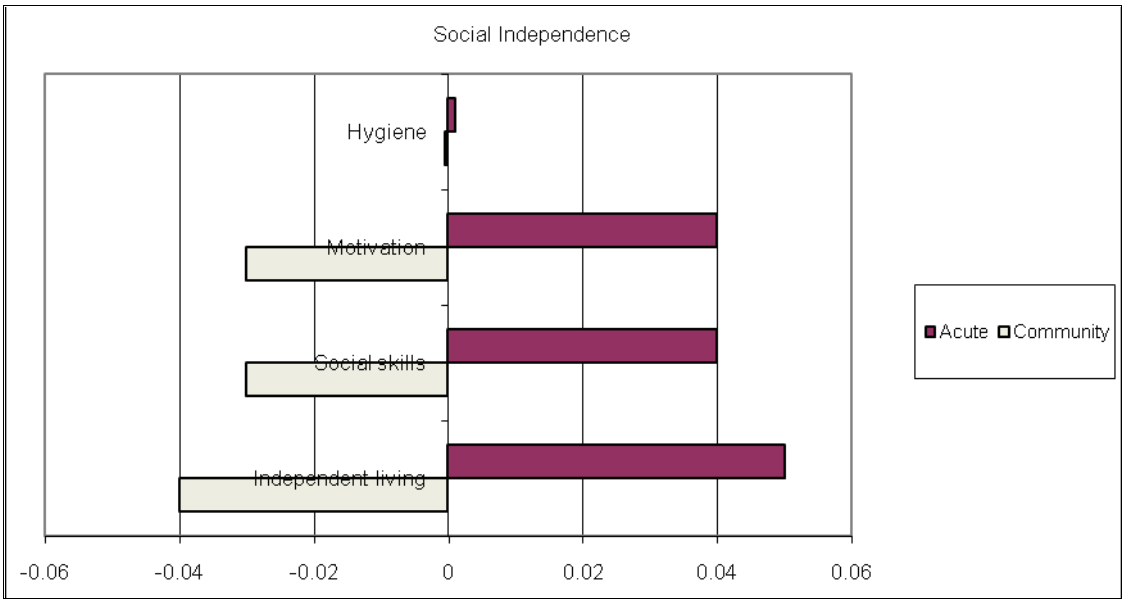
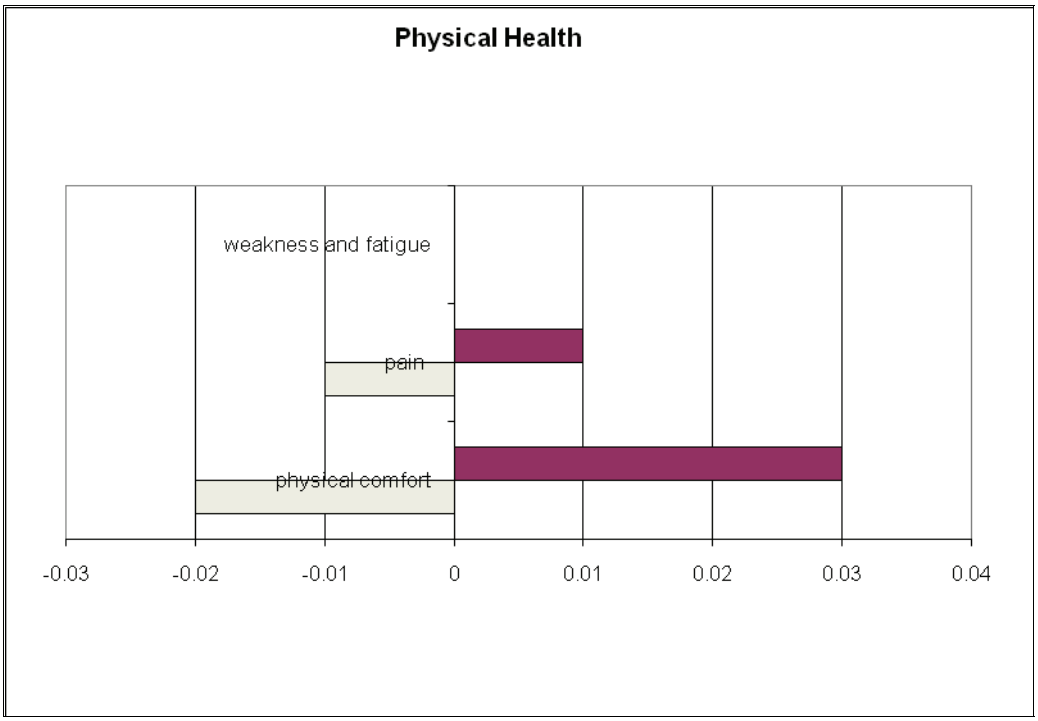


Figure 10 Fingerprint Graph for Physical Health



To assess whether the difference between problems were significant across the community and acute inpatient mental health settings, z scores were calculated and compared to critical value at both the .01 and .05 level (Fleiss et al 1979, Fleiss and Kingman, 1990). The critical values of 2.64 (at .01 level) and 1.96 (at .05 level) were used to determine whether the level of client problems were significantly different across client groups. The results of this analysis for the I-NMDS (MH) client problems scale variables are outlined below in Table 60.

If the value of the resulting z-score is greater than or equal to 1.96 or 2.64 the null hypothesis is rejected and it can be concluded that a significant difference exists between the client groups. Only the client problems 'Sleep disturbance', 'Weakness and fatigue', 'Pain' and 'Hygiene' were found not to differ significantly across client groups.

Table 60 Significance for Ridits Calculated for I-NMDS (MH) Problems Scale Variables

Problem Variable	**z-score**	**P Value**
Emotional Health		
Anxiety or fear linked to current stressors	4.67	.000
Longstanding anxiety	4.60	.000
Mood	8.16	.000
Sleep disturbance	0.00	1.00
Physical Health		
Physical comfort	3.33	.001
Pain	1.30	.194
Weakness and fatigue	0.00	1.00
Social Independence		
Independent Living	6.00	.000
Hygiene	0.00	1.00
Social skills	4.67	.000
Level of motivation	4.67	.000
Client Insight		
Client knowledge deficit regarding illness..	4.00	.000
Thought and cognition	7.30	.000
Trust in others	6.00	.000
Challenging behaviour	4.70	.000
Adherence to treatment or medication	4.70	.000
Coping and adjustment	3.30	.001
Communication	2.00	.046
Social Support		
Family knowledge deficit illness or treatment	4.67	.000
Level of social support from significant others	4.67	.000
Family coping	6.67	.000
Social disadvantage	7.30	.000
Appropriateness of the care environment	9.33	.000
Social Stigma	4.00	.000

Fingerprint graphs for nursing interventions across the community and acute inpatient settings are presented in Figures 11 to 13 below. These graphs are organised according to the factors that resulted for the construct validity testing of the I-NMDS (MH).

Figure 11 Fingerprint Graph for Psychological Care

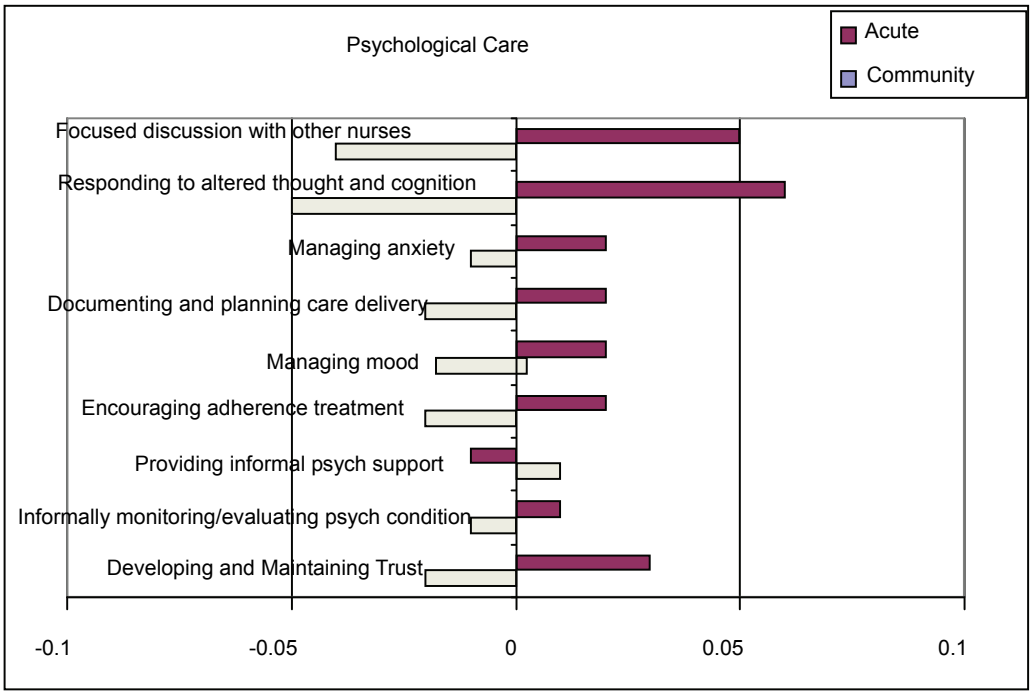


Figure 12 Fingerprint Graph for Client and Family Support

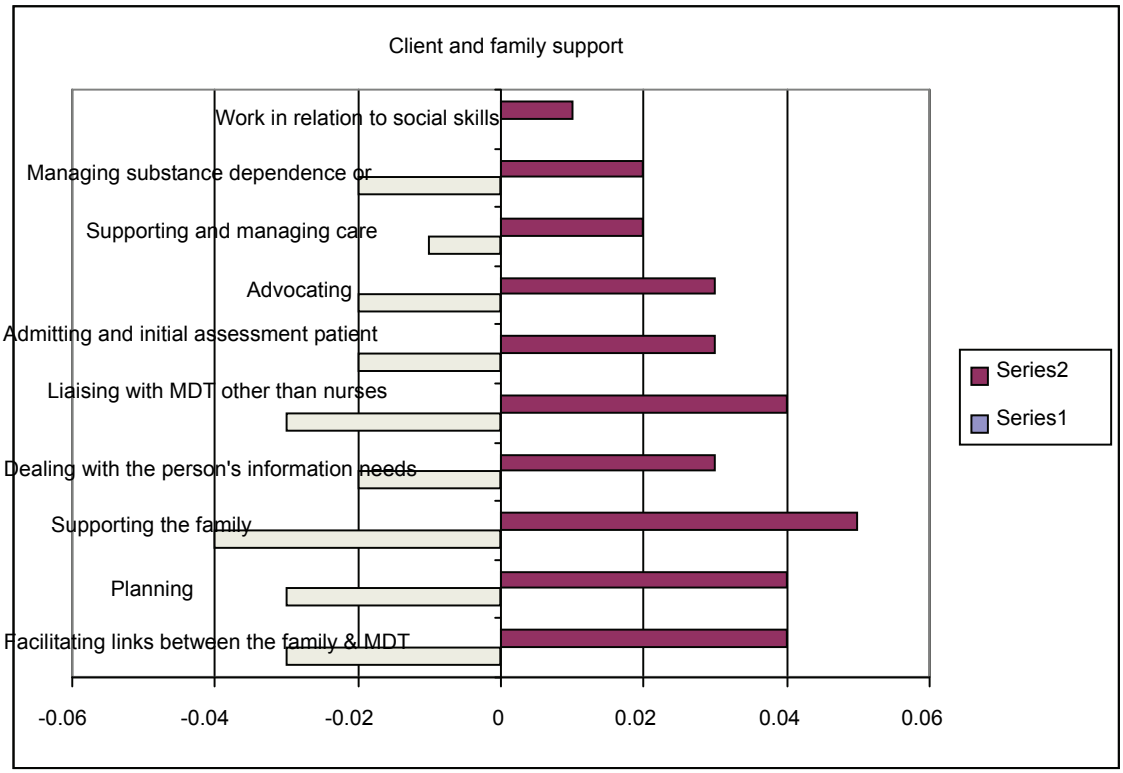
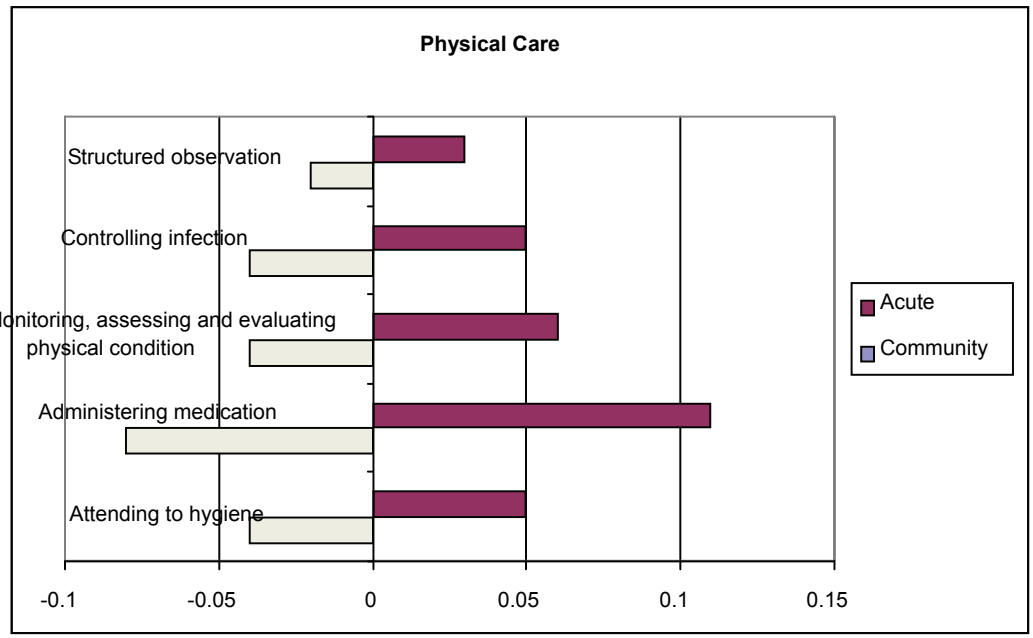


Figure 13 Fingerprint Graph for Physical Care



The z-scores and corresponding P-values for the ridits calculated for the interventions scale are presented in Table 61 below.

Table 61 Significance for Ridits Calculated for I-NMDS (MH) Interventions Scale Variables

Intervention Variable	**z-score**	**P Value**
Psychological Care		
Managing Anxiety	2.00	.046
Managing mood	2.67	.008
Focused discussion with other nurses	6.00	.000
Documenting and planning the patient's care	2.67	.008
Dealing with the person's information needs	3.30	.001
Responding to altered thought and cognition	7.30	.000
Developing and maintaining trust	3.33	.001
Encouraging adherence to treatment or interventions	2.67	.008
Providing informal psychological support	1.33	.184
Informally monitoring or evaluating psychological function	1.33	.184
Client and Family Support		
Work in relation to social skills	.670	.508
Managing substance dependence or misuse	2.67	.008
Supporting the family	6.00	.000
Supporting and managing care delivery	2.00	.046
Facilitating links between family/significant other & MBT	4.67	.000
Advocating	3.30	.001
Liaising with MDT members other than nurses	4.67	.000
Admitting and initial assessment of the patient	3.30	.001
Planning discharge	4.67	.000
Physical Care	**z-score**	**P Value**
Attending to hygiene	6.00	.000
Administering medication	12.67	.000
Monitoring, assessing and evaluating physical condition	6.67	.000
Controlling infection	6.00	.000
Structured observation	6.00	.000

The interventions 'Providing informal psychological support', 'Informally monitoring psychological functioning' and 'Work in relation to social skills' were found not to differ significantly across client groups. It is interesting to note that the administration of medication was the intervention illustrating the greatest differentiation in terms of activities that occur across community and acute inpatient mental health nursing. Again the higher incidence of administration of medication within the acute inpatient setting was to be expected.

10.12 Discussion

Striking a balance between maximising the clinical utility of I-NMDS (MH) tool and ensuring the reliability of its content was emphasised throughout the validity testing of the I-NMDS (MH) scale. Prior to carrying out factor analysis, all I-NMDS (MH) variables were examined to assess how relevant they were to mental health nursing. A 75% cut off point was adopted to identify 'irrelevant' problems and interventions on the data set. All variables found to be irrelevant to both acute inpatient and community based mental health nursing were excluded from the factor analysis as they had the potential to impact on the validity of the tool.

At this early stage in the analysis of the problems scale, the variables 'Elimination', 'Breathing', 'Fluid balance', 'Spiritual needs', 'Psychological side effects of treatment or medication' and 'Delayed discharge' were highlighted for exclusion from factor analysis. In order to ensure variable exclusion was warranted, the endorsement of these variables across the inpatient and community setting was examined. This resulted in the identification of the variables 'Breathing', 'Fluid balance', 'Elimination' and 'Spiritual needs' as appropriate for exclusion from analysis of the problems scale. While the exclusion of the variables 'Breathing', 'Fluid balance' and 'Elimination' was understandable, given their increased relevance to a general nursing setting, the exclusion of the variable 'Spiritual needs' was of interest. Recent research suggests that spirituality and a personal sense of meaning and identity help people recover their health (Brimblecombe et al, 2007). Furthermore, nurses engaged in the development stage of the I-NMDS (MH) suggested the inclusion of a variable to address client spiritual needs as they felt it was an important dimension of mental health recovery (Scott et al, 2006a). As suggested, the subjective nature of the concept of spirituality may have led to lack of understanding in relation to this variable's meaning. This should be addressed in future research using the I-NMDS (MH).

The only intervention variable that adhered to the 75% 'intervention not carried out' cut off was 'Controlling Infection'. A total of 79% of nurses did not carry

out any interventions related to infection control. 'Structured observation' was the only other variable that received 'intervention not carried out' ratings over 70%. This intervention had not been carried out for a total of 74% of the mental health clients rated. 'Responding to extreme situations' received 70% 'intervention not carried out' ratings. All of these variables were examined across acute inpatient and community settings to see if there were differences in their levels of endorsement across specialty. The findings of this analysis highlighted that there were quite marked differences in the ratings of these variables across acute inpatient verses community mental health nursing. See Table 62 below.

Table 62 Percentage 'Intervention Not Carried Out' Ratings across Nursing Specialty

Variable	Community Rating	Acute inpatient Rating
Structured Observation	85%	60%
Controlling Infection	93%	66%
Responding to Extreme Situations	80%	57%

Clearly there was a relatively high level of relevance of these interventions to the acute inpatient setting, where participants in the study rated them as interventions that had been carried out to some extent for between 34% and 43% of clients. For this reason it was decided to include all of the intervention variables in the initial stages of the factor analysis of the I-NMDS (MH) interventions scale.

Principal components analysis was used to establish the factorability of the data and to determine the number of factors to extract. The results of this analysis indicated that there were sufficient levels of correlations in the data and that the sample size was appropriate for factor analysis to proceed. PCA also pointed to the retention of approximately 5 factors for the problems scale and between 3 and 5 factors for the interventions scale. PCA was not used for further analysis as it was not deemed appropriate in the examination of the underlying structure of the data. The reason for this was that PCA considers all variance in the data

when establishing a factor structure and consequently does not produce a clean picture of the relationship among variables within the resulting factors.

Exploratory factor analysis was favoured for the purpose of establishing the construct validity of the I-NMDS (MH) as it is concerned with common variance only and the factor solution in EFA is based on values with high communalities. The decision to use the Maximum Likelihood (ML) extraction method with a PROMAX rotation in the exploratory factor analysis of the data was based on the utility of ML in establishing confirmation of the fit of the data to the factor model (Fabrigar 1999). The ML approach also supports statistical methodologies used to determine the number of factors to be retained for further analyses (Alguire et al 1994).

Problems Scale Discussion

A step-by-step approach to the exploratory factor analysis of the problems scale was taken. A factor loading cut off point of .35 was used to interpret the findings over a more liberal .3 cut off point. This was deemed an appropriate cut off point to use as it is suitable for data sets with 350 or more cases (Hair et al, 2005). For conceptual and statistical reasons, a 5 factor model for the problems scale was accepted over and above alternative 4 and 6 factor models.

Upon the extraction of the 5 factor model for the problems scale, a total of 16 out of the 32 problems variables analysed were found to have communality scores falling below .5. While this does not infer that these variables are unreliable within the overall structure of the scale, it does infer that they have the potential to cause scale reliability problems in future analysis. It is therefore advisable that close attention should be paid to these variables in any future analysis.

Following this first step in the exploratory analysis of the 5 factor model the variables ‘Overall psychological well being’ and ‘Social disadvantage’ cross loaded above the .35 cut off point. Furthermore, the variables ‘Psychological side effects of treatment or medication’, ‘Physical side effects of treatment or

medication' and 'Delayed discharge' failed to load above the .35 cut off. All indicator variables loaded according to their expected respective subscales i.e. 'Overall physical well being' loaded with other physically oriented variables, 'Overall psychological well being' loaded with other psychologically oriented variables and 'Overall social well being' loaded with other socially oriented variables.

The second phase in this analysis involved the elimination of all indicator variables and the variables 'Delayed discharge' and 'Psychological side effects of treatment and medication'. Despite inferences of unreliability for the variables 'Physical side effects of treatment and medication' and 'Social disadvantage', these variables were retained for further analysis as they were relatively strongly endorsed by mental health nurses. The results of this analysis indicated again that the variable 'Physical side effects of treatment and medication' was unreliable in the problems scale and it was therefore eliminated from further factor analysis. In addition, while the variable 'Nutrition' received a 'problem not present' rating of 56%, it failed to load above the .35 factor loading cut off point and was consequently excluded from further analysis.

The final factor structure for the problems scale explained 58% of the variance in the data and was found to have good levels of model fit. The Normed X^2 goodness of fit score for this model was a good 2.6, while the RMSEA was also a good .067. While the variable 'Coping and adjustment' cross loaded on factors 1 and 3, the loading of .01 above the cut off point was close enough to warrant its retention in the scale. In addition, this variable was highly endorsed as relevant to mental health nursing.

While it is important to note potentially problematic variables for future analysis, the results of the scale reliability and stability testing for the problems scale were encouraging. Scale internal consistency (or reliability) for each of the I-NMDS (MH) problems sub scales was good with observed Cronbach alpha scores of between .716 and .829 (Nunnally and Bernstein 1994, Pallant, 2005). In addition, the factor correlation matrix indicated factorial

independence and that each factor resulting from the analysis served to measure different types of client problems.

The stability of the factor structure was largely established through a confirmatory factor analysis of the I-NMDS (MH) problems scale. Data collected on Day 2 of the study were used for this purpose. Caution is required in the interpretation of these findings as the same sample was used, albeit that data were collected on a different study day making the data set different to that used for the exploratory factor analysis. The 5 factor model that resulted from the exploratory factor analysis was specified and a confirmatory factor analysis was run in AMOS using maximum likelihood estimation. The majority of the factor loadings that resulted from this analysis were above the recommended .5 cut off and all factor loadings were significant. The goodness of fit scores however were inconclusive with relatively good fit inferences coming from the RMSEA and Normed X^2 goodness of fit scores but a poor fit inference coming from the CFI score. These findings give further strength to the result of the exploratory factor analysis of the problems scale, as they infer good levels of construct validity and factorial stability. Further research is required to verify the factor structure of the problems scale using CFA with a new data set.

In sum, it can be said that the construct validity of the I-NMDS (MH) problems scale was verified given the alignment of the resulting factors to the hypothesized biopsychosocial model of care. The 'Client Insight', 'Emotional Health', 'Social Support' and 'Social Independence' factors represent the psychosocial client problems nurses attend to as part of their caring role. The 'Physical Health' factor is representative of the biomedical client problems nurses are presented with in the course of their work. This infers the I-NMDS (MH) problems scale can essentially measure what it is designed to measure i.e. a holistic description of mental health nursing practice. Furthermore, the I-NMDS (MH) problems scale is internally consistent inferring that the variables within each factor of the scale are related to one another, measure similar concepts and are therefore well placed within the scale. The results of the test of the stability of the factor structure of the I-NMDS (MH) problems scale post confirmatory factor analysis inferred its consistency across multiple

applications.

Interventions Scale Discussion

In line with the analysis of the problems scale, a step-by-step approach to the exploratory factor analysis of the interventions scale was taken and a factor loading cut off point of .35 was used to interpret the findings. The analysis of the interventions scale was more complex than that of the problems scale given the direct and indirect nature of the interventions variables. While analysis of the direct interventions (outlined in Appendix H) resulted in a good fit to a 3-factor model, the indirect interventions results were problematic. Specification of a 2 and a 3 factor model for the indirect, coordination and organisation of care variables resulted in the observation of Heywood cases, signifying problems with the models. Furthermore, extraction of a stand alone one factor model resulted in an extremely poor model fit. These findings highlight the advantages of using the maximum likelihood extraction method in conducting exploratory factor analysis. If a different extraction method had been used, for example PCA or principal axis factoring, these problems with model fit would have gone unnoticed. The consequence of this could have been the utilisation of an unreliable I-NMDS (MH) tool for clinical or management research purposes. See Appendix H (p 422) for a more detailed outline and discussion of this analysis.

The 3 factor model, which included a combination of the direct and indirect nursing interventions, was accepted over and above any independent direct/indirect interventions models. This particular model was found to make conceptual sense, adhering well to the biopsychosocial model of care (Engel, 1980). While a number of variables retained in the final factor model observed low communality scores, it is advised that these variables should be examined carefully in future analysis using the tool, rather than eliminating them at this early stage of validation. The variables 'Teaching skills and promoting health' and 'Responding to extreme situations' were eliminated from the scale analysis as they were found to be statistically unreliable. While 'Teaching skills and promoting health' was endorsed as relevant to mental health nursing, scale

reliability was prioritised and this variable was eliminated from further analysis. Furthermore, it might be argued that this variable was conceptually similar to and correlated well with the variable 'Dealing with the persons information needs' (at .614).

Examination of the definitions for these variables provided for participants in the I-NMDS (MH) User Manual (Scott et al, 2006b) highlights this conceptual cross over. Examples of interventions related to teaching skills and promoting health included in the manual were 'general or informal encouragement and guidance with care and independence rehabilitation, communication and the provision of information' (Scott et al, 2006c p. 24). Examples of interventions relating to dealing with a persons information needs provided in the manual include 'providing information or responding to questions regarding clinical issues such as diagnosis, post-operative phase of recovery, diet; or service issues such as appointment times, access to services' (Scott et al, 2006c p. 24). The intervention 'Responding to extreme situations' was not found to occur regularly in mental health nursing and therefore its exclusion from further analysis caused less concern.

The final phase of analysis involved the exclusion of the variable 'Facilitating external activities'. This variable was not found to be highly relevant to both inpatient and community based care but very much irrelevant in the context of inpatient care. For this reason and because of the observation of a slight cross loading above the .35 factor loading cut off, 'Facilitating external activities' was excluded from the final factor analysis for the interventions scale. This resulted in a clean, simple 3 factor structure for this scale. The goodness of fit scores for this factor structure were acceptable and the internal consistency scores for each sub scale were found to be above the .7 cut off point for the observation of good scale reliability. The resulting Cronbach alpha scores were between .77 and .89.

The factor correlation matrix for this model indicated factorial independence between factors 1 and 3 and factors 2 and 3 but some level of dependence was noted between factors 1 and 2. The correlation between these factors was .675,

above the more desirable .5 level. The reason for this appeared to lie with difficulties in making very definite distinctions across subjective, and often similar, psychosocial elements of mental health nursing practice. Such similarities can be seen across interventions like managing anxiety and providing informal psychological support to the client and work in relation to social skills and advocating on his/her behalf.

A relatively stable factor structure over time was also observed for this 3-factor model. Following the same procedure for the I-NMDS (MH) problems scale, a post hoc confirmatory factor analysis of the interventions scale was carried out. Only one variable loaded below the .5 factor loading cut off point i.e. 'Controlling infection'. The factor loading observed for this variable was .445 which did not represent a major deviation from the preferred .5 factor loading. Encouragingly, all factor loadings were significant. The goodness of fit scores for this test however were less encouraging with an unacceptable Normed X^2 goodness of fit of 3.9, a more acceptable RMSEA score of .091and an unacceptable CFI score of .805. It should be stressed that the confirmatory factor analysis for the interventions and problems scale was imperfect. This was due to the fact that ideally, exploratory factor analysis should be conducted on a different data set to that of any subsequent confirmatory factor analysis. Running the confirmatory factor analysis using the day 2 and day 3 data collected over the course of the study, rather than the day 1 data used for exploratory analysis, infers that these results should be interpreted with caution. This is because in the main, the same participants responded to the scale across all study days, making the data sets to some extent indistinguishable. This analysis did however serve to indicate whether the final accepted factor structures for the I-NMDS (MH) would be maintained in future analysis. While the indications were positive, a well designed study for the purpose of carrying out a confirmatory analysis of the I-NMDS (MH) is recommended.

While the findings for the construct validity, internal consistency and stability of the I-NMDS (MH) interventions scale were encouraging, they were less desirable than the corresponding findings for the I-NMDS (MH) problems scale. Further research and adjustments to the interventions scale may be

warranted in the future to ensure improved factorial independence and stability over time.

Implications of the Distribution of the Data

The distribution of the data was examined closely in this study. While factor analysis generally does not depend on a normal distribution, normality is preferential when implementing a factor analysis that utilises a goodness of fit test.

In Chapter Nine, consideration was given to the fact that statistical significance tests used in maximum likelihood exploratory factor analysis are sensitive to a non-normal distribution. A number of variables in the I-NMDS (MH) problems scale were found to deviate from the level of skewness and kurtosis deemed acceptable for maximum likelihood factor analysis, according to guidelines set out by West et al (1995) i.e. skew > 2; kurtosis >7. Following the elimination of irrelevant variables and the use of a step-by-step approach to the elimination of further variables from the factor analysis, most of the skewed variables were excluded from the final factor model of the scale. The only skewed variables that remained were 'Pain', 'Communication' and 'Controlling infection'. As the levels of skewness observed for these two variables did not represent large deviations from the skew > 2 guideline, the use of the original data set, without inclusion of transformed variables, was deemed appropriate for factor analysis.

Discriminative Validity Discussion

In line with the aim of this study, ridit analysis was conducted to investigate the ability of the I-NMDS (MH) to illustrate differences in client problems and nursing interventions across two client groups. Discriminative validity is another form of construct validity and the results of this analysis were expected to strengthen conclusions regarding the previously established construct validity following factor analysis.

Expected outcomes relating to the differences in levels of problems and interventions across the groups were put forward at the outset of this analysis. In the main, expectations were for higher levels of problems and interventions in the acute inpatient client group, compared to those in the community based client group. Frequency based ridit scores for each independent 'acute inpatient' and 'community based' client group were calculated and set against ridit scores for the entire group of clients. Using graphical depictions of ridits i.e. fingerprints, it was deduced that the I-NMDS (MH) could indeed assist in illustrating differences across these client groups, when compared to the overall client group.

The results of the ridit analysis revealed that, on a whole, clients in the acute inpatient setting were found to experience more severe levels of problems than those in the community based setting. In total, significant differences were noted for 20 of the 24 variables on the factor analysed I-NMDS (MH) problems scale. Client problem presentation was found to be more severe in the acute inpatient setting than in the community setting. The ridit analysis illustrated that clients in the acute inpatient setting were more likely to experience problems related to mood, thought and cognition and challenging behaviour. These findings concur with research suggesting the negative thoughts, suicidal ideation and violent behaviour are associated with increased levels of hospital admission (McNeil and Binder, 1987, Ziegenbein et al, 2006). Other variables noted to be more prevalent in the acute inpatient setting were of a social functioning nature including family coping, independent living and the appropriateness of the care environment. These findings are in line with recent research that suggests that social supports or lack of social support influence practitioners' decisions to admit clients to psychiatric inpatient services (Ziegenbein, 2006). Other research has indicated that clients who are cared for in the community are significantly more likely to be living independently and in employment than those cared for in the inpatient setting (Marshall and Lockwood, 1998).

In addition, this study inferred that inpatient clients were more likely to experience problems and receive interventions related to adherence to treatment

and medication. Non-adherence to treatment is associated with increased levels of hospitalisation among schizophrenia clients in particular. Further to this, it is related to the revolving door scenario so widely experienced in mental health inpatient care (Singh et al, 2006).

The very stark difference across groups noted for the intervention 'Administration of medication' is entirely expected given the presence of medically oriented care within the inpatient setting and the fact that many community based nurses tend not to administer medication as part of their daily routine.

Examination of the significance scores across both client problems and nursing interventions indicated that no significant differences were observed across nursing specialty for the problem variables 'Sleep disturbance', 'Hygiene', 'Pain', 'Weakness and fatigue' and 'Nutrition' and the intervention variables 'Informally monitoring and evaluating psychological functioning' and 'Providing informal psychological support'. The low incidence of severity of physical problems observed for mental health clients as a whole meant that non-significant ridit results were no surprise. For the interventions scale, significant differences in interventions carried out across the community and acute inpatient settings were observed for 21 out of the 24 variables, whereby the vast majority of interventions were rated as being higher in intensity in the acute inpatient setting. One variable was noted to be higher in intensity in the community setting i.e. 'Providing informal psychological support'. This was not unusual given the emphasis on promoting and sustaining independent living in community mental health care.

10.15 Conclusion

This chapter reported on the construct validity, internal consistency, stability (or test retest reliability) and discriminative validity of the I-NMDS (MH), a new tool aimed at gathering standardised comparable information regarding mental health nursing work. The findings of this study are based on the first application of the tool within the clinical setting for validation purposes and

infer that the I-NMDS (MH) for mental health possesses a strong theoretical basis, has discriminative power and is relatively stable upon multiple applications. Furthermore these findings infer that variables within the subscale of the validated I-NMDS (MH) are highly correlated and therefore appropriately placed.

As noted in Chapter Two, contemporary definitions of nursing highlight the true diversity of nursing work, from observable, objective tasks through to subjective parts of the professional role that are hard to quantify. However, in practice, mental health nursing work lacks definitional clarity and role demarcation (Buller & Butterworth, 2001, Chiovitti, 2008, Clark, 1999, Crawford et al, 2008). The I-NMDS (MH) was developed in order to facilitate descriptions of nursing work. The alignment of the I-NMDS (MH) structure to the biopsychosocial model of care supports suggestions that mental health care consists of psychological, physical and social dimensions. For example, research suggests that psychological interventions are appropriate for the delivery of effective client care and should be implemented (The National Institute for Clinical Excellence, 2003). Furthermore, mentally ill clients have been found to be at risk of problems with physical and social wellbeing as they are more likely to smoke, be physically inactive, be socially isolated and suffer from unemployment than the general population (Brimblecombe et al, 2007, National Institute of Mental Health in England, 2004). Together, these findings support the idea that systems of documentation in mental health nursing should represent a holistic approach to care.

The variables retained within the final factor models of the I-NMDS (MH) were mainly psychosocial problem and care related variables. While physical problem and care related variables were also retained, the majority of these variables were excluded from the validated data set as they were found to be unreliable in the context of a mental health focused nursing minimum data set. This finding supports suggestions that a reliance on psychiatry in the realm of mental health nursing has potentially impeded the visibility and autonomy of mental health nursing (Crowe, 2000).

Further research is warranted to establish the true construct of validity of the I-NMDS (MH) for mental health. This can be achieved through well designed studies to investigate the factor structure of the scale using a new sample and confirmatory factor analysis. The future development of this tool will be important. Further investigations of the I-NMDS (MH) validity, through confirmatory factor analysis, should be carried out to ensure that it can indeed be applied with confidence. Data collected using the I-NMDS (MH) can then be used to describe nursing activity and client profiles. This evidence can then provide much needed support in clinical and management decision making, and perhaps most importantly to increase the visibility of the nursing contribution to client care.

CHAPTER ELEVEN

Establishing the Interrater Reliability of the I-NMDS (MH)

11.1 Introduction

Interrater reliability relates to the 'level of agreement between a particular set of judges on a particular instrument at a particular point in time' (Stemler, 2004 p. 2). The aim of this chapter is to describe the stand alone study, carried out to establish the interrater reliability of the I-NMDS (MH). Establishing the interrater reliability of a tool typically involves asking two or more respondents to rate the same subjects and then correlating their ratings. High correlations across ratings infer that the raters are rating the same construct, therefore inferring good interrater reliability. The objective of this study was to investigate the level of agreement across I-NMDS (MH) ratings made by two mental health nurses working in the same mental health day centre. These ratings were made for the same clients at the same point in time.

11.2 Methodology

11.2.1 Ethical Approval

Before commencing this study, ethical approval was granted from both the University ethics committee and the relevant hospital management.

11.2.2 Site and Sample

The site chosen for inclusion in this study was a mental health day centre operating in the Dublin Mid-Leinster HSE area. Two mental health nurses working in this centre opted into the study. In this way, the nurse participant sample was convenience based. Both participants were required to have similar levels of experience working in the mental health day centre (approximately ten years) and both had to have similar levels of knowledge of the day centre clients' presenting problems and interventions. Furthermore, the nurse participants were

required to have previous experience of using the I-NMDS (MH) rating scale. As such, they had to have participated in the study to test the validity and reliability of the I-NMDS (MH), which was implemented prior to the study to test the interrater reliability of the tool.

11.2.3 Procedure

The participants were instructed in the use of the I-NMDS (MH) tool. As they had previous training and experience in completing the I-NMDS (MH), the instruction period took approximately 40 minutes. Written instruction was also given to participants. Three different clients were rated by both of the raters at approximately the same time each day for a period of ten days. This resulted in the rating of 30 different clients over the duration of the ten-day study. Raters were encouraged to complete the I-NMDS (MH) for their clients within 30 minutes of each other to control for the occurrence of any potential change in client problems or nursing interventions. Ratings were typically completed towards the end of the nursing shift. The researcher was on hand to provide any necessary assistance to the raters over the duration of the study. When data collection was completed, all data were entered into the Stats Direct computer programme and analysed.

11.3 Analysis

Currently, one of the most controversial areas in the study of interrater reliability relates to the question of the appropriateness of the various statistical tests applied in its measurement (e.g. Banerjee and Fielding, 1997, Tooth et al 2004, Stemler, 2004). In order to test the interrater reliability of the I-NMDS (MH), a decision was made to calculate both the weighted kappa (k_w) (Cohen, 1968) and the percentage agreement scores. This decision to use the k_w was based on the following:

a) k_w is generally cited in the literature as the statistic of choice for interrater reliability testing, given that it corrects for chance agreement between raters

b) The I-NMDS (MH) employs a 5-point Likert scale, the data from which is more appropriately analysed using the k_w statistic, over the k statistic. The reason for this is that the non-weighted kappa is sensitive to the number of

categories on the scale, whereby a scale with only two categories will produce higher kappa scores than one containing for example, four or more categories (Jakobsson et al 2005). Unlike the non-weighted kappa statistic, the weighted kappa penalises disagreement in terms of its seriousness e.g. distance between number of points on the scale (Sim et al 2005).

The decision to include percentage agreement statistics in the analysis was based on the potential for prevalence to be present in the data. There was reason to believe that prevalence might exist in the data because the study was focused on one mental health service type. Nurses in community based day centres would not typically care for clients experiencing high or 'acute' levels of presenting problems. Furthermore, these clients would not be in receipt of high levels of nursing interventions, compared with those that might be administered in an inpatient caring environment. As such, the effects of homogeneity of the sample and prevalence in the data had to be considered when deciding on the appropriate analytical tests to use.

11.4 Findings of the Interrater Reliability Test of the I-NMDS (MH)

The findings of the interrater reliability test of the I-NMDS (MH) are outlined in Table 63 below. All scores were rounded up /or down to two decimel places. Note that weighted kappa and percentage agreement scores for 10 variables on the I-NMDS (MH) could not be estimated due to the large numbers ‘constants’ in the data. For an adequate calculation of agreement using kappa, a reasonable spread over all values is necessary (Goossen et al, 2003). Stats Direct did not calculate a kappa score when all variable scores were in one or two of the cells of the contingency table i.e. when prevalence existed in the data. This result will be discussed in section 11.2.6 below.

Table 63 Findings for the Interrater Reliability Test of the I-NMDS (MH): Variables with Weighted Kappa, % Agreement Scores

Variable	Weighted Kappa	Observed agreement	Expected agreement – based on chance
Physical Health			
Physical comfort	.1	76.67%	74%
Weakness and Fatigue	.3	85%	78.67%
Emotional Health			
Anxiety current	.36	83.33%	73.33%
Longstanding anxiety	.45	87.78%	77.7%
Mood	.11	70%	66.44%
Client Insight			
Thought and Cognition	.67	90%	69.33%
Challenging behaviour	.35	90%	84.67%
Communication	.15	66.67%	60.67%
Trust in Others	.11	78.33%	75.67%
Adherence to treatment	.22	88.89%	85.78%
Coping and Adjustment	0	86.61%	86.61%
Client knowledge deficit	.12	66.67%	62.22%
Social Independence			
Level of Motivation	.16	75%	70.11%
Social Skills	.43	81.67%	67.89%
Hygiene	.57	86.67%	69.11%
Independent Living	.2	72.41%	65.64%
Social Support			
Appropriateness o the care environment	-.05	86.67%	87.33%
Level of support from family	.13	76.67%	73.11%
Family knowledge deficit	0	90%	90%
Family coping	.21	83.33%	78.89%
Social disadvantage	0	90%	90%
Monitoring assessing and evaluating physical condition	.09	80%	77.93%
Administering medication	.73	90%	63.33%
Attending to hygiene	.58	90%	76%
Psychological Care			
Informally monitoring psychological condition	.35	83.33%	74.44%
Providing informal psychological support	.09	71.67%	68.89%
Managing mood	.32	83.33%	75.33%
Developing and maintaining trust	-.02	71.67%	72.22%
Responding to altered thought and cognition	.39	91.67%	86.33%
Managing anxiety	.17	73.33%	67.78%
Encourage adherence treatment /medication	.19	70%	62.89%
Focused discussion with other nurses	-.01	57.78%	58.3%
Client and Family Support			
Dealing with the persons information needs	0	76.67%	76.67%
Work in relation to social skills	0	86.67%	86.67%
Advocating	0	86.67%	86.67%
Supporting and managing care delivery	0	86.67%	86.67%

Guidelines from Landis and Koch (1977) were used to interpret the resulting kappa scores i.e. poor k_w <0; slight k_w = 0–0.20; fair k_w = 0.21–0.40; moderate k_w = 0.41–0.60; suboptimal k_w = 0.61–0.80; almost perfect k_w = >0.80. In order to interpret the observed percentage agreement scores, the guideline cited by Stemler (2004) was adhered to i.e. that agreement levels should reach 70% or more in order for them to be considered acceptable. The results of this analysis are discussed in section 11.5 below.

11.5 Discussion

In testing the interrater reliability of the I-NMDS (MH), both the weighted kappa (k_w) (Cohen, 1968) and the percentage agreement scores were used. As mentioned above, weighted kappa and percentage agreement scores for 10 variables on the I-NMDS (MH) could not be estimated due to the large numbers of 'constants' in the data. On one hand it is stated that, for an adequate calculation of agreement using kappa, a reasonable level of heterogeny is required within the data (Goossen et al, 2003). On the other hand however, it is stated that if a kappa score cannot be calculated for a variable due to constants, then that variable is unreliable (Kotner, 2008). The fact that these constants existed in the data inferred that prevalence was at play. K_w could not be calculated for the variables 'Pain'; 'Sleep disturbance'; 'Controlling infection'; 'Managing substance dependence and misuse'; 'Supporting the family'; 'Facilitating links between family and significant other'; 'Planning and documenting patient care'; 'Admitting and assessing'; 'Planning discharge' and 'Structured observation'. Careful attention will need to be paid to these variables in future application of the I-NMDS (MH).

Examination of the results outlined in Table 63 above indicated that 6 (16%) of the remaining 38 variables on the I-NMDS (MH) achieved a k_w score that might be considered moderately reliable in terms of Landis and Koch's, (1977) interpretation of kappa, i.e. above .41. Only 2 variables i.e. 'Administering medication' and 'Thought and cognition' achieved weighted kappa scores of .73, .67 respectively indicating 'good' levels of reliability. In addition, 9 of the 38 variables on I-NMDS (MH) observed 'fair' levels of k_w indicating fair levels

of interrater reliability. The remaining 22 variables observed 'poor' levels of k_w and consequently 'poor' levels of reliability.

When evaluating levels of interrater reliability based on observed percentage agreement ratings (Po), typical guidelines found in the literature indicate that agreement levels should reach 70% or more in order for them to be considered acceptable (Stemler, 2004). Considering levels of observed percentage agreement for the variables in tandem with their corresponding kappa scores brings the prevalence paradox associated with kappa to light. All but 3 of the 22 variables that observed k_w scores below .41 had corresponding observed agreement scores above 70% i.e. 'Client knowledge deficit regarding treatment or medication' (66.67% agreement), 'Communication' (66.67% agreement) and 'Focused discussion with other nurses' (57.78% agreement).

In line with the findings of Hasnain et al (2004), kappa approached 0 in the face of high, observed percentage agreement. Of particular interest are the variables 'Adherence to treatment or medication' and 'Appropriateness of the care environment'. These variables observed 'poor' kappa scores but very high observed percentage agreement (Po) i.e. k = .22, k = -.05 and Po = 88.89% and 86.67% respectively. As already mentioned, variability in ratings is required for a high level of kappa to be observed. Because high levels of the same ratings were observed in this study, variability in the data was low and therefore kappa was low. Although standards for interpretation of the kappa statistic would infer low reliability on a number of variables within the I-NMDS (MH), it is advocated that the high level of prevalence, or low level of variability in the ratings, resulted in low kappa scores.

While k_w is calculated based on the premise that high percentage agreement is in some way based on chance agreement, Uebersax (1987) points out that the term chance agreement represents agreement that occurs based on a null hypothesis of random decision making. The author suggests that it is unclear how k should be interpreted in situations where ratings made across raters are real rather than random or based on chance. This point may well be applicable to this particular study as low level ratings would be expected in the data due to

the nature of the sample. This would indicate that high levels of observed percentage agreement are based on real rather than chance agreement.

A further criticism of the kappa statistic comes from Maclure and Willett (1987) who state that, for ordinal data 'kappa is so arbitrary it is virtually meaningless' (p.161) and because it allows weights to be arbitrary in relative magnitude, the magnitude of the weighted kappa may be arbitrary.

This study engaged two nurses working in a mental health day centre. This is typical of the staffing levels in such a clinical setting in Ireland. The decision to use kappa in tandem with the percentage agreement scores to assess the interrater reliability of the I-NMDS (MH) was based on previous research that indicated the suitability of kappa to the research question. A second deciding point related to the fact that the research itself took place within a specific area of care where I-NMDS (MH) ratings would not be expected to be particularly high across client presenting problems and nursing interventions. This expectation was indeed realised and a high level of homogeneity of (low) ratings or 'prevalence' was noted within the data.

In order to limit the incidence of prevalence in the data, Hoehler (2000) suggests that investigators concentrate on obtaining populations with trait prevalence of around 50%, i.e., that are relatively heterogeneous in their make up. However, investigation of interrater reliability in particular populations with specific presenting problems and nursing interventions makes this difficult to achieve. Such investigations tend to focus on groups known to have a particular mental health diagnoses with particular levels of presenting problems and particular caring needs. It is therefore important, if possible, to acknowledge that prevalence is present and to point out how it is impacting on kappa scores. Failure to do so could result in a misleading interpretation of the reliability of the tool of measurement in question.

In conclusion, 35 of the 38 variables on the I-NMDS (MH) for which k_w could be calculated reached acceptable levels of interrater reliability. A total of 6 of these variables had an acceptably high-level weighted kappa score and the

remaining variables had below acceptable kappa scores but high-observed percentage agreement scores of approximately 70% or more. While the I-NMDS (MH) was designed to enable the collection of standardised nursing information across acute inpatient settings, day hospitals, day centres, home based teams and community mental health nursing, the interrater reliability of the tool has to date only been examined within a mental health day centre. This can be considered a starting point in interrater reliability testing of the tool, or a limitation of this particular study. Further reliability testing will need to be implemented in the future to investigate reliability across a more varied group of nurses and clients. Such research would be expected to produce higher weighted kappa scores, thus further informing the research base relating to the interrater reliability of the I-NMDS (MH) and other similar tools.

CHAPTER TWELVE

Assessing the Impact of Nursing Interventions on Client Well-being

Building a model of nursing sensitive patient outcomes

12.1 Introduction

The aim of this study was to demonstrate the potential of the Irish Nursing Minimum Data Set (MH) to yield useful, usable information regarding the impact of nursing interventions on client outcomes*. The main objective of this study was to investigate whether the I-NMDS (MH) can be used to demonstrate the impact of psychological care nursing interventions on client emotional health problems over the 5 days of the I-NMDS (MH) validity and reliability study. In order to do this, a model of nursing outcomes was constructed according to a step-by-step analytical process of model fit determination. Three separate group based process models of nursing care were subjected to outcomes analysis. This approach to outcomes analysis was based broadly on the research carried out by Doran et al (2002), described in Chapter Three.

The results of this study a) highlight issues relating to the usability of the I-NMDS (MH) in investigating the impact of mental health nursing on client outcomes, b) offer a more complete understanding of the extent to which the nursing process can be held accountable for client recovery and c) produce research findings that are original and that go some way to increasing the visibility of mental health nursing in Ireland.

In this chapter an attempt is made to use the term 'client' in place of the term 'patient' in order to be consistent with the terminology used in mental health care in Ireland. It should be noted that in the literature on outcomes, the term 'patient' is predominantly used.

12.2 Study Aim

The aim of this study was to adapt the Nursing Role Effectiveness Model (Irvine et al, 1998, Doran et al, 2002) to investigate the ability of the I-NMDS (MH) to highlight the impact that psychological care nursing interventions have on client emotional health outcomes.

12.3 Study Design

This study was cross-sectional and longitudinal in design and involved a secondary analysis of the I-NMDS (MH) validity and reliability study data. Path analysis was the analytical technique used to assess the usability of the I-NMDS (MH) in investigating nursing sensitive client outcomes. Nursing sensitive client outcomes are defined as measurable changes in a client's state of health or condition as a result of nursing interventions and for which nurses are responsible (Maas et al, 1996). The Nursing Role Effectiveness Model (NREM) was used as a conceptual framework upon which to base the investigation of nursing sensitive client outcomes. The NREM was adapted to incorporate structure, process and outcomes variables relevant to the I-NMDS (MH). In particular, it is important to point out that structure variables were limited within the I-NMDS (MH), as the design of the validity and reliability study did not allow for the collection of data on nurse experience, qualifications or workload.

Previous research into the role definition of Irish mental health nurses indicated that they acknowledge the psychological care related elements of their practice (Cowman et al 2001, Hanrahan et al, 2003, Corbally et al, 2004, Scott et al, 2006a). This study aimed to explore how 'psychological care' nursing interventions impact on client 'emotional health' problems. The analysis was conducted across 3 different client groups i.e. the overall study group, consisting of both acute inpatient and community based clients, the acute inpatient group only and the community based group only. Analysing outcome

of care across client groups was important given the shortcomings in previously developed mental health outcomes scales. For example, HoNOS does not indicate significant change in the client's condition within the community setting (Rees et al, 2004).

The decision to examine the impact of psychological care interventions on client emotional health problems, stemmed from the fact that client problems relating to mood and anxiety were the most highly rated problems across all of the clients for whom data were collected. See Chapter Nine and Appendix G for a breakdown of the descriptive statistics relating to client problem presentation. Furthermore, psychological and psychotherapeutic care is one of the main tenets of mental health nursing (O'Brien, 1999, Scott et al, 2006a) and elements of the nurse-client relationship, like building trust and encouraging and facilitating coping, are recognised as core to mental health nursing practice (Crowe, 2001, Scott et al, 2006a, Perraud et al, 2006).

While the scope of this study allowed for the analysis of one particular intervention type/factor, it is anticipated that future analysis could be rolled out to investigate the type of nursing interventions that play the greatest role in client recovery related to client health problems across nursing specialties.

In mapping the I-NMDS (MH) data onto the NREM, the following structure process and outcomes variables were highlighted for analysis purposes:

Structure variables in this study included the emotional health of the client on Day 1 of data collection, client age and client stage of admission. The emotional health factor represents problems related to client anxiety or fear linked to current stressors, more longstanding anxiety and problems with mood and disturbed sleep.

Process variables included psychological care related interventions carried out on Days 1, 2, 3, 4 and 5 of the validity and reliability study. Psychological care interventions included developing and maintaining a trusting relationship with the client and encouraging adherence to his or her treatment plan. Other psychological care related interventions included the informal monitoring of the clients psychological functioning, the provision of informal psychological

support, managing client mood and anxiety levels and responding to altered thought processes. The final nursing activities included in this factor related to documentation and care planning, as well as discussion of client care with other nurses.

Outcomes variables included the emotional health status of the client on Day 2, 3, 4 and 5 of the study.

12.4 Hypothesis

Examination of mean and median scores in Tables 64 and 65 below, revealed that across the three study groups, client emotional health status improved from Day 1 to Day 5 of the I-NMDS (MH) main study data collection period. In addition, the level of intensity of psychological care interventions was reduced. Therefore, this study hypothesis advocated that improvement in client problem status came about as a result of nursing interventions carried out over the duration of the 5-day study period.

Table 64 Mean Scores for Client Emotional Health Status / Nursing Interventions over the 5 Days of Data Collection for the Overall Study Group

	Day 1 EH	Day 2 EH	Day 3 EH	Day 4 EH	Day 5 EH	Day 1 Psych Care	Day 2 Psych Care	Day 3 Psych Care	Day 4 Psych Care	Day 5 Psych Care
Overall Group	1.6	1.4	1.35	1.2	1.2	2	1.9	1.8	1.7	1.6

Table 65 Mean Scores for Client Emotional Health Status / Nursing Interventions over the 5 Days of Data Collection for the Acute and Community Client Groups

	Day 1 EH	Day 2 EH	Day 3 EH	Day 4 EH	Day 5 EH	Day 1 Psych Care	Day 2 Psych Care	Day 3 Psych Care	Day 4 Psych Care	Day Psych Care
Community	1.5	1.4	1.2	1.1	1	2	1.8	1.7	1.7	1.5
Acute	1.7	1.6	1.5	1.4	1.35	2.1	2	1.9	1.8	1.6

The overall hypothesis for this study was that improvement in client emotional health status was related to the administration of psychological care related nursing interventions in a) the overall study group b) the community mental health client group and c) the acute inpatient client group.

12.5 Sample

The study sample was broken down and analysed according to three different client related groups:

- The overall study group, consisting of 360 mental health clients from across the community and acute inpatient setting
- The acute inpatient mental health client group, consisting of 160 clients
- The community based mental health client group, consisting of 200 clients

12.6 Analysis

In order to operationalise this model, data were subjected to a path analysis using AMOS 7 and SPSS 14. Path analysis forms the underpinnings of structural equation modelling, using path diagrams to illustrate regression relationships between variables. Furthermore, it serves to minimise measurement error found in traditional regression techniques and indicates whether the model under investigation suits the research question. See Figure 1, Appendix I for the baseline path diagram used for statistical analysis.

According to Hair (2005), over 5 subjects per parameter are required for adequate path analysis. As there were 19 parameters within the baseline model to be tested, a sample size of 95 or more participants was desirable. This sample size was achieved for all of the study groups but as the model was built up, the number of parameters changed. As will be discussed in section 12.8 below, the increase in the number of parameters infers that some of the study findings should be interpreted with caution.

All study models were specified and estimated using the AMOS 7 statistical package. Analyses of the baseline and subsequent outcomes models were run using 3 separate data sets, representing data collected for the three study groups. Parameters were estimated using maximum likelihood. In order to deal with missing data, a maximum likelihood estimation (EM algorithm) was used.

Little and Rubin (1987) recommend using a maximum likelihood estimation method for missing data analysis in order to maximise the use of the data. The EM algorithm (based on ML estimation) is advocated over methods such as pairwise and listwise deletion methods for dealing with missing data (Bunting et al, 2002). Modification indices were not used as the data set was incomplete due to the longitudinal nature of the study. The 'Estimate Means and Intercepts' command in AMOS 7 to deal with missing data does not allow for the use of modification indices.

Both absolute and relative fit statistics were used to assess the fit of the outcomes model of nursing care to the data. Fit indices used to assess the model fit for this study included the Normed X^2 goodness of fit score, the comparative fit index (CFI) and the root mean square error of approximation (RMSEA). In order to determine a good fit, the Normed X^2 score should be at or below 3:1 (X^2:df), the CFI should be greater than .9 and the RMSEA should be below .1 or more preferably .08 (Hu and Bentler, 1999, Hair et al, 2005).

To examine the outcomes relationships between psychological care interventions and the resulting emotional health outcomes of the client, a series of multiple regression models were estimated. The models were sequential, building up to a picture of the components of the complete cross-lagged path model of outcomes of nursing care. A total of 5 models were estimated for the three study groups.

12.7 Model Specification Results

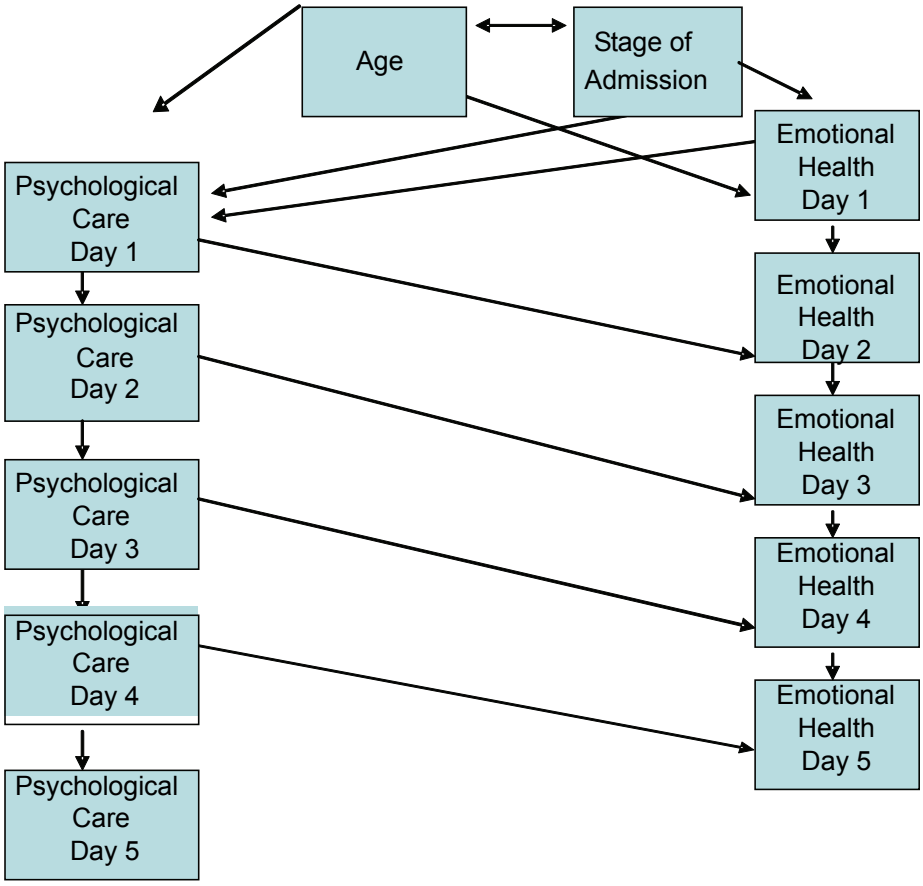
12.7.1 Baseline Model of Nursing Outcomes

The analysis began with a very simple baseline process model of nursing care illustrating the regression of each variable on to the variable that preceded it. In other words, the emotional health status of the client was preceded by the client age and the client stage of admission. The psychological care interventions on Day 1 of the study were preceded by both the client age and stage of admission as well as the client emotional health status on study Day 1. Moving down the

model, the emotional health variables were regressed onto variables representing psychological care interventions administered on the previous day.

This model inferred that nursing sensitive outcomes of care can be conceptualised according to the effects of nursing interventions on the clients' presenting problem status. In this way, characteristics of the clients' at the outset (i.e. Day 1 of data collection) as well as nursing interventions, were hypothesised to impact on the level of client problems recorded throughout the I-NMDS (MH) validity and reliability study period. The relationships between interventions carried out over the duration of the study as well as those between client emotional health from Day 1 to Day 5, were included in the model of nursing outcomes, as it was hypothesised that they played an important role in influencing outcomes. In other words, it was hypothesised that the level of the emotional health problems on day 'x' would impact on the level of emotional health problems measured the following day. Similarly, the level of psychological care interventions administered on day 'y' would impact on the level of interventions administered the next day. See Figure 14 below for an illustration of the baseline model of outcomes measurement.

Figure 14 Baseline Model of Nursing Outcome



Findings

The effects of psychological care interventions on the client emotional health status were measured over the 5 days of data collected for the I-NMDS (MH) main study. The first outcome measure was the change in the clients' emotional health status on Day 2 of data collection, followed by outcome measures according to the change in the client problem status on Days 3, 4 and 5. As can be seen from Table 66 below, the goodness of fit for the baseline outcomes model was not acceptable. Across all 3 study groups, the *P* scores were below the recommended .05 level. In addition, the Normed X^2, CFI and RMSEA scores indicated that this model was not appropriate for use in the explanation of nursing outcomes of care.

Table 66 Model Fit Scores: Baseline Outcomes Model 1

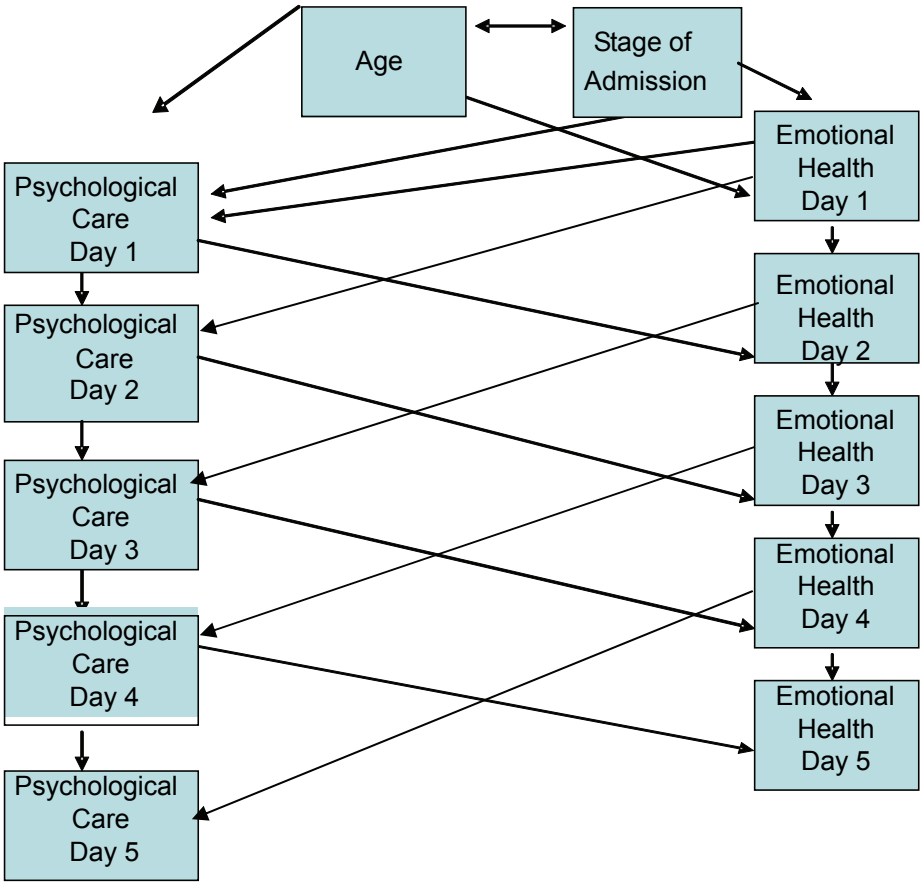
	Overall Group	Community Group	Acute Inpatient Group
X^2	396.5	279	272
DF	49	49	49
P	0	0	0
Normed X^2	8	5.7	4.2
CFI	.84	.84	.79
RMSEA	.14	.15	.14

12.7.2 Cross-lagged Model 1

In order to more accurately explain the impact of nursing interventions on the client outcomes specified in the baseline model, further relationships among variables were investigated. The next model specified for analysis was a cross-lagged model incorporating the reciprocal relationships between psychological care and emotional health problems. The cross-lagged modelling technique is widely used to assess relationships in data from longitudinal research designs. With cross-lagged modelling, each variable in the model is regressed onto all of the variables that precede it in time.

In addition to the relationships between variables imposed on the baseline model, psychological care variables were regressed onto their reciprocal lagged emotional health scores. As such, psychological care Day 2 was regressed onto emotional health Day 1. These relationships were replicated across Day 1 to Day 5 of the study. See Figure 15 below.

Figure 15 Cross-lagged Outcomes Model 1



Findings

This model was subjected to a path analysis and once again the model was found unacceptable in the explanation of outcomes of nursing care. See Table 67 below for the probability and fit statistics for the cross-lagged model 1 across each of the 3 study groups.

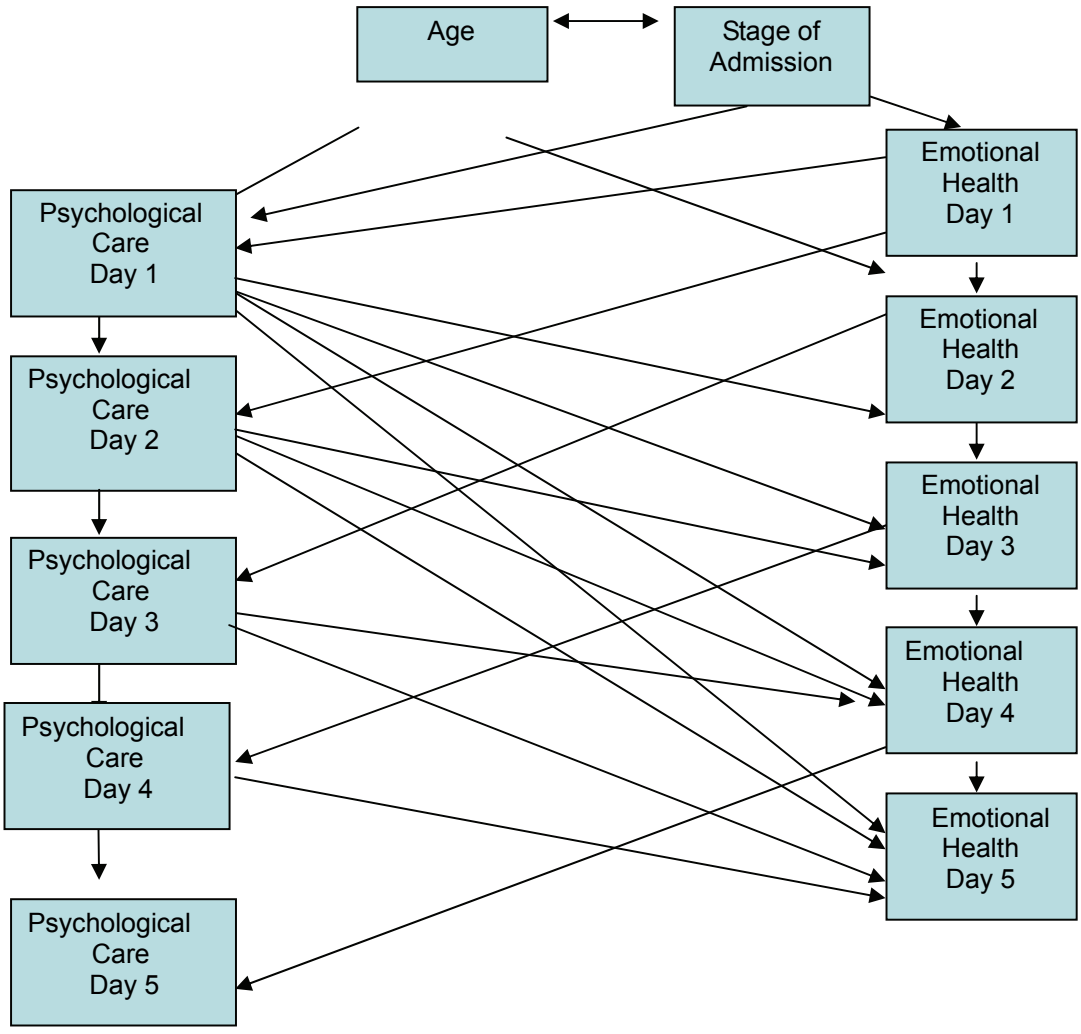
Table 67 Model Fit Scores: Cross-lagged Outcomes Model 1

	Overall Group	**Community Group**	**Acute Inpatient Group**
X^2	329.45	269.9	205.6
DF	45	45	45
P	0	0	0
Normed X^2	8.7	6	4.6
CFI	.84	.84	.79
RMSEA	.15	.16	.15

12.7.3 Cross-lagged Outcomes Model 2

Following the failure of the cross-lagged model 1 to adequately explain the process by which nursing interventions impact on client outcomes, some further constraints were added. The cumulative effect of psychological care interventions on emotional health outcomes was investigated by regressing the emotional health variables for Days 3, 4 and 5 on to all preceding psychological care interventions. In this way, psychological care interventions carried out on Day 1 were specified to impact on client emotional health Day 2, Day 3, Day 4 and Day 5 of the study. Psychological care interventions carried out on day 2 of the study were specified to impact on emotional health Day 3, Day 4 and Day 5 and so forth. Figure 16 below outlines the regression relationships investigated for this purpose.

Figure 16 Cross-lagged Outcomes Model 2



Findings

The goodness of fit results of the path analysis carried out for cross-lagged model 2 are outlined in Table 68 below. Again, this model was found to fall short of adequately explaining how psychological care related nursing interventions influence emotional health problems across each of the study groups.

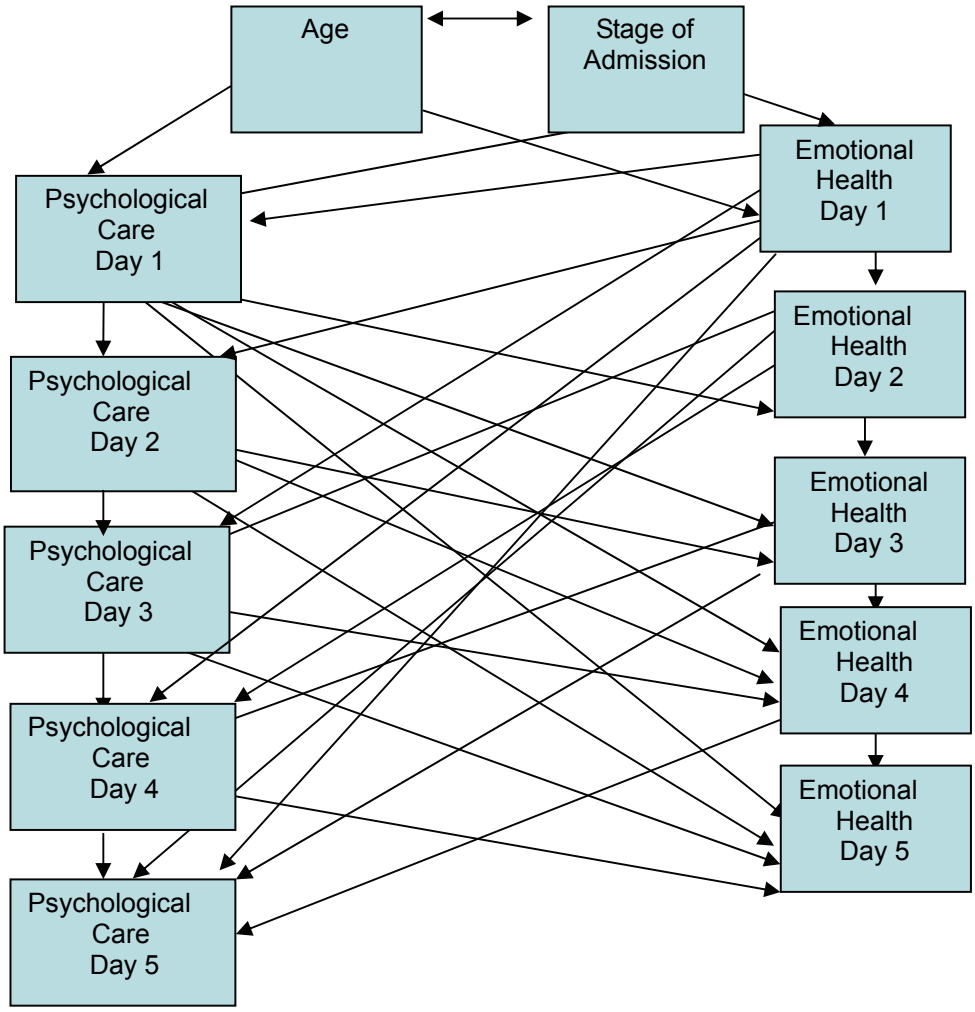
Table 68 Model Fit Scores: Cross-lagged Outcomes Model 2

	Overall Group	**Community Group**	**Acute Inpatient Group**
X^2	384	265.8	198.6
DF	39	39	39
P	0	0	0
Normed X^2	9.8	6.8	5.1
CFI	.84	.84	.79
RMSEA	.16	.17	.16

12.7.4 Cross-lagged Outcomes Model 3

Cross-lagged model 3 was next investigated to find a plausible explanation of the relationships between psychological care interventions and client emotional health outcomes. This model built on the previous cross-lagged model 2 by investigating the cumulative effect of level of the clients' emotional health status on the administration of psychological care interventions. In this way, psychological care interventions Day 3, Day 4 and Day 5 were regressed onto preceding emotional health variables. As such client emotional health status on Day 1 was specified to impact on psychological care interventions on Day 2, Day 3, Day 4 and Day 5 of the study. Emotional health status on Day 2 of the study was specified to impact on psychological interventions Day 3, Day 4 and Day 5 and so forth. See Figure 17 for a graphical illustration of the regression relationships specified for cross-lagged outcomes model 3.

Figure 17 Cross-lagged Outcomes Model 3



Findings

As can be seen in Table 69 below, this model again failed to sufficiently explain the impact that nursing interventions have on client emotional health. Poor fit statistics were observed across the overall, acute inpatient and the community based study groups. In order to get some insight into the processes at work, the Table of unstandardised regression coefficients was examined (See Appendix I, Table 1 p. 425). As can be seen, the immediacy effect was at play. The *r* coefficient decreased in size as the time between the administration of the intervention and the measured emotional health outcome increased. In other

words, *r* was greater for the regression relationship between psychological intervention Day 1 and emotional health Day 2 than it was between psychological interventions Day 1 and emotional health Day 5. This was to be expected.

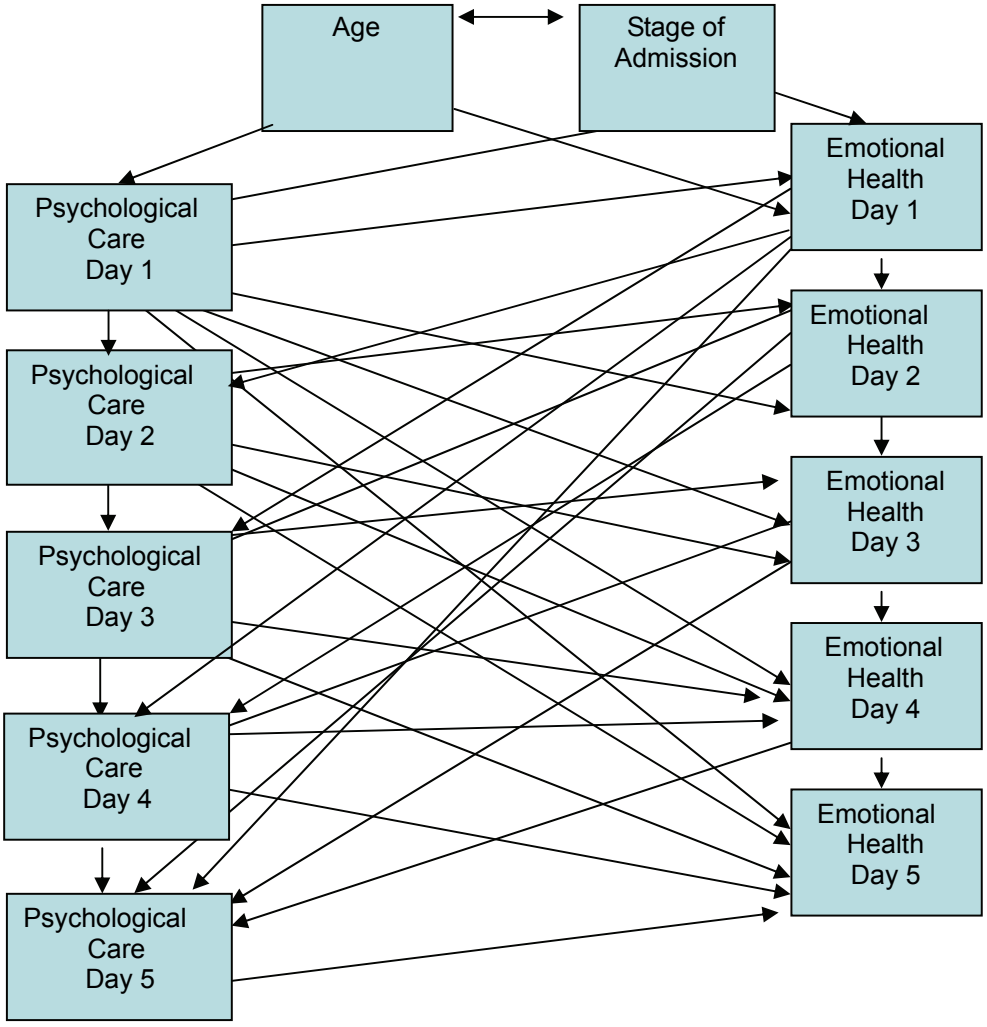
Table 69 Model Fit Scores: Cross-lagged Outcomes Model 3

	Overall Group	**Community Group**	**Acute Inpatient Group**
X^2	372.814	256.2	192.6
DF	33	33	33
P	0	0	0
Normed X^2	11.23	7.8	5.8
CFI	.84	.85	.79
RMSEA	.17	.18	.17

12.7.5 Final Cross-lagged Model

In continuing to build the process model of nursing outcomes of care, the immediacy effect was further explored. This time constraints were added between psychological interventions on Day 1 and emotional health status Day 1, psychological interventions on Day 2 and emotional health status Day 2, psychological interventions on Day 3 and emotional health status Day 3 and so forth, to Day 5 of the study. See Figure 18 below.

Figure 18 Cross-lagged Final Model



Findings

This model produced good fit statistics, all adhering to the recommended cut off points. The Normed X^2 goodness of fit score was below the 3:1 ratio of X^2:df, the RMSEA was below the conservative .05 cut off point and the CFI was above the recommended .95 level (Hu and Bentler, 1999). See Table 70 below.

Table 70 Model Fit Scores: Cross-lagged Outcomes Final Model

	Overall Group	**Community Group**	**Acute Inpatient Group**
X^2	38.17	56.1	38.4
DF	28	28	28
P	.095	.001	.091
Normed X^2	1.4	2	1.4
CFI	.995	.98	.99
RMSEA	.032	.071	.048

The unstandardised regression coefficients and corresponding P values for all three study groups are outlined in Table 71 below. The standardised and therefore comparable regression coefficients for all study groups are outlined in Table 72.

Table 71 Unstandardised R Coefficients and Corresponding P Values for the Overall, Community and Acute Inpatient Client Groups

			Overall Group		Community Group		Acute Group	
Regression Relationship			R	P	R	P	R	P
D1Psych Interventions	<	Age Group	.080	.025	.104	.02	.04	.50
D1Psych Interventions	<	Stage of admission	-.07	.018	-.13	***	.06	.24
D1Emotional Health	<	Age group	.035	.341	.038	.43	.01	.81
D1Emotional Health	<	Stage of admission	-.08	.010	-.08	.05	-.03	.56
D1Emotional Health	<	D1 Psych Interventions	.571	***	.706	***	.40	***
D2Psych Interventions	<	D1 Psych Interventions	.742	***	.706	***	.77	***
D2Psych Interventions	<	D1 Emotional Health	.042	.239	.061	.13	.01	.86
D2Emotional Health	<	D1 Psych Interventions	-.06	.362	-.11	.11	-.01	.94
D2Emotional Health	<	D1 Emotional Health	.632	***	.67	***	.525	***
D2Emotional Health	<	D2 Psych Interventions	.353	***	.460	***	.272	.00
D3Psych Interventions	<	D2 Psych Interventions	.798	***	.742	***	.829	***
D3Psych Interventions	<	D2 Emotional Health	.050	.328	.157	.03	-.05	.54
D3Psych Interventions	<	D1 Emotional Health	-.03	.440	-.09	.12	-.03	.67
D3Emotional Health	<	D2 Psych Interventions	-.16	.027	-.17	.12	-.21	.04
D3Emotional Health	<	D2 Emotional Health	.718	***	.758	***	.692	***
D3Emotional Health	<	D1 Psych Interventions	-.14	.009	-.17	.02	-.07	.36
D3Emotional Health	<	D3 Psych Interventions	.496	***	.459	***	.520	***
D4Psych Interventions	<	D3 Psych Interventions	.216	.004	.410	***	.038	.72
D4Psych Interventions	<	D3 Emotional Health	-.11	.291	-.15	.27	-.07	.71
D4Psych Interventions	<	D1 Emotional Health	-.13	.12	-.2	.11	-.01	.93
D4Psych Interventions	<	D2 Emotional Health	.188	.113	.211	.24	.116	.48

			Overall Group		Community Group		Acute Group	
Regression Relationship			R	P	R	P	R	P
D4Emotional Health	<	D3 Psych Interventions	.181	.083	.158	.28	.172	.23
D4Emotional Health	<	D3 Emotional Health	.29	**	.30	**	.200	.04
D4Emotional Health	<	D1 Psych Interventions	-.07	.41	.14	.21	-.41	**
D4Emotional Health	<	D2 Psych Interventions	-.21	.08	-.33	.04	.079	.63
D4Emotional Health	<	D4 Psych Interventions	.56	**	.50	**	.69	**
D5 Psych Interventions	<	D4 Psych Interventions	.81	**	.85	**	.76	**
D5 Psych Interventions	<	D4 Emotional Health	-.02	.55	-.07	.16	.01	.85
D5 Psych Interventions	<	D1 Emotional Health	.12	.01	.08	.20	.14	.04
D5 Psych Interventions	<	D2 Emotional Health	-.14	.05	-.03	.72	-.22	.02
D5 Psych Interventions	<	D3 Emotional Health	.06	.27	.02	.78	.11	.24
D5 Emotional Health	<	D4 Psych Interventions	-.41	**	-.39	**	-.39	**
D5 Emotional Health	<	D4 Emotional Health	.78	**	.73	**	.81	**
D5 Emotional Health	<	D1 Psych Interventions	-.09	.48	-.01	.93	-.06	.42
D5 Emotional Health	<	D2 Psych Interventions	.05	.49	.04	.77	.06	.54
D5 Emotional Health	<	D3 Psych Interventions	-.01	.86	-.05	.64	.02	.82
D5 Emotional Health	<	D5 Psych Interventions	.50	**	.48	**	.51	**

*'**' = significant result below the .01 level '***' = significant result below the .001 level*

Table 72 The standardised R Coefficients for the Overall, Community and Inpatient Client Groups

Standardised Regression Relationship			**Overall Group**	**Community Group**	**Acute inpatient Group**
Regression Relationship			R	R	R
D1Psych Interventions	<	Age Group	.125	.171	.058
D1Psych Interventions	<	Stage of admission	-.124	-.236	.094
D1Emotional Health	<	Age Group	.047	.049	.020
D1Emotional Health	<	Stage of admission	-.120	-.119	-.044
D1Emotional Health	<	D1Psych Interventions	.486	.547	.397
D2Psych Interventions	<	D1Psych Interventions	.745	.748	.727
D2Psych Interventions	<	D1Emotional Health	.049	.083	.011
D2Emotional Health	<	D1Psych Interventions	-.049	-.092	-.007
D2Emotional Health	<	D1Emotional Health	.666	.724	.525
D2Emotional Health	<	D2Psych Interventions	.316	.364	.284
D3Psych Interventions	<	D2Psych Interventions	.812	.765	.833
D3Psych Interventions	<	D2Emotional Health	.057	.205	-.046
D3Psych Interventions	<	D1Emotional Health	-.041	-.125	-.030
D3Emotional Health	<	D2Psych Interventions	-.150	-.136	-.225
D3Emotional Health	<	D2Emotional Health	.742	.796	.716
D3Emotional Health	<	D1Psych Interventions	-.127	-.150	-.069
D3Emotional Health	<	D3Psych Interventions	.452	.370	.559

Standardised Regression Relationship			Overall Group	Community Group	Acute inpatient Group
Regression Relationship			R	R	R
D4Psych Interventions	<	D3Psych Interventions	.216	.364	.043
D4Psych Interventions	<	D3Emotional Health	-.123	-.164	-.070
D4Psych Interventions	<	D1Emotional Health	-.152	-.247	-.011
D4Psych Interventions	<	D2EmotionalHealth	.214	.244	.129
D4Emotional Health	<	D3Psych Interventions	.169	.140	.166
D4Emotional Health	<	D3Emotional Health	.291	.334	.180
D4Emotional Health	<	D1Psych Interventions	-.064	.132	-.377
D4Emotional Health	<	D2Psych Interventions	-.194	-.302	.076
D4Emotional Health	<	D4 Psych Interventions	.520	.503	.580
D5Psych Interventions	<	D4 Psych Interventions	.853	.903	.785
D5Psych Interventions	<	D4Emotional Health	-.026	-.075	.014
D5Psych Interventions	<	D1Emotional Health	.151	.109	.161
D5Psych Interventions	<	D2Emotional Health	-.162	-.041	-.258
D5Psych Interventions	<	D3Emotional Health	.072	.023	.119
D5Emotional Health	<	D4 Psych Interventions	-.39	-.419	-.335
D5Emotional Health	<	D4Emotional Health	.819	.789	.837
D5Emotional Health	<	D1 Psych Interventions	-.038	-.007	-.056
D5Emotional Health	<	D2 Psych Interventions	.054	.034	.061
D5Emotional Health	<	D3 Psych Interventions	-.012	-.047	.020
D5Emotional Health	<	D5 Psych Interventions	.464	.494	.423

Finally, the squared multiple correlation coefficients for all three study groups for the client emotional health outcomes are outlined in Table 73 below.

Table 73 Table of Squared Correlation Coefficient for the Overall, Community and Acute Inpatient Study Groups

Factor	Overall Group	Community Group	Acute Group
D1 Emotional Health	.271	.351	.158
D2 Emotional Health	.669	.807	.439
D3 Emotional Health	.735	.750	.713
D4 Emotional Health	.377	.392	.447
D5 Emotional Health	.724	.650	.798

12.8 Discussion

In Chapter Three, the current thinking on nursing sensitive patient/client outcomes measurement was outlined. As noted, two predominant perspectives on the investigation of nursing sensitive client outcomes dominate the literature. In particular, emphasis is given to the conceptualisation of nursing sensitive client outcomes as the unintended effects of inadequate nursing care. In this way outcomes include the effects of medication errors, patient falls and nosocomial infections on client health (e.g. Aiken et al, 2002, 2003, McGillis-Hall, 2004). The other, less prominent conceptualisation of nursing sensitive client outcomes is based on a process model of care whereby outcomes are affected by nursing characteristics, nursing care provided, client characteristics, the interpersonal aspects of care and the care environment (Irvine et al, 1998).

In a significant number of studies carried out using the conceptualizations of outcomes based on adverse effects of care, hospital administrative databases have been used to provide data on client outcome status (Aiken et al, 2002, 2003, 2008, Rafferty, 2007). It is argued here, that using hospital databases falls short of capturing outcomes directly related to the nursing contribution to care. Where possible, using NMDS's to measure outcomes should more accurately reflect the nursing contribution to care, as they are specifically designed and validated to capture elements of the nursing role.

Investigation of the usability of the I-NMDS (MH) in capturing nursing sensitive outcomes of care was considered appropriate, as it accounts for both the level of the client's presenting problems, and the level and type of nursing care provided to address those problems. Furthermore, if the I-NMDS (MH) was found to be usable in the assessment of nursing sensitive client outcomes, it could be used to gather data upon which important nursing management and practice related decisions could be made. In order to assess the usability of the I-NMDS (MH) in the measurement of nursing sensitive client outcomes, a statistically robust model of the nursing process, based on I-NMDS (MH) variables (latent variables) was required. As such, this study engaged a step-by-

step analytical process of model building and model fit determination. Three separate group based process models of nursing care were subjected to outcomes analysis based broadly on the research carried out by Doran et al (2002) described in Chapter Three.

The first, baseline model of nursing sensitive client outcomes was constructed according to the idea that nursing sensitive outcomes of care can be conceptualized according to a process model of care. In this way, interventions mediated the relationship between client problem state at point 1 and point 2 in time. All 5 days of I-NMDS (MH) data were used in model construction. In keeping with the Nursing Role Effectiveness Model (Doran et al, 2002), characteristics of the client were included in the model. The characteristics client age and stage of admission, along with the measure of the clients' emotional health problems on Day 1, constituted the structural variables of the model. Within the NREM the structural variables include the nurse, client, and nursing unit characteristics that influence the processes and outcomes of health care. As this study was a secondary analysis of the validity and reliability study data, the research design was imperfect for the analysis of nursing sensitive outcomes of care in strict adherence to the NREM. Psychological care interventions over the 5 study days represented process variables, and client emotional health problems on days 2, 3, 4 and 5 represented client outcomes of nursing care.

The fit statistics for this baseline model were poor, indicating that further constraints needed to be imposed to improve the model fit. Adding constraints would also facilitate the building of a model that more accurately accounted for the processes underpinning the improvement in client emotional health from Day 1 to Day 5 of the study.

A step-by-step process was engaged to build a cross-lagged model of care that was statistically robust and valid for the investigation of the impact that nursing interventions play on client outcome achievement. Cross-lagged model 1 introduced reciprocal constraints between psychological care and emotional health problems i.e. both psychological care and emotional health at time 2

were regressed onto their reciprocal lagged scores. When this model failed to produce a good statistical fit to the data, further constraints were added to account for the cumulative effect of psychological care interventions on emotional health outcomes. Again the model failed to explain the processes underlying the impact of nursing psychological care interventions on client emotional health outcomes.

In the final two models specified, the immediacy effect of the reciprocal relationships between client emotional health on each study day and the psychological care administered on that same day were explored. The imposition of constraints to account for the relationship between care and wellbeing on the same day resulted in a good fit and a statistically robust model of nursing sensitive client outcomes. The number of parameters within the final cross-lagged model was 39, resulting in a sample requirement of approximately 195 participants. As the overall sample size for this study was 360, the sample size requirement was met. However because the sample size for the community and acute inpatient groups respectively was 160 and 200 and because the sample size reduced from Day 1 to Day 5 of the study, the results of this analysis should be treated with caution.

Discussion of Findings for the Overall Group

For the overall study group, both age and stage of admission were found to be significantly related to the level of interventions administered, while stage of admission was found to be significantly related to the clients emotional health status ($\beta = .08$, $p < .05$; $\beta = .-.067$, $p < .05$; $\beta = .-.076$, $p < .05$). The older the client, the more intensive the intervention administered. The longer the client had been admitted to the service, the lower the level of intervention administration and emotional health problems were found to be.

A noted above, it was important to account for the relationship between the level of psychological care administered and the level of the clients emotional health problems on the same study day. It was only when this relationship was included in the model that a good statistical fit was found, indicating the

importance of the immediacy effect in contributing to our understanding of nursing sensitive patient/client outcomes.

A significant relationship was observed between psychological care and emotional health status on the same day, across all 5 days of the study. All of the regression coefficients for these relationships were positive inferring that as the level of the intervention increased, so too did the level of the client problem presentation. However, the study design did not account for the time delay between the administration of the intervention and the subsequent problem level. Thus, it was not possible to say that the intervention influenced the problem state, when measured on the same study day. In other words, positive coefficients were not necessarily indicative of disimprovement in client condition, as the study design did not allow for time delay. As such, it is assumed that the positive regression coefficients were indicative of an association between level of intervention and level of problem, i.e. when intervention was high, so too was the problem and vice versa.

As one would expect, significant direct regression relationships were observed from Day 1 emotional health to Day 2 emotional health ($\beta = .632$, $p < .05$), from Day 2 emotional health to Day 3 emotional health ($\beta = .718$, $p < .05$), from Day 3 emotional health to Day 4 emotional health ($\beta = .29$, $p < .05$) and from Day 4 emotional health to Day 5 emotional health ($\beta = .78 < .05$). These findings indicated that emotional health status of the client recorded on any given day of the study was positively related to the emotional health status of the client recorded on the subsequent study day. The weaker coefficient noted between days 3 and 4 was likely to be due to the fact that day 4 of the study tended to be a Monday. Many clients may have been on weekend leave from their inpatient unit or not attending community based care facilities on the preceding days. This may have impacted on associations. A similar pattern of significant relationships were observed between level of intervention carried out on Days 1 and 2 ($\beta = .74 < .05$), 2 and 3 ($\beta = .798 < .05$), 3 and 4 ($\beta = .216 < .05$) and 4 and 5 ($\beta = .81 < .05$) of the study. As such, interventions carried out on any given day were positively related to the level of intervention carried out on the following day.

As hypothesised, examination of the lagged relationships between psychological care interventions and emotional health outcomes indicated that the administration of psychological care interventions resulted in a reduction in client emotional health problems across a number of study days. Significant negative regression scores were found for the cross lagged relationships between the administration of interventions on Day 1 and corresponding emotional health outcomes on Day 3 (β = -.14 < .05), the administration of interventions on Day 2 and corresponding emotional health outcomes on Day 3 (β = -.16 < .05) and the administration of interventions on Day 4 and corresponding emotional health outcomes on Day 5 (β = -.41 < .05). While the relationship between the administration of interventions on Day 2 and problem status of the client on Day 4 was not significant, it was not far off being significant (β = -.21, P =.08). A similar finding was observed for the relationship between administration of interventions on Day 3 and problem status of the client on Day 4 (β = .181 < .083).

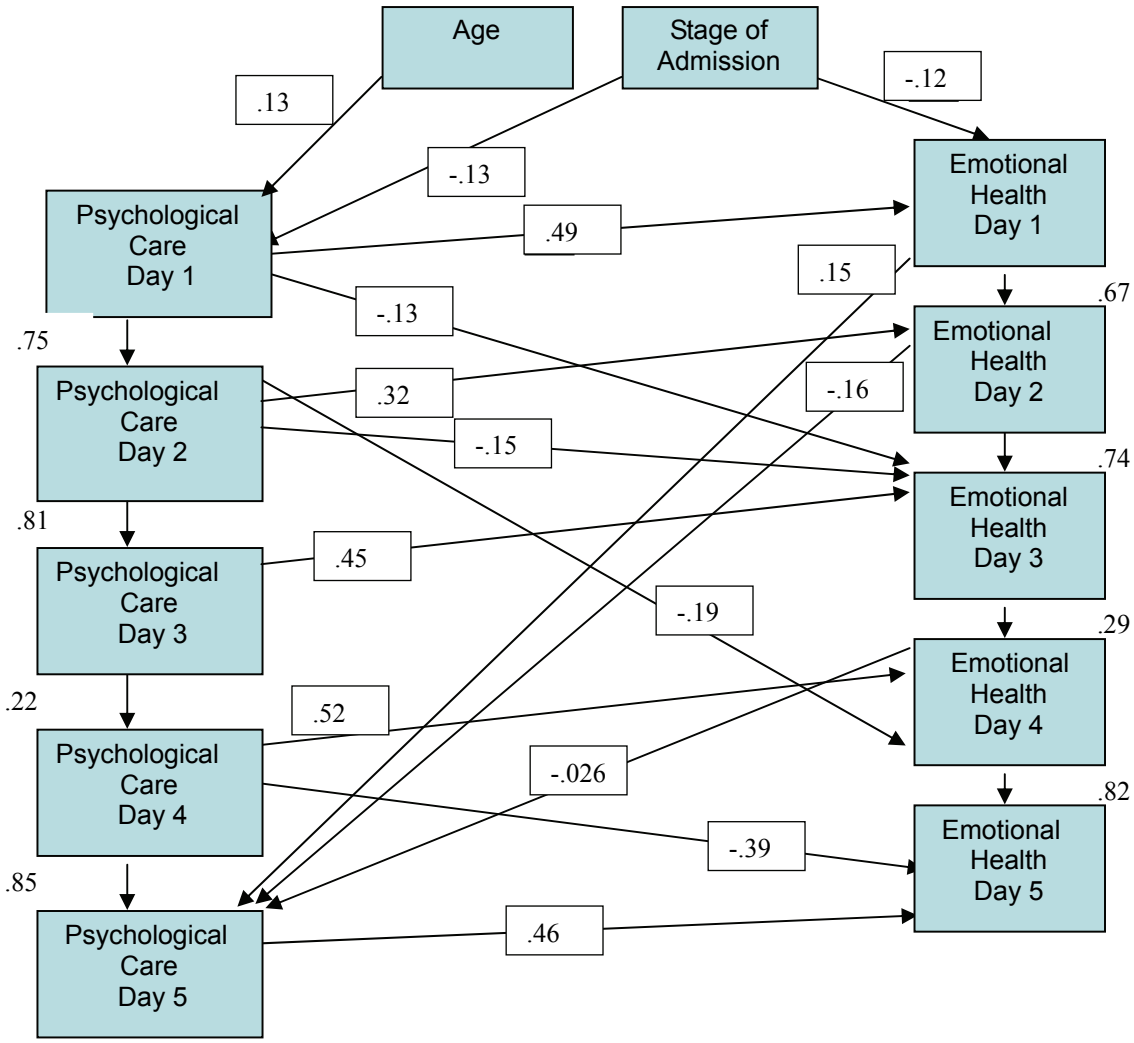
The negative scores observed for this analysis indicate a negative relationship between intervention administration and subsequent problem presentation. In other words, as the intervention level increased, the problem level decreased. This finding is important as it indicates that the I-NMDS (MH) can potentially be used to track significant and meaningful change in the level of client problem presentation as a result of nursing care. The positive regression coefficient noted for the cross lagged effect between interventions administered on Day 3 and problem status on Day 4 indicates that the break in care over the weekend may have temporarily impacted on the effectiveness of nursing care.

Interestingly, when the cross lagged relationships between emotional health status and intervention administration were examined, only two significant relationships were observed. A significant relationship was found between emotional health scores on Days 1 and 2 of the study and interventions administered on Day 5 (β = .12, P< .05; β = -.14, P< .05). It is understandable that a low (high) level of problem was found to be associated with a corresponding low (high) level of intervention after 5 study days. It is less

understandable that a low (high) level of problem was found to be associated with a corresponding high (low) level of intervention, indicated by the negative relationship between Day 2 emotional health presentation and Day 5 psychological interventions. The magnitude of clients' problems at the outset may have influenced the nurses' ratings of the intervention intensity level after 5 days of care. This finding may indicate that the nurses' perception of the client's problem level earlier on in the care process may have impacted on interventions administered over the course of the caring period, regardless of a decrease in the client's problem state. Another reason for this finding may have been 'reactivity' whereby the respondent became sensitized to the research tool and `learned' to respond in a way he or she believed was expected (McHaney et al, 1999). It may have been that respondents felt that they should be rating their intervention levels highly to indicate that they were working hard at improving the clients' wellbeing. More research is needed to explore this idea further.

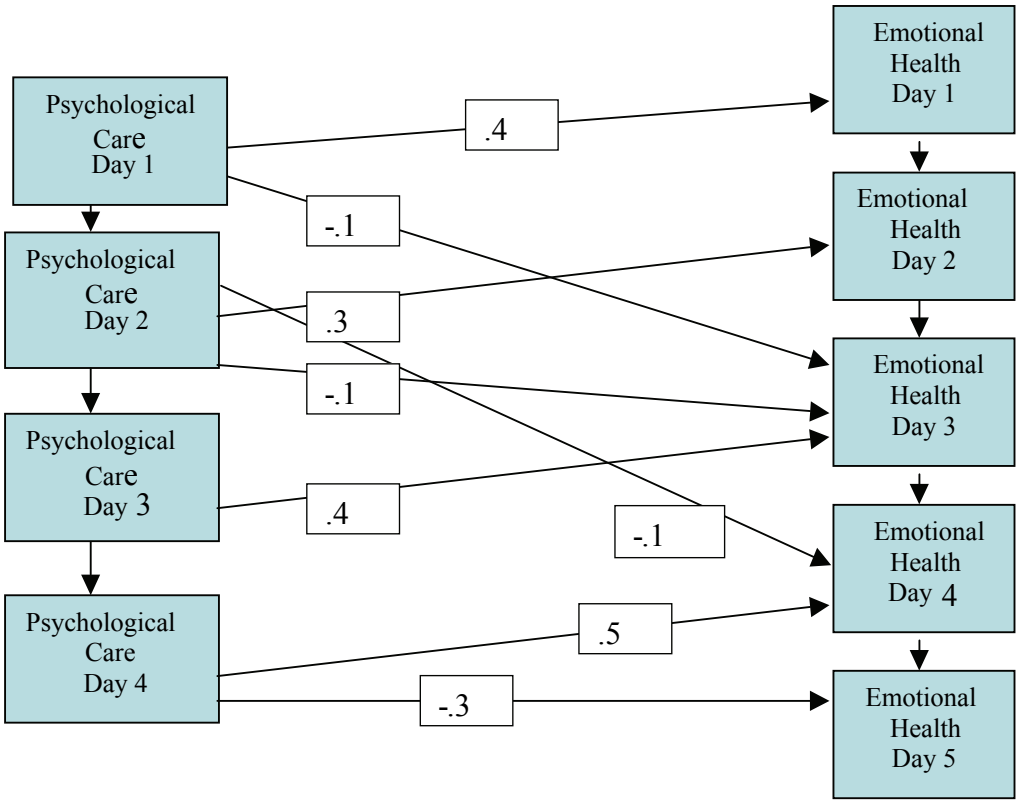
Figure 19 below outlines the standardised, and therefore comparable, regression scores for each significant relationship in the final cross lagged model of nursing sensitive patient/client outcomes. These scores represent findings for the overall study group. Regression scores are rounded up to two decimel places.

Figure 19 Model of Significant Relationships in the Final Cross-lagged Model of Nursing Sensitive Patient/Client Outcomes for the Overall Study Group



The significant immediate, same day and lagged, outcomes relationships for the overall group are depicted in Figure 20 below. The nearly significant relationship between interventions Day 2 and outcomes Day 4 are included here to highlight the potential of the I-NMDS (MH) in outcomes analysis.

Figure 20 Model of Significant Immediate, Same Day, Lagged Outcomes Relationships in the Final Cross-lagged Model of Nursing Sensitive Patient/Client Outcomes for the Overall Study Group



Examination of the relationship between interventions Day 1, emotional health Day 1, and emotional health Day 3 illustrates the mediating effect of nursing interventions on change in client problem status where the negative value of r=-.13 infers that the interventions led to a reduction in the client emotional health problem status. This pattern is reflected in the relationships between interventions and emotional health Day 2 and emotional health Day 3 and between interventions and emotional health Day 2 and emotional health Day 4 as well as between interventions and emotional health Day 4 and emotional health Day 5. The regression effect increased as the caring process progressed i.e. the impact of nursing interventions on the emotional wellbeing of the client was higher towards the end of the study than it was at the beginning of the

study period. This pointed to the cumulative effect of nursing interventions on client problem outcomes.

The lack of a significant relationship between interventions Day 1 and emotional health Day 2 may have been a result of the fact that the study typically started on a Monday, at the beginning of the week and after a period away from the care setting for a number of clients in this study. Investigation of outcomes for the community based group, who were definitely not in receipt of weekend care, will facilitate the exploration of this finding.

The squared correlation coefficients for the model for the overall group are outlined in Table 73 above. As can be seen this nursing outcomes model explains 27% of the variance in client emotional health on Day 1, 67% on Day 2, 74% on Day 3, 38% on Day 4 and 72% on Day 5 of the study.

Overall, these results support the model as a structure for assessing the nursing contribution to mental health client emotional health status across both acute inpatient and community based mental health care settings.

Discussion of Findings for the Community Based Group

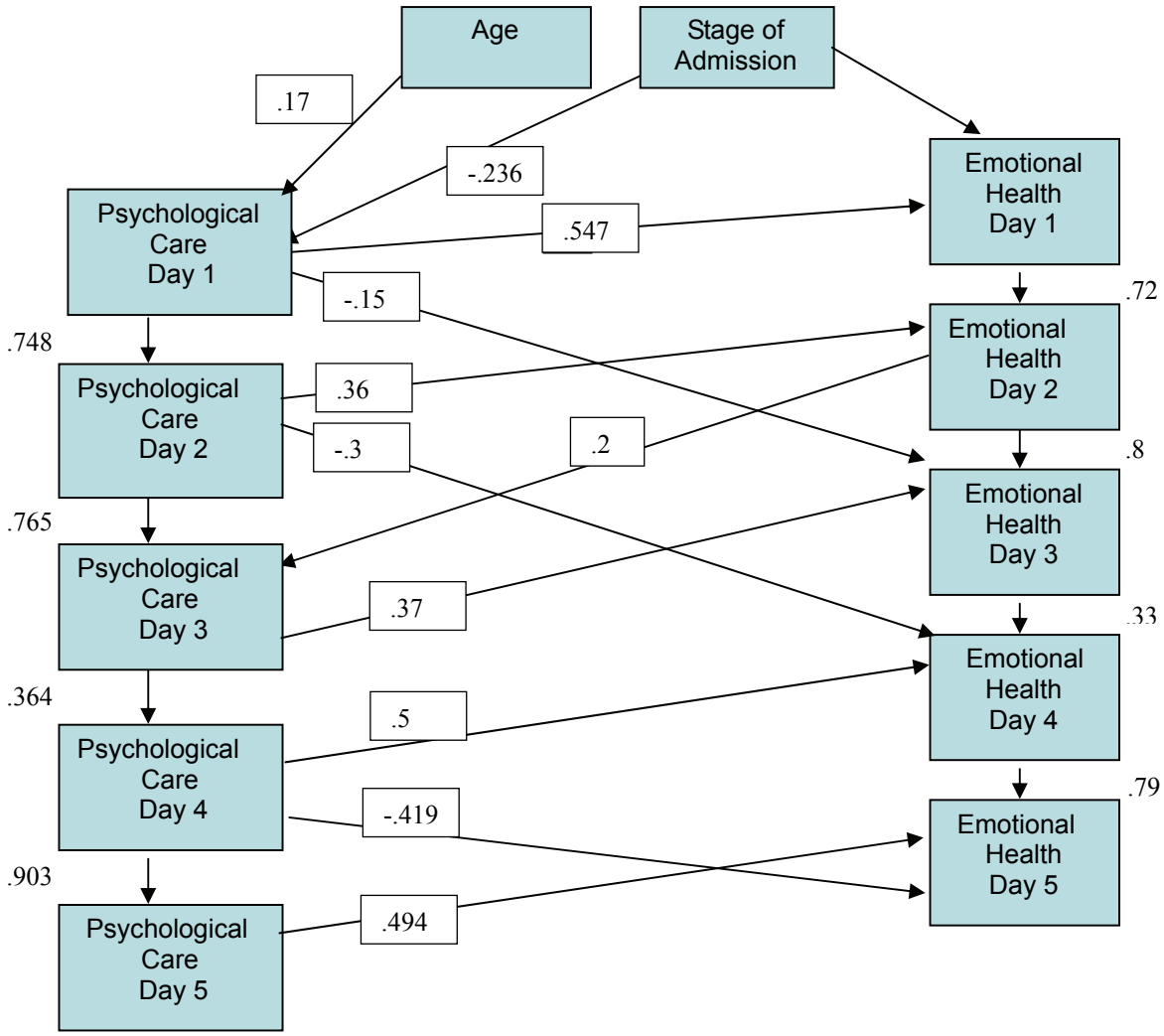
In line with the findings for the overall study group, for the community based group, both age and stage of admission were found to be significantly related to the level of interventions administered ($\beta = .104$, $p < .05$; $\beta = -.13$, $p < .05$). These findings infer that the older the client, the higher the level of interventions s/he was likely to be receiving. Conversely, the longer the client was in the care setting, the lower the level of interventions s/he was likely to be receiving. Furthermore, stage of admission was found to be significantly negatively related to client emotional health status ($\beta = -.08$, $p < .05$). This may be due to the longevity of care in the community. Individuals who are in the community based care system for a longer period of time are likely to have lower levels of intervention and lower levels of emotional health problems than those who have more recently been admitted to community care, generally

from an acute based care setting. See Figure 21 below for an outline of all of the significant relationships observed for the community based client group.

Again, a significant positive relationship was observed between psychological care and emotional health status on the same day, across all 5 days of the study. As with the overall group analysis, significant direct regression relationships were noted from Day 1 emotional health to Day 2 emotional health ($\beta = .67$, $p < .05$), from Day 2 emotional health to Day 3 emotional health ($\beta = .76$, $p < .05$), from Day 3 emotional health to Day 4 emotional health ($\beta = .3$, $p < .05$) and from Day 4 emotional health to Day 5 emotional health ($\beta = .73 < .05$). Significant positive regression relationships were also observed between level of intervention carried out on Days 1 and 2 ($\beta = .706 < .05$), 2 and 3 ($\beta = .742 < .05$), 3 and 4 ($\beta = .41 < .05$) and 4 and 5 ($\beta = .85 < .05$) of the study.

While the relationship between interventions carried out on Days 3 and 4 of the study were weaker than those carried out between the other study days, this relationship was stronger than that noted for the overall group. This may be due to the nature of community based care and the fact that data collection for a proportion of this group (i.e. those in receipt of domiciliary care) took place approximately once a week or upon nurse/client appointment.

Figure 21 Model of Significant Relationships in the Final Cross-lagged Model of Nursing Sensitive Patient/Client Outcomes for the Community Based Group



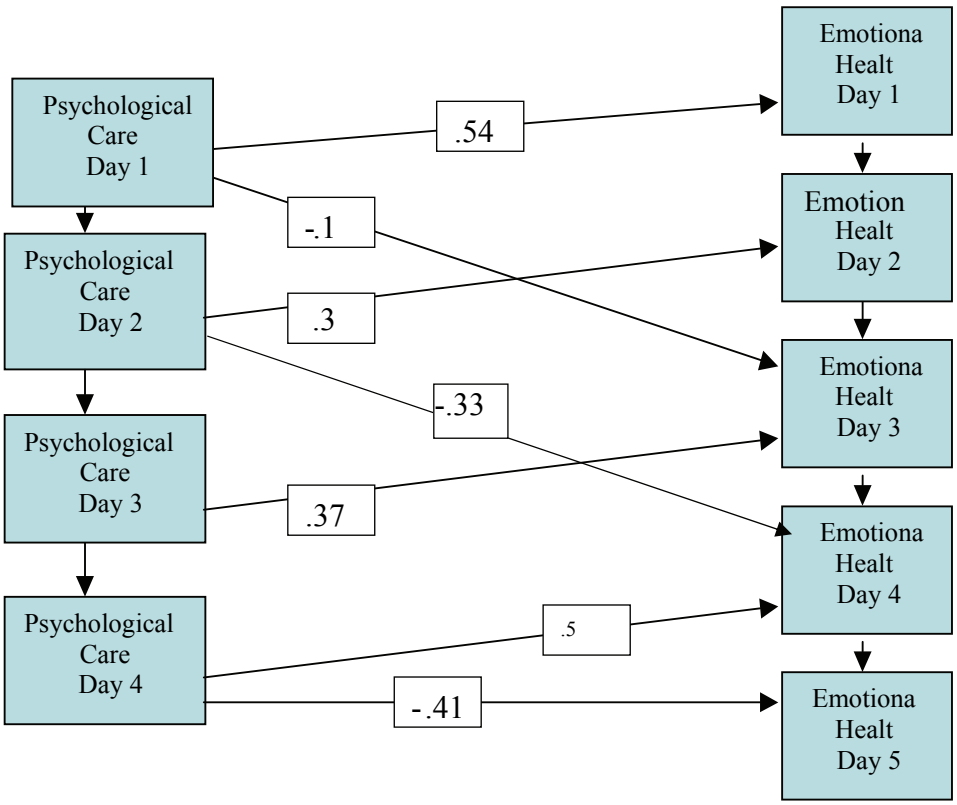
In line with the overall group, examination of the lagged relationships between psychological care interventions and emotional health outcomes for the community based group indicated that the administration of psychological care interventions resulted in a reduction in client emotional health problems. Significant negative (unstandardised) regression scores were found for the cross lagged relationships between the administration of interventions on Day 1 and corresponding emotional health outcomes on Day 3 ($\beta = -.17 < .05$), the

administration of interventions on Day 2 and corresponding emotional health outcomes on Day 4 ($\beta = -.33 < .05$) and the administration of interventions on Day 4 and corresponding emotional health outcomes on Day 5 ($\beta = -.39 < .05$). These findings infer that the I-NMDS (MH) can capture nursing sensitive patient/client outcomes or the mediating effects of interventions on change in the clients' emotional health status for community based clients.

Examination of the lagged relationships between the emotional health status of the client and interventions carried out for the community based group indicated only one significant coefficient. A significant relationship was noted for the relationship between the emotional health status of the client on Day 2 and the nursing interventions administered on Day 3 ($\beta = .157 < .05$). This finding infers a positive relationship between client problems and subsequent nursing interventions. See Figure 22 below for an outline of the significant outcomes relationships for this client group.

Examination of the fit statistics in Table 70 indicates that while this outcomes model fit the data well, it was not as good a fit for the community group as it was for the overall or the acute inpatient based client/nursing groups. This may again be due to the length of stay of some clients within the community setting, i.e. from weeks to years. A more focused research design to capture nursing outcomes of care for community based nurses and their clients is recommended to ensure that the data collection period is spread over a longer time frame to more accurately capture change in the clients' problem presentation. For certain client groups e.g. those in chronic care environments like day centres, this time frame could be over a full year. For others, e.g. those care for via community based acute care services like day hospitals and community home based teams, the study time frame could be over a two week to one month period.

Figure 22 Model of Significant Immediate, Same Day, Lagged Outcomes Relationships in the Final Cross-lagged Model of Nursing Sensitive Patient/Client Outcomes for the Community Based Study Group



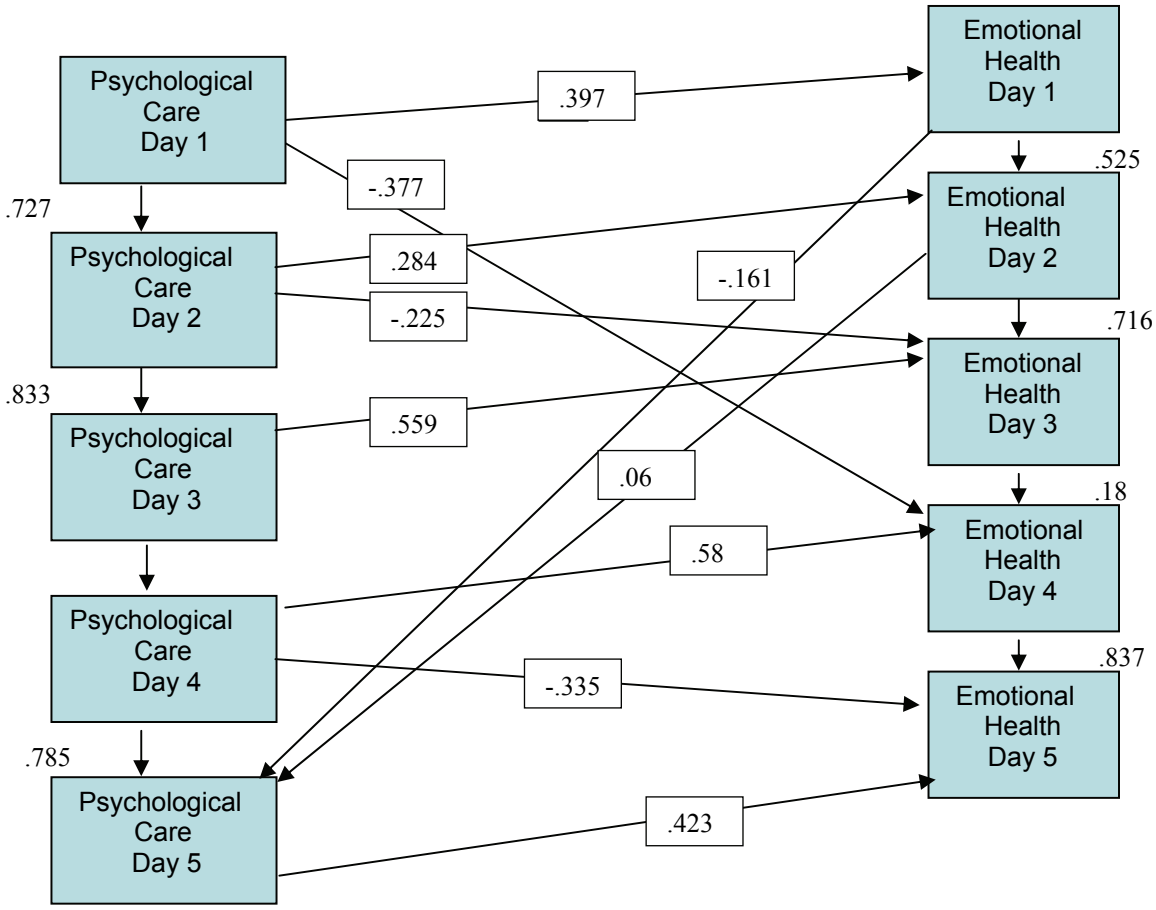
Discussion of Findings for the Acute Inpatient Based Group

In contrast to the findings for the overall study group and the community based group, no significant relationships were found between age and stage of admission and health status and intervention level for the acute inpatient group. The lack of a significant relationship between age and stage of admission and level of intervention carried out may be due to the fact that clients attending acute inpatient care services are by definition 'acutely ill'. This implies the clients have similar levels of problem presentation necessitating similar levels of intervention. Today, there is an emphasis placed on care of the mentally ill in the community rather than in inpatient settings whereby only those deemed ill enough to be admitted to the inpatient services will find themselves in such care settings. Chronic mental illness is progressively debilitating and the older the client gets, the longer s/he has had to live with the problem. This may explain the correlation between age and stage of admission with client

problems and nursing interventions administered to community based clients and the overall study group.

The immediacy effect between interventions carried out and level of emotional health problems on the same day was at play, with significant relationships observed across all same day relationships. See Figure 23 for an outline of the significant relationships observed for this client group. The statistics used in this model are the comparable standardised regression coefficients.

Figure 23 Model of Significant Relationships in the Final Cross-lagged Model of Nursing Sensitive Patient/Client Outcomes for the Acute Inpatient Study Group



Strangely, and in contrast to the overall and community based groups, the relationship between psychological interventions Day 3 and psychological

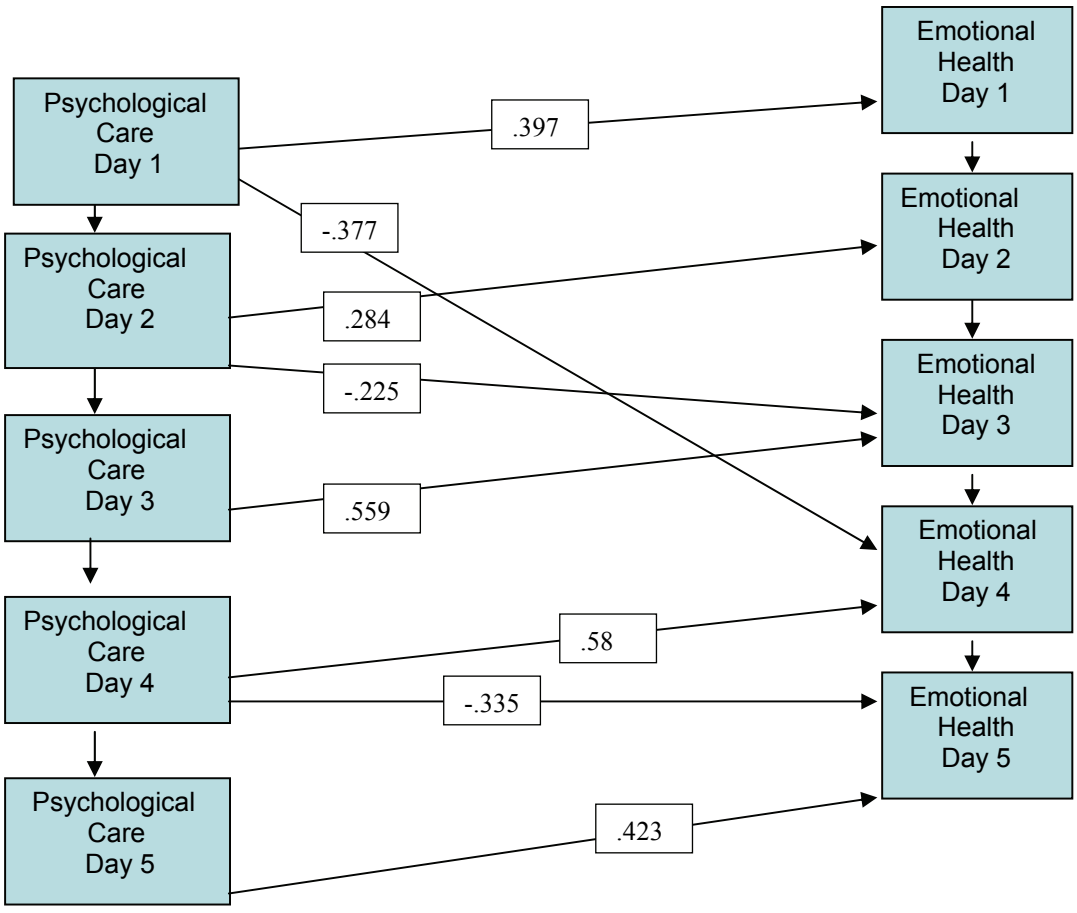
interventions Day 4 was not significant (β = .038 > .05). The interventions carried out on Day 3 would most likely have been on a Friday, while those carried out on Day 4 would have been on a Monday. This finding indicates the importance of time in the care process for acutely ill mental health clients. Furthermore, it infers that the nurse was unlikely to have based his/her decision regarding the clients care requirement on Day 4 on the care given on Day 3 of the study. Within the acute mental health setting, weekend leave can be considered an intervention in itself whereby the reaction of the client to being in the home environment can inform clinical decision making related to the clients functioning outside of the protected therapeutic environment. If the client illustrates an ability to function and cope well in the home setting, s/he may be considered for discharge into community mental health based care.

All other regression relationships between psychological interventions administered on a specific day and that on the following day were significant and in a positive direction. The same was found for the regression relationships between emotional health presentation on any given day and that on the following study day. These findings are in line with those for the overall and community based study groups.

Emotional health on Days 1 and 2 were significantly related to psychological interventions Day 5 (β = .14 < .05; β = -.224 < .05). Again, a negative regression coefficient was noted between emotional health problems Day 2 and nursing interventions Day 5. Once again, this might be explained by respondent reactivity. Moreover, perhaps the nurses' perception of the client's problem level earlier on in the care process impacted on interventions administered over the course of the caring period, regardless of a decrease in the client's problem state. The latter explanation seems to fit best when these results are considered against the converse finding for the community based group. In other words, it is more likely that ratings of nurses working in the acute inpatient environment might be influenced by their perception of the clients' problem status at the outset of the study, when considered against those of nurses working in the community setting (given the very different length of client stay in the respective care settings).

Significant negative regression relationships were observed between level of intervention carried out on Day 2 of the study and emotional health presentation on Day 3 ($\beta = -.21 < .05$), between level of intervention carried out on Day 1 of the study and emotional health presentation on Day 4 ($\beta = -.41 < .05$) and between level of intervention carried out on Day 4 of the study and emotional health presentation on Day 5 ($\beta = -.39 < .05$). The significant lagged and same day relationships are outlined in isolation in Figure 24 below.

Figure 24 Model of Significant Immediate, Same Day, Lagged Outcomes Relationships in the Final Cross-lagged Model of Nursing Sensitive Patient/Client Outcomes for the Acute Inpatient Study Group



The multiple squared correlation coefficients outlined in Table 73 above infer that, for the acute inpatient group, this model of nursing outcomes accounts for approximately 16% of the variance in client emotional health status Day 1, 44% of the variance in client emotional health status (outcomes) on Day 2, 71% of the variance in client emotional health status (outcomes) on Day 3,

45% of the variance in client emotional health status (outcomes) on Day 4 and 80% of the variance in client emotional health status (outcomes) on Day 5. Again the cumulative effect of the variables in the model on client outcomes is noted in the overall increase in the regression coefficients from Day 1 to Day 5 in the study.

Examination of the fit statistics for this model of nursing outcomes of care in Table 70 above illustrates that the model can explain the decrease in client problem presentation, and the mediating effect of nursing interventions. Across the three different study groups, it is noted that the model was best suited to the overall group and the acute inpatient group. While it fitted the community based group data well, the fit statistics for this group were not as robust as those for the other two groups. This may be because a number of acutely ill clients would have been in receipt of community based as well as inpatient care, due to the ambiguous and changing nature of mental health care in Ireland. For example, in the North East HSE region, a home based mental health team care for acutely ill clients in their homes rather than admitting them into inpatient care facilities. Another explanation for this is that chronic care in the community setting is often focused on maintaining a certain level of wellbeing and prevention of the exacerbation of the clients presenting problems rather than striving for improvement. In this way, positive outcomes may simply be maintaining the clients' presenting problem level and ensuring it does not deteriorate.

These findings again infer that the I-NMDS (MH) and the model of nursing outcomes outlined in this study have the potential to yield meaningful evidence regarding the impact of nursing interventions on client problem presentation.

12.9 Conclusion

The findings of this study support the idea that the I-NMDS (MH) in conjunction with a process model of nursing care can potentially be used to examine nursing sensitive client outcomes. As already outlined, these outcomes

would represent measurable changes in a client's state of health or condition as a result of nursing interventions and for which nurses are responsible (Maas et al. 1996, Van der Bruggen & Groen 1999). The fit statistics for the final cross lagged model of nursing sensitive patient/client outcomes for all three study groups, indicated that the impact of psychological nursing interventions on client emotional health can be described according to a model of nursing care based on the Nursing Role Effectiveness Model (Irvine et al, 1998). While it cannot be stated that any correct model of nursing outcomes analysis has been found, it is possible to state that this proposed process model of nursing outcomes cannot be rejected. Examination of the model fit statistics verified that a regression model of change in the client problem status supported the theoretical view that psychological nursing interventions would play a predictive role in the reduction in the clients' emotional health problem status.

Use of this theory-driven approach to outcome assessment dictates the researcher's definition of outcome, as it insists that any outcome is responsive to care provided. In this way, it makes elements of nursing care mediators between initial client state and client outcomes of care. Such outcomes can relate to client health e.g. physical, psychological, social and behavioural wellbeing (Sidani, 2004, Johnson et al, 2000) and are examined through the illustration of change in client state over a caring period.

This study engaged a secondary analysis of the data collected for the national validity and reliability testing of the I-NMDS (MH). As such, the research design was imperfect. In order to more accurately assess nursing sensitive patient/client outcomes using the I-NMDS (MH) and a process model of care, a number of areas of the research design would need to be addressed. These are discussed in relation to the limitations of the research study and recommendations for future research in the concluding Chapter Thirteen.

The potential for the I-NMDS (MH) in the investigation of nursing sensitive patient/client outcomes is great. If used in tandem with other research tools, greater organisational and health system level research studies could be implemented. For example, the I-NMDS (MH) could be used in tandem with

research tools to assess organisational management characteristics in the investigation of the impact of hospital/service level management models on nursing related client outcomes. Because the I-NMDS (MH) specifically relates to nursing related client problems and interventions, it should be more appropriate to use in the assessment of client outcomes, than for example discharge or hospital administration databases. These databases are large, generic care rather than nursing specific care information systems.
Furthermore, they can been inaccurately completed and do not always capture the complete nursing resource employed on a specific day of the working week (Van den Heede, 2008). These databases are not used to measure outcomes in real time rather the data is used retrospectively in many studies of nursing outcomes of care (e.g. Aiken et al 2002, 2003, 2008, Rafferty et al, 2007).

Finally more research into the area of nursing sensitive patient/client outcomes is required to improve current understanding regarding what aspects of nursing care that are most crucial to client recovery. It is argued here that the I-NMDS (MH) and other NMDS tool can and should be used for this purpose.

CHAPTER THIRTEEN

Conclusion

The overall aim of this study was to establish the validity and reliability of the Irish Nursing Minimum Data Set for mental health. A secondary, post hoc aim of the study was to investigate its usability in the analysis of nursing sensitive patient/client outcomes.

A Nursing Minimum Data Set (NMDS) can be used to systematically describe the nursing contribution to health care. Establishing the validity and reliability of the I-NMDS (MH) is an important development in the context of Irish mental health nursing given the requirements for the systematic description of nursing care. Throughout Chapter Two of this study, the consequences of the current invisibility of nursing in the overall context of client care were outlined. Without a definitive understanding of how nurses contribute to health care delivery, it is very difficult to justify the need for nursing care**.** This is perhaps best illustrated by the quotations '*If we cannot name it, we cannot control it, finance it, research it, teach it, or put it into public policy'* (Clark and Lang, 1992 p. 109) and '*if the evidence does not exist for a nursing intervention, does this reflect an ineffective intervention, or an understudied intervention?*' (Forchuk, 2001 p.40).

The literature clearly inferred the need for data regarding mental health nursing to make visible its contribution to both the work of the multidisciplinary team and client outcomes. Furthermore, the development of health and nursing specific information systems has long been advocated in Government reports for this purpose yet until now, no validated information system specific to mental health nursing had been developed in Ireland. Added to this, a review of the literature clearly inferred a gap in the literature in the area of Nursing Minimum Data Sets specific to mental health internationally. While there are

minimum data sets for multidisciplinary mental health practice e.g. the RAI: MH (Hirdes et al, 2001) and the 'The Minimum Psychiatric Data (MPD21)' in Belguim (unpublished), it appears that the I-NMDS (MH) represents the first NMDS system developed specifically by and for mental health nurses.

As a first step in the analysis of the data a missing data analysis was conducted. This was deemed important as it effectively served to increase the reliability of the data by uncovering, understanding and rectifying any problems with missing values. There appears to be a scarcity of reporting of this kind of analysis in the development of NMDSs and perhaps more importantly, in the investigation of nursing related patient outcomes (e.g. Aiken et al 2002, 2003, Rafferty et al, 2007). Nursing related outcomes research has typically utilised hospital discharge databases to derive outcomes indicators but as Van den Heede (2008) noted, these data bases often have high levels of missing data. It is proposed here that it is particularly important for outcomes researchers to conduct missing data analyses so that they understand the reasons behind any noted patterns of missing data and can then decide on appropriate measures to deal with that missing data in the actual outcomes analysis.

Prior to embarking on the main validity and reliability study, pre testing was carried out to ensure the I-NMDS (MH) variables adequately represented mental health nursing practice and were semantically clear and coherent. Pilot work on the I-NMDS (MH) led to the redesign of the presentation of the tool to optimise its usability and to ensure that it was content and face valid.

The results of validity and reliability study inferred that the I-NMDS (MH) was construct valid and that the individual factors on the tool possessed good levels of internal consistency and were relatively stable when analysed over more than one application. Furthermore it inferred that the I-NMDS (MH) could discriminate across mental health care specialties and could distinguish among groups that theory claims ought to be distinguished, i.e. acute inpatient and community based mental health client groups. These findings enforced the conclusion that the I-NMDS (MH) can be used with a good degree of confidence in research regarding descriptions of mental health nursing care.

The results of the studies to establish the construct and discriminative validity, stability and internal consistency of the I-NMDS (MH) inferred that mental health nursing embraces a theoretically holistic approach to client care and recovery. The factor structure of the I-NMDS (MH) concurred with biopsychosocial, holistic perspectives of wellbeing that are becoming more prevalent in mental health care today. In this way the structure of the validated I-NMDS (MH) acknowledges the real relationship between mental health, social functioning and physical health. Added to this, the conceptual underpinnings of the validated I-NMDS (MH) are in line with evidence of a move away from paternalistic, psychiatric models of mental health care discussed in Chapter Two. Implementation of the I-NMDS (MH) should therefore serve to increase the visibility of the nursing contribution to care, ensuring that the more subjective elements of nursing work become tangible.

The finding that the I-NMDS (MH) is based on a biopsychosocial understanding of mental health should be considered in the context in which the mental health caring role takes place. While it is acknowledged that the nursing role consists of physical, social and psychological dimensions, psychiatrists remain highly influential in client care, despite moves away from their traditional power base in hospitals (Brimblecombe, 2005). While it is not immediately apparent, such power relations pose a threat to transparency and critical reflection on mental health nursing care. The dominance of a biomedical model in the organisation of care contrasts with nurses' less visible (and less transparent and measurable) psychosocial contribution to care. As discussed in Chapter Two the noted difficulty of defining the mental health nursing role poses challenges for clinical practice, education and professional development. Many elements of nursing can be considered insufficiently technical and tangible in comparison with diagnostic, routine medical care. It is therefore important that intangible elements of nursing care such as the interpersonal/caring relationship and other psychosocial elements of nursing care, become formalised and consequently recognised as core to the nursing role. Descriptions of nursing care based on the validated I-NMDS (MH) should go some way to increasing the visibility of the holistic nature of mental health nursing.

Another element of the nursing role that tends to go unrecognised is that relating to the coordination and organisation of care. Mental health nurses in Ireland have previously indicated that indirect nursing care is central to their role (Scott et al, 2006a, Morris et al, in press) yet it goes unaccounted for in documentation relating to day to day nursing activity (Hanrahan et al, 2003). Indirect nursing activities such as documenting client care, answering the telephone and attending meetings have previously been considered peripheral rather than central to the nursing role, yet they are integral to making the care system work. The presence of indirect interventions related to the management and organisation of care within the validated I-NMDS (MH) is a step forward in highlighting the multidimensional aspects of nursing work.

Although ambiguous, the study of the interrater reliability of the I-NMDS (MH) indicated that 35 of the 38 variables on the tool, for which k_w could be calculated, reached acceptable levels of reliability. Only 6 tool variables had an acceptably high-level weighted kappa score while the remaining variables had below acceptable kappa scores but high-observed percentage agreement scores i.e. of approximately 70% or more. Jakobsson and Westergren (2005) acknowledge the scarcity of interrater reliability studies in the nursing literature. The results of the research conducted to establish the interrater reliability of the I-NMDS (MH) may therefore have implications for future nursing research. This study highlighted the difficulties that exist for researchers concerned with establishing the meaningful interrater reliability of a tool measuring variables on an ordinal scale in a specific clinical setting where nursing care is administered to a relatively homogenous group of clients. The major lesson learned here is that it may not always reliable to depend on any single statistic to interpret levels of interrater reliability. Furthermore, kappa should probably be presented in tandem with other statistics that can facilitate in the interpretation of variable and tool reliability. This study needs to be implemented again in a more diverse sample, representative of clients from across mental health nursing specialties. This should then shed more light on the issue of prevalence and consequently the interrater reliability of the I-NMDS (MH).

Using the I-NMDS to Investigate Nursing Sensitive Patient/Client Outcomes

This study inferred that the I-NMDS (MH) can be used to study nursing related client outcomes. It is argued here that the I-NMDS (MH) can be used in the investigation of outcomes conceptualised according to a process model of care whereby 'outcomes are affected not only by the care provided but also by the factors related to the client, to the interpersonal aspects of care and to the setting or environment in which care is provided' (Irvine et al, 1998 p.58). The finding that the I-NMDS (MH) has the potential to be used in longitudinal research on the impact of environmental conditions and the mediating effects of nursing interventions on client outcomes, infers the potential of the tool in future nursing sensitive patient/client outcomes and nursing effectiveness research. The I-NMDS (MH) offers a perspective on client outcomes that focuses on how the nursing role impacts on client wellbeing. This kind of research is important in safeguarding the future of nursing and ensuring appropriate resources are made available to provide effective and quality nursing services in Ireland.

The outcomes study findings are both topical and timely in light of the Government commitment to cut Irish nurses' working week from 39 hours to 37.5 hours, if this can be done on a cost neutral basis. These proposals will inevitably impact on the future organisation of nursing in Ireland. Research suggests that a higher educated nursing workforce can reduce the requirement for higher volumes of nursing staff in the pursuit of improved client outcomes (Aiken et al, 2003). Ireland has a high ratio of nurses to patients (between 1:6 and 1:15 nurses to patients or 14 nurses to every 1,000 of the population, compared to an OECD average of 9.7) yet problems persist regarding the delivery of effective and efficient care. This raises questions regarding nursing skill mix and patient outcome achievement in Ireland. The findings outlined in Chapter Twelve above infer that the I-NMDS (MH) can be used in investigations of nursing effectiveness, implying that it could be used in research to establish whether better educated nurses operating in smaller teams, comprising appropriate skill mix (and better nurse to patient ratios) result in

more effective patient care. The results of such a study could have serious implications for health service organisation and resource management in the future.

Other Potential Uses of the I-NMDS (MH)

Descriptions of Nursing Care:

There are a number of potential uses of the I-NMDS (MH), the most obvious perhaps being the description of nursing care. Data collected using the I-NMDS (MH) can be easily analysed and graphed to provide information on nursing trends in e.g. client populations, diagnosis, nursing interventions and differences in client presentations and nursing practice across service and geographic boundaries. Illustration of variations in client populations and trends in nursing practice using ridit scores and fingerprint graphs has been ongoing in Belgium to support management decisions relating to hospital budgets and staff allocation. Use of the I-NMDS (MH) to collect data to provide service providers with evidence of trends and patterns relating to nursing and client care would be valuable in facilitating effective mental health service management in Ireland.

Assessing nursing workload:

The conceptualisation and measurement of nursing workload is a complex area of research that has produced many ambiguities across traditional conceptualisations and systems of workload measurement (Morris et al, 2007). Workload research is directly related to hospital resource management. The I-NMDS (MH) has the potential to provide valuable information to inform hospital budgeting, nurse staffing and consequently client safety. In Belgium, the San Joaquin patient classification system has been integrated into the BNMDS (Sermeus et al, 2007). This provides information on patient needs to inform nurse staffing levels and consequently to ensure patient to nurse ratios are adequate and safe. This system includes a classification of nursing workload according to whether it is 'low intensity' or 'high intensity', using a 5-point scale. Integrating a workload measure into the I-NMDS (MH) will be important in ensuring its future use to inform staffing resource management. It

is difficult to recommend an appropriate system for use, as noted difficulties exist in capturing nursing workload in its entirety (Morris et al, 2007). It may be that a less complex, uni-dimensional measure, such as one that captures nursing intensity levels should be used to inform nursing resource allocation using the I-NMDS (MH). Further research will be required in this area.

Informing Education Development:

Keeping up with workforce demands and the changing nature of health service provision both internationally and at home is imperative to ensuring a quality nurse education system. The Health Service Executive in Ireland is currently specifically concerned with the development of Clinical Nurse Specialist and Advanced Nurse Practitioner roles, which require up to date high quality curricula. The Draft Report of the Post-registration Nursing and Midwifery Education Review Group (2007) outlines recommendations for a 'stock taking' of nurse educational needs. Data relating to the supply and demand for nurses and midwives with specific knowledge, skills and competencies is required, most specifically in relation to expanding practice requirements. This stock taking process will involve an examination of nursing information to identify the imbalance between the supply and future demand for skilled nurses.

In order to do this, the Review Group recommends that structured systems for stock taking and forecasting educational need to be developed at local, regional and national level. The National Nursing and Midwifery Human Resource Minimum Dataset is recommended for this purpose. This data set consisted of thirteen variables of information per individual nurse/midwife. While this data set can assist in the collection of data on the supply of skilled nurses, it seems that there is a gap in the data set when it comes to collecting data for future demands. While census information will allow for some analysis regarding the future demand for nursing, there may be room for synergies between the National Nursing and Midwifery Human Resource Minimum Dataset and the I-NMDS (MH) in the mental health domain. It is advocated that the I-NMDS (MH) provides for the collection of reliable data regarding the current demands being made on nurses in terms of client problems that they must attend to and the interventions (direct and indirect) they carry out in order to facilitate client

recovery. Longitudinal cross sectional data collection using the I-NMDS (MH) would allow for the study of change in problem severity and related nursing activity across diagnoses, specialties, wards and units, local and regional geographic boundaries and time. This kind of research could provide valuable information to educators and policy makers in manpower planning and skills training for the future development of nursing in Ireland.

Integration of the I-NMDS (MH) into the Electronic Patient Record

Integration of the I-NMDS (MH) in the future development of the electronic patient record has the potential to greatly facilitate the access to nursing information to facilitate decision making and consequently to increase the efficiency of nursing care. It is well known and understood that data in electronic or digital form provides an efficient method of storing, accessing, and analysing data for decision makers across professions. It is also true that the Irish health service has some way to go before implementation of electronic records to support the access and use of health information is full and complete. While this has negative implications for management and practice, it does provide an opportunity for the integration of the I-NMDS (MH) into developing electronic systems to allow access to important nursing information to enhance the quality of nursing care.

Comparisons with Other Similar Research Tools

A number of differences are noted between the validated I-NMDS (MH) and nursing minimum data sets developed specifically for a general nursing setting. These are detailed in Table 1, Appendix D. There is an obvious inclusion of psychosocial elements of nursing work within the I-NMDS (MH) when compared with other NMDS tools, which were primarily designed for use within the general hospital setting. A comparison of the patient problems included in the I-NMDS (MH) with those included in the NMDSN (Goossen et al, 2000, 2003) and the NMDS (Werley et al 1988, 1991) highlight differences between the patient/client problems presenting in general nursing practice visa vie those presenting in mental health. Again the dominance of the medical

model in general nursing settings is highlighted by these differences. The variables 'Breathing', 'Elimination', Fluid balance', 'Nutrition', 'Physical side effects of treatment or medication', 'Psychological side effects of treatment or medication', 'Teaching skills and promoting health', 'Responding to extreme situations', 'Facilitating external activities' and 'Delayed discharge' were all eliminated from the original set of variables in the course of validating the I-NMDS (MH). The validated tool had a clearly reduced set of variables relating to client physical problems.

Interventions or nursing activities included in the BNMDS (Sermeus et al, 2005) are predominantly of a physical nature and are very different to those included in the I-NMDS (MH). Of the nursing activities on the BNMDS, the variables 'Medication management (intramuscular, subcutaneous)', 'Medication management (intravenous)', 'Monitoring vital signs', 'Monitoring clinical signs' 'Isolation for preventing contamination' and 'Care relating to hygiene' (Sermeus et al, 2008) are closely aligned with the I-NMDS (MH) physical care interventions 'Attending to hygiene', 'Administering medication', 'Monitoring assessing and evaluating physical condition' and 'Controlling infection'. A small number of other variables on the BNMDS cross over with the I-NMDS (MH) variables, namely 'Training in activities of daily living', 'Emotional support', 'Care of a disorientated patient' and 'Nursing admission assessment'. On balance the BNMDS is much more relevant to general nursing where activities such as 'Infusion therapy', 'Surgical wound care' and 'Traumatic wound care' are carried out on a day to day basis.

The NMDSN variables appear to be more in line with those on the I-NMDS (MH) as it includes patient problems variables relating to communication, patient /family information, knowledge and skills needs, patient/family anxiety, patient motivation, adherence to treatment/therapy, behaviour, disorientation, sleep, pain, coping and stress and nursing activities such as coordination of care with other disciplines, teaching, information provision, anxiety reduction, listening and motivating the patient (Goossen et al, 2000, 2003). Patient problems and nursing interventions on this tool are again, more orientated

towards physical patient care.

Data collection tools specific to mental health and similar to the I-NMDS (MH) have been developed and warrant a mention here in order to highlight the clear differences that exist between them. Comparison between the I-NMDS (MH) and the Resident Assessment Instrument-Mental Health (RAI-MH) (Hirdes et al, 2001) is interesting. The RAI-MH assesses psychiatric, social, environmental and medical issues at intake and, unlike the I-NMDS (MH) it is designed essentially to be an inpatient screening tool. While the I-NMDS (MH) is nursing specific the RAI-MH is multidisciplinary. The RAI-MH is designed for use with inpatients in acute, long term, forensic and geriatric psychiatry care units in particular while the I-NMDS (MH) is designed for use in both acute inpatient and community care. Unlike the I-NMDS (MH), the RAI-MH indicates the *presence or immediate risk* of problems affecting the client's ability to function independently and contains no interventions related information.

A second mental health client data collection tool that should be noted here is the Health of the Nation Outcomes Scale (HoNOS), (McClelland et al, 2000). HoNOS is a 12 variable scale designed to provide a brief, accurate, and relevant measure of mental health and social functioning. The 12 variables relate to client behaviour, impairment, symptoms and social functioning/context. Like the I-NMDS (MH) problems scale, each variable on the HoNOS measures a type of problem commonly presented by clients in mental health care settings. Again, like the I-NMDS (MH), these variables are scored on a five point scale ranging from 0 (no problem) to 4 (severe/very severe problem). Ratings are carried out either by a single practitioner or using input from the clinical team. Outcome is measured by comparing a client's scores at two points in time, using individual variable scores, dimensional sub-scores and a total score. Comparison of variables on the I-NMDS (MH) with variables on HoNOS and RAI-MH indicates a number of common measures. For example upon comparison between the emotional health variables on the I-NMDS (MH) with similar variables on these respective tools a crossover is noted between mood, anxiety, behavioural, communication, physical health and

environmental related variables. The I-NMDS (MH) and the RAI-MH and HoNOS are designed for differing populations and purposes. While HoNOS and RAI-MH are multidisciplinary, the I-NMDS (MH) is a nursing specific data set based on a process model of nursing care.

Limitations of the Study

Sampling: There are known limitations to the use of convenience samples. These limitations are based on the fact that samples are usually selected on the basis of their availability or because the participants volunteered to take part in the study. This leads to an unknown portion of the population being excluded and consequently results are not generalisable. The use of a relatively large sample size in the study of the construct and discriminative validity and internal consistency and stability of the I-NMDS (MH) should have increased its design and statistical conclusion validity, therefore optimising the generalisability of the research findings.

Group Based Analysis: The fact that community mental health services in Ireland are not well defined posed difficulties in the interpretation of some study findings. Interpretation of findings in relation to group based analysis (acute inpatient versus community based services) proved ambiguous due to the cross over of acutely ill and chronically ill mental health clients attending the same community services. As mentioned in Chapter Two (p. 33), while the official function of the community mental health day centres in Ireland is to provide 'social care for service users, with an emphasis on rehabilitation and activation services' (Mental Health Commission, 2006), the function and activities of day centres go beyond this definition and a combination of day hospital type services can be delivered within day centres and vice versa. While this may be more a limitation of the organisation of these services it has posed difficulties in ensuring clarity in the research findings.

Exclusion of the client's opinion in the development of the I-NMDS (MH): The I-NMDS (MH) in its current form is a nurse informed data set. While questions surrounding the inclusion of the client's perspective in the development of the

I-NMDS (MH) are understandable, it is important to point out that the data set is in its infancy in developmental terms. The BNMDS, now widely used in Belgium to inform nursing policy decisions regarding budgeting, staffing and more recently intensity levels, has been in development for almost 2 decades and continues to be revised. It is also important to note that inclusion of the client perspective in the development of the I-NMDS (MH) is dependent on the potential uses of the data collected. It is advocated here that the client perspective is important in the assessment of nursing outcomes. For example, client satisfaction and quality of life indices should be included in the future if the I-NMDS (MH) is to be used in investigations of nursing outcomes. It is anticipated that, with time, the clients' perspective will be included in the I-NMDS (MH) if it is to be used to assess aspects of the nursing role such as client outcomes of nursing care and nursing role effectiveness.

Interrater reliability: As noted in already in this chapter, the design of the interrater reliability study could be improved to ensure more variability across raters and settings. Use of a higher number of I-NMDS (MH) raters across more than one service may shed light on the question of whether low kappa scores were due to true prevalence in the data or whether a number of variables on the I-NMDS (MH) are unreliable.

Investigation of nursing outcomes of patient care: The study carried out to investigate the use of the I-NMDS (MH) to investigate nursing sensitive outcomes of care was a secondary analysis of the main study data. While it was useful as a preliminary investigation of the use of the I-NMDS (MH) in this way, the design of the study needs addressing before future investigations of outcomes using the tool can to be carried out. This will be further discussed below in terms of recommendations for future research.

Reactivity: Finally 'reactivity' to the I-NMDS (MH) may have been at play within this study. It is possible that respondents `learned' to respond in a way he or she believed was expected. The reactivity effect may have led to nurses believing that they should be seen to be implementing high levels of nursing

interventions to indicate that they were working hard. It is difficult to say whether this was the case or not but this should be kept in mind in future studies using the I-NMDS (MH). The concept of reactivity and its limitations in research design should be outlined and addressed in training materials distributed prior to study implementation.

Recommendations for Future Research

A confirmatory factor analysis of the I-NMDS (MH) is recommended to further establish the construct validity of the tool. A new data set is required to perform this analysis and confirm the factor structure of the tool.

The I-NMDS (MH) was designed to enable the collection of standardised nursing information across acute inpatient settings, day hospitals, day centres, home based teams and community mental health nursing. Further interrater reliability testing is required to establish the reliability of the I-NMDS (MH) across nurses and clients within all of these services. As noted, research in the area of interrater reliability within nursing is limited inferring the need for such investigations to add to the research base in the area of interrater reliability of the I-NMDS (MH) and other similar tools.

Future research using the I-NMDS (MH) should be implemented to more fully investigate the usability of the tool in the study of nursing sensitive patient outcomes. In order to do this, a number of changes to the research design used in the present study are required. These include, but are not confined to the following:

- Structure variables should be included in the study to account for level of nursing experience, qualifications and diagnosis, among other structure variables of interest to the researcher
- The clients included in the study should be at the admission stage of their care upon commencement of the study. In this way the researcher would get a more complete understanding of the impact

of nursing interventions on wellbeing over the course of the caring process

- The duration of the study period should correspond with the duration of the client admission where possible, so that the study is more complete in its assessment of outcomes of care. This will be more easily achieved in the acute inpatient and acute community services
- It would be interesting to focus on specific areas of care or specific client diagnoses to get a more detailed understanding of the nursing process in relation to e.g. chronic schizophrenia care or acute anxiety and depression care
- The study data collection timings would also need to be addressed to be confident of making accurate assumptions regarding the impact of interventions on problem states
- Different intervention types might also be examined to assess the impact of e.g. physical care interventions like medication administration or specific psychological/behavioural therapies on client wellbeing

In concluding on the study as a whole, it can be said the I-NMDS (MH) was found to be construct valid and internally consistent. Some questions lie over the interrater reliability of a number of variables on the tool and as such further investigation of the interrater reliability of the I-NMDS (MH) is warranted.

In terms of hypothesis testing, Hypothesis 1 (H1) was largely supported, leading to the conclusion that the I-NMDS (MH) possesses good levels of content, face, construct and discriminative validity. The content and face validity of the tool were optimised post pilot study analysis. The I-NMDS (MH) may require further content and formatting refinements prior to future use to further enhance validity and decrease the potential for systematic error. Hypothesis 2 (H2) was also largely supported leading to the conclusion that the I-NMDS (MH) possesses good levels of internal consistency and relatively good levels of factorial stability. Findings of the interrater reliability study were

encouraging but ambiguous, suggesting further research in this area. Finally, Hypothesis 3 (H3) was supported, indicating that the I-NMDS (MH) can potentially be used in the future to capture nursing sensitive outcomes of care, defined as changes in the patient's condition, mediated by nursing interventions.

Finally, the research reported herein is of value to the nursing research and broader health science community both in Ireland and internationally. This research differs from other previous researhc studies concerned with the development of NMDSs as a) it is concerned with the development of an NMDS specific to mental health b) advanced statistical processes were used to both assess the factorial model upon which the tool is based and to investigate the impact of the nursing process on patient care and c) it adds to the nursing outcomes research base by utilising a nursing specific minimum data set to analyse nursing sensitive patient outcomes with a longitudinal research design.

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APPENDICES

APPENDIX A

Nursing Minimum Data Set Variable Descriptions

Table 1 Overview of the Variables Contained Within the Belgian Nursing Minimum Data Set

BNMDS Core Variables	Toileting urinary, toileting bowel, elimination training (urinary and bowel); bed rest care; positioning; transport (inside nursing ward); feeding; enteral tube feeding; TPN; pain management; nausea management; self-care assistance: hygiene/bathing; oral health maintenance/restoration; in/out measurement (fluids/food); administration medication IM/SC/ID; administration medication IV; aerosol; artificial airway management; mechanical ventilation; wound care: suture, drains & osteosynthesis equipment, pressure ulcer care; wound care: open complex; access points (IV; SC; arterial); arterial blood sampling; venous blood sampling; capillary blood sampling; cognitive therapy; emotional support; teaching (not specified elsewhere); teaching: preoperative/procedures; pressure ulcer prevention (dynamic alternating material); pressure ulcer prevention (positioning); vital signs monitoring (continuous); vital signs monitoring (discontinuous); infection control (isolation); intake interview; multidisciplinary meeting
Geriatric care ancillary variables	Exercise therapy (physical); urinary catheterisation; constipation/impaction management; dining room; training hygiene/bathing; dressing (civil clothing); self-image management; activity therapy; diagnostic sampling; assessment; health care information exchange
Chronic care ancillary variables	Exercise therapy (physical); urinary catheterisation; constipation/impaction management; transport (outside nursing ward); dining room; fatigue management; training hygiene/bathing; dressing (civil clothing); bath/shower; self-image management; activity therapy; communication enhancement; diagnostic sampling; environmental management: safety; assessment; health care information exchange

Table 1 Overview of the Variables Contained Within the Belgian Nursing Minimum Data Set Continued

Oncology care ancillary variables	Constipation/impaction management; transport (outside nursing ward); fatigue management; self-image management; tube care: gastrointestinal; hyper/hypo glycaemia management; airway suctioning; wound care: open simple; blood products administration; communication enhancement; diagnostic sampling; family involvement promotion, assessment; physician support; health care information exchange: extra muros
Cardiology care ancillary variables	Transport (outside nursing ward); hyper/hypo glycaemia management; electrolyte/acid-base management; airway suctioning; wound care: open simple; temporary pacemaker (external) management; cultural brokerage; physician support; healthcare information exchange: extra muros
Paediatric care ancillary variables	Elimination management child < 5 years; urinary catheterisation; transport (outside nursing ward); dining room; bottle feeding; sedation management; bath/shower; tube care: gastrointestinal; hyper/hypo glycaemia management; electrolyte/acid–base management; neurologic monitoring: Glasgow Coma Scale; airway suctioning; wound care: open simple; wound care: dermatologic; blood products administration; activity therapy; diagnostic sampling; environmental management: safety; family involvement promotion
Intensive care ancillary variables	Transport (outside nursing ward); traction care; sedation management; tube care: gastrointestinal; electrolyte/acid–base management; dialysis therapy; neurologic monitoring: Glasgow Coma Scale; intracranial pressure monitoring; wound care: open simple; blood products administration; communication enhancement; temporary pacemaker (external) management; circulatory care: mechanical assistance; diagnostic sampling; family involvement promotion; physician support.
Other	Medical and nursing diagnosis; drug prescription and utilization patterns; cost indicators: e.g. combinations of itemized charges; social indicators: socio-economic status etc; outcome measures such as length of stay and continuity of care in chronic conditions. Ward, staffing and patient demographics

Table 2 Overview of the Variables Contained Within the Nursing Minimum Data Set for the Netherlands

Patient demographics	Sex, year of birth, admission and discharge dates, unique patient code and age
Health care setting	hospital, ward, specialty, type of nursing delivery system, date of data collection
Patient medical condition	Admission and additional medical diagnoses, complications, predictability and stability of the health situation, life-threatening, situations, and the derived item `multiple health problems'
Patient problems	Problematic communication; Need for information, knowledge, or learning of skills; Fear; Uncertainty about the future; Problems in contact with family; Insufficient insight in the health situation; Difficulty managing therapy/regimen; Lack of motivation to co-operate in treatment and care; Behavioural problems; Disorientation in time, place, activity or person; Memory problems/confusion; Restlessness; Pain; Problems with rest/sleep; Difficulties with stressful situations (coping); Pressure ulcer; Impairments in elimination; Fever; Breathing problems; Problems with food and fluids; Self-care limitations; Functional problems with activities of daily living; High risk; Impairments in vital functions
Outcomes	Patient falls; satisfaction with care; satisfaction with information; satisfaction with pain management
Interventions	Giving information; Teaching skills; Psychosocial support; pain; care for family; Involve family in care; Hygiene care; Assisting with posture and movement; Assisting with mobility; Care of elimination; Care of food and diet; Clothing; Feeding tube care; Preparation for tests and surgery; Breathing support; Orientation training; transport for the patient; risk prevention; Central venous catheter Care for plaster, traction; Mouth care; Prevention of pressure ulcer and care via body repositioning; Assisting physicians; Sampling of blood and physiological parameters; Continuous observation or monitoring; Registration of vital and physiological signs Medication: IV/other than IV; Infusion; Wound care: surgical/trauma; Care for tubes, drains, catheters

APPENDIX B

First Draft of the I-NMDS (MH) (Scott et al, 2006b)

NMDS Number :
(for office use only)

NURSING MINIMUM DATA SET: COMPLETION FORM

MENTAL HEALTH NURSING

If you require further assistance, please contact :
Roisin Morris, Research Fellow, Nursing Research Unit, DCU;
Tel: (01) 7005018 **Email:** roisin.morris@dcu.ie

SECTION A : BACKGROUND INFORMATION

	Date: Day 1	Date: Day 2	Date: Day 3	Date: Day 4	Date: Day 5	
Date of Completion:						(Please insert date in appropriate box)
Nurse Initials:						(Please insert your initials in the appropriate box)

PATIENT DETAILS (Please complete the following patient details)

Date of Birth		**Ward/Unit**	
Sex		**Reason for Admission**	
Date of admission		**Medical Diagnosis** (if different from above)	
Date of Discharge		**DSMIV or ICD10 Code**	
		Area of Residence	

Section B: Client/ Service User Problems

Using the scale below, please indicate, by placing a tick in the appropriate box, which of the following problems this client/service user had today and the degree of severity of each problem.

Day of week →	Day 1							Day 2						Day 3						Day 4						Day 5					
	Degree of problem							Degree of problem						Degree of problem						Degree of problem						Degree of problem					
Physical Problems in relation to …	N/A	0	1	2	3	4	P	0	1	2	3	4	P	0	1	2	3	4	P	0	1	2	3	4	P	0	1	2	3	4	P
Physical discomfort																															
Elimination																															
Weakness and fatigue																															
Pain																															
Nutrition																															
Negative physical side effects from treatments /medications																															
Dependence with hygiene needs																															
Breathing																															
Sleep disturbance																															
Fluid balance																															
Overall physical wellbeing																															
Psychological Problems in relation to …	N/A	0	1	2	3	4	P	0	1	2	3	4	P	0	1	2	3	4	P	0	1	2	3	4	P	0	1	2	3	4	P
Anxiety (longstanding)																															
Anxiety or fear in response to current stressors																															
Client knowledge deficit regarding illness or treatment																															
Spiritual needs																															
Coping and adjustment																															
Non-adherence to a treatment or medication																															
Low level of motivation																															
Negative psychological side effects of medications																															
Stigma																															
Difficulty communicating																															
Thought and cognition																															
Mood																															
Overall psychological wellbeing																															
Social Problems in relation to …	N/A	0	1	2	3	4	P	0	1	2	3	4	P	0	1	2	3	4	P	0	1	2	3	4	P	0	1	2	3	4	P
Independent Living																															
Social skills																															
Social disadvantage																															
Care environment																															
Delayed discharge																															
Level of social support from significant others																															
Family (or significant other) knowledge deficit regarding illness or treatment																															
Overall social wellbeing																															
General wellbeing																															

Problem Rating Scale Scoring Key

N/A = *Not applicable – the problem was not assessed*

0 = Problem not present

1 = *Minor problem; no impact on functioning*

2 = Problem has limited impact on functioning

3 = *Moderate problem; significant impact on functioning*

4 = Severe problem; severe impact on functioning

P = ***Problem is absent, with an elevated risk of it occurring within three days***

Section C: Nursing Interventions and activities

Below you will see two lists, one of nursing interventions and one of organisation and co-ordination of care activities.
Using the intensity scale below, please indicate, by placing a tick in the relevant box, which nursing interventions/ coordination of care/ organisation activity have been carried out for this patient and the intensity of each intervention/coordination of care/ organisation activity.

Please place a tick in the appropriate box	Day 1				Day 2				Day 3				Day 4				Day 5			
	Intensity				Intensity				Intensity				Intensity				Intensity			
Physical Nursing Interventions	0	1	2	3	0	1	2	3	0	1	2	3	0	1	2	3	0	1	2	3
Administering medication, fluids or blood products																				
Controlling infection																				
Monitoring, observing and evaluating physical condition																				
Hygiene																				
Responding to emergency situations																				
Psychological Nursing Interventions	0	1	2	3	0	1	2	3	0	1	2	3	0	1	2	3	0	1	2	3
Developing and maintaining trust																				
Encouraging adherence to treatment or interventions																				
Managing anxiety																				
Responding to altered thought and cognition																				
Providing informal psychological support																				
Managing mood																				
Monitoring, observing and evaluating psychological condition																				
Managing substance dependence or misuse																				
Advocating																				
Dealing with the information needs of family (or significant other)																				
Teaching skills and promoting health																				
Social Nursing Interventions	0	1	2	3	0	1	2	3	0	1	2	3	0	1	2	3	0	1	2	3
Work in relation to social skills																				
Supporting families (or significant other)																				
Dealing with the person's information needs																				

Organisation and Co-ordination of Care Activities	Day 1				Day 2				Day 3				Day 4				Day 5			
	Intensity				Intensity				Intensity				Intensity				Intensity			
Select from list	0	1	2	3	0	1	2	3	0	1	2	3	0	1	2	3	0	1	2	3
Focused discussion with other nurses																				
Documenting and planning the patient's care																				
Liaising with multidisciplinary team members other than nurses																				
Admitting and assessing the patient																				
Planning discharge																				
Facilitating links between the family or significant other and multidisciplinary team																				
Facilitating external activities																				
Supporting and managing care delivery																				

Intensity Scale

0 = No intervention undertaken
1 = Once-off or minimal intervention in a routine way
2 = Intermittent or regular interventions and/or of a more complex nature
3 = Continuous or multiple interventions and/or of a complex nature and/or requiring more than one nurse or specialist nursing skills

Section D: Outcomes of Nursing Care

This section should be completed on Day 5 of the recording period or upon discharge if this occurs sooner.
Please consider the items below in terms of patient problems.
Using the outcomes rating scale below, please indicate, by placing a tick in the appropriate box, the change in problem status by comparing the problem rating on Day 1 with that on Day 5.

Physical Outcomes of Nursing Care in relation to….	**Outcome**						
	Change in problem status						
	N/A	**- 2**	**- 1**	**- 0**	**+0**	**+ 1**	**+ 2**
Physical discomfort							
Elimination							
Weakness and fatigue							
Pain							
Nutrition							
Negative physical side effects from treatments / medications							
Dependence with hygiene needs							
Breathing							
Fluid balance							
Overall physical wellbeing							
Psychological Outcomes of Nursing Care in relation to….	**N/A**	**- 2**	**- 1**	**- 0**	**+0**	**+ 1**	**+ 2**
Client knowledge deficit regarding illness or treatment							
Anxiety (longstanding)							
Anxiety or fear in response to current stressors							
Spiritual needs							
Sleep disturbance							
Coping and adjustment							
Non-adherence to a treatment or medication							
Low level of motivation							
Negative psychological side effects from treatments / medications							
Stigma							
Difficulty communicating							
Thought and cognition							
Mood							
Overall psychological wellbeing							
Social Outcomes of Nursing Care in relation to….	**N/A**	**- 2**	**- 1**	**- 0**	**+0**	**+ 1**	**+ 2**
Independent living							
Social skills							
Social disadvantage							
Care environment							
Delayed discharge							
Level of social support from significant others							
Family (or significant other) knowledge deficit regarding illness or							
Overall social functioning							
General wellbeing							

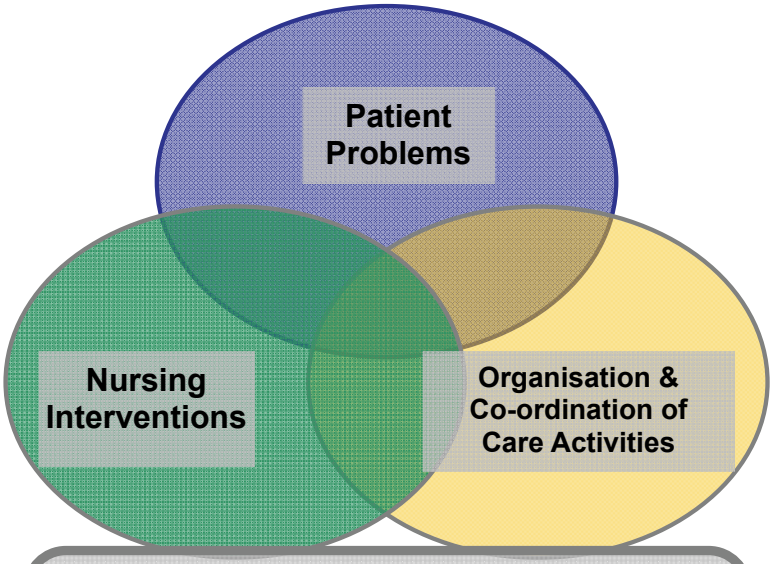
Nursing Sensitive Outcomes Scale

N/A *= Not applicable – not a focus for care*
-1 = Major deterioration in problem status
-2 *= Moderate deterioration in problem status*
1 = Moderate improvement in problem status
2 *= Major improvement in problem status*
-0 = No change in problem – a negative outcome
+0 *= No change in problem – a positive outcome*

APPENDIX C

The I-NMDS (MH) User Manual (Scott et al, 2006c)

Irish Nursing Minimum Data Set



User Manual
Version 2.2

Acknowledging and Recording the Nursing Contribution to Care

TABLE OF CONTENTS

1 Introduction

The Irish Nursing Minimum Data Set (I-NMDS) is the product of an extensive research project carried out with Irish nurses since 2002. This research has been funded by the Health Research Board as part of the first national nursing research programme. Health care provision is changing rapidly in Ireland and internationally. In this context, it is important that nurses are supported to articulate as clearly as possible the full contribution that they make to patient care. The I-NMDS has been developed to assist in achieving this aim.

At the moment, Irish nurses do not have an agreed method available to them to record the contribution that they make to health care. The I-NMDS is designed to meet this need, while at the same time imposing the minimum possible time burden on nurses completing the form. The I-NMDS form is a brief record form. It is accompanied by a User Manual that provides background information on the items included on the form. Definitions of items and guidance on completing the I-NMDS rating scales are included in the User Manual to ensure that information is consistently recorded and of a high quality. This is Version 2.2 of the User Manual, which will be used during the I-NMDS research validation study being carried out during 2006.

Frequently Asked Questions

1.1 What is the aim of the Irish Nursing Minimum Data Set?

Nursing researchers have noted that existing information on nursing care is limited in its ability to identify the full contribution that nurses make to health care. The Nursing Minimum Data Set is a research tool designed to support a nurse to record all the major elements of care provided to a particular patient, while at the same time being relatively undemanding in terms of time.

1.2 What can the I-NMDS information be used for?

The primary aim of the I-NMDS research team is to produce a well constructed data collection tool that provides high quality information on nursing care. Extensive research in Europe, the US and Australia has identified a number of uses for the information that is recorded through the use of a Minimum Data Set. These uses include:

- Collecting information on nursing care that can be used by clinicians and managers to seek additional funding and resources.
- Allowing researchers to study what nursing care is provided to address particular problems experienced by patients.
- Supporting educators to make their courses more relevant to the care that is actually provided in the health care setting.

1.3 How was the I-NMDS developed?

The I-NMDS was developed through an extensive programme of research.

- This research included a focus group study of the nursing contribution to care that involved 21 focus groups with nurses working across a range of general nursing and mental health nursing settings and a review of nursing care notes for 93 patients in general and mental health nursing settings.
- This led to an initial list of items related to nursing care that was tested further in a Delphi survey research study with a sample of over 300 mental health and general nurses.

- The I-NMDS record form includes only those items that were rated in the survey as being relatively high in frequency, importance and relevance to the respondents' area of nursing care.

1.4 Is the I-NMDS relevant to me?

The research carried out to devise the I-NMDS included nurses working in oncology, cardiology, medical nursing, surgical nursing, acute mental health care and community mental health care.

Some of the items included on the I-NMDS were found during the research process to be relevant to both general and mental health nurses. Other items are specific to mental health or general nurses. This is the Mental Health nursing User Manual.

1.5 How do I use the I-NMDS?

In the research validation phase, nurses nationwide are being asked to use the I-NMDS form to record information on their patients. Information is recorded separately on each patient. The form is divided into several sections (background information, patient problems, nursing interventions, and organisation & co-ordination of care activities), each of which is explained below.

- The I-NMDS form is completed by a nurse once in a 48 hour period, based on the nursing care delivered to that patient over the previous 24 hours. In community settings such as Day Hospitals this is based on the nursing care delivered to that patient over the time they have spent over the last two days at the facility, which is not likely to be longer than 8 hours per day.
- The form is designed to be completed at the same time each day.
- A unit report form has also been devised in order to record information on the environment in which care is provided. This form is completed by a nurse once a day and unlike the I-NMDS is not specific to an individual patient.

Note on terminology

The terms 'person', 'individual', 'patient' 'service-user' and 'client' are used interchangeably in this document. The majority of I-NMDS items refer to a particular individual, with a small number of interventions related to the family and some organisational duties related to the health service provider.

2 Overview of I-NMDS Sections

This part of the User Manual gives an overview of the main sections included on the I-NMDS form, each of which deals with a separate aspect of nursing care:

- Background Information
- Client / Service User Problems
- Nursing Interventions and Activities
-

NB: More detailed instructions on completing I-NMDS items are provided Pages 7-15.

2.1 Background information

The I-NMDS form does not request identifying information on patients. Some patient details are requested (medical diagnosis, sex, date of birth, etc.) in order to provide information on the links between patient characteristics and the problems that they experience.

2.2 Client / Service User Problems

A patient problem is a physical, psychological or social state which is considered to be actually or potentially impairing health status. It is described through the use of a label and a rating (moderate impairment in breathing, severe mood problem, etc.) (McCloskey Dochterman & Bulechek, 2003; Martin & Scheet, 1992).

2.3 Nursing Interventions and activities

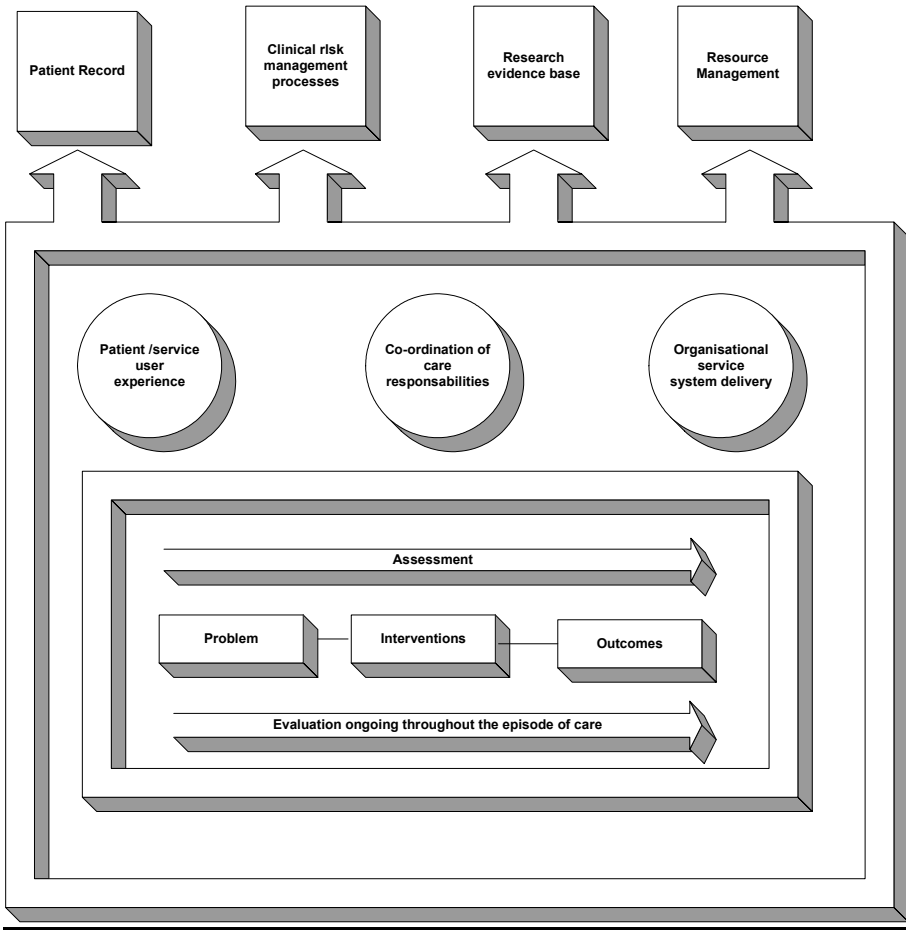
A nursing intervention refers to a group of activities undertaken by a nurse with the intention to improve, maintain or restore the health of an individual or family, or to prevent a health problem (McCloskey Dochterman & Bulechek, 2003). Nursing interventions can be directly or indirectly focused on the person.

Direct Nursing Intervention: A direct intervention is an intervention performed through direct interaction with the person or the family (McCloskey Dochterman & Bulechek, 2003)

Indirect Nursing Intervention (Co-ordination of Care): An indirect nursing intervention is an intervention that is not performed through direct interaction but on behalf of the person or family (e.g., focused discussion with other nurses, documentation and planning of care).

Organisational Function: An organisational function is a task carried out by a nurse to support the maintenance or further development of the health care organisation. It contributes to care through the management of resources and environment (Martin & Scheet, 1992)

DIAGRAM 1. CONCEPTUAL MODEL OF THE I-NMDS.



3 Recording Information on Nursing Care using the I-NMDS Record Form

3.1 Completing the service users ID

The instruction sheet is a detatchable on which you should record the service-user's ID information. This is for your convenience, so that you can easily check that you are completing the right form for the right service-user**. This will not breach service-user confidentiality, as you will detach and dispose of this sheet prior to submitting the completed forms.**

3.2 Completing the Background Information Section

Please begin entering information on the I-NMDS Record Form by completing the cover page. The Background Information items relate to the person described on the I-NMDS form, with the exception of the name of the Ward / Unit.

The following background information on the person is requested – date of birth and sex. The remaining information is related to the person's health care status: date of admission, reason for admission, medical diagnosis / diagnoses associated with the admission, whether this is their first admission or a readmission, legal status, expected length of stay, date of discharge (if applicable), and place to which the person is discharged.

The success of the I-NMDS depends on obtaining high quality and consistent information. All sections of the I-NMDS form have a rating scale attached. Please use these scales to record any problems the person is experiencing, what nursing interventions have been carried out, and co-ordination activities related to the person's care. The rating scales are as standardised as possible to reduce the workload involved in completing the I-NMDS. Detailed instructions on each scale are provided in the following pages:

3.3 Completing the Problem Rating Scale

The Problem Rating Scale is used to record scores for problems experienced by the patient or client. These ratings reflect the professional judgement made of the person's situation or condition. Problem ratings are based on the judgement made by one (or more) nurses about the patient or client over the previous 24 hour period. The problem rating reflects the highest problem level experienced by the person during that time. The judgement is based on the normal clinical information that is used in practice (e.g., a formal rating scale, a qualitative judgement, a gut feeling, professional judgement, the outcome of a case conference or discussion at nursing handover).

Overview of the Problem Rating Scale

- Each patient problem (e.g. pain, mood) is recorded on a five-point scale (0-4) indicating the degree of the problem. The absence of a problem state is indicated by a score of 0 (*problem not present*), with four levels of problem status (1-4) from the presence of a *minor problem* (1) to a *severe problem* state (4).

- Each problem is rated every second day on the I-NMDS form. The rating should represent the highest level of the problem state experienced by the person in the previous 24 hours.

Further details and examples of ratings are given below:

0: *Problem not present*. For example, no difficulty with mood (*mood*), no problem with social independence (*independent living*). Tick the '0' box on the I-NMDS rating scale for the relevant item.

1: *Minor problem; no impact on functioning.* The person can currently cope with the challenge without formal assistance. For example, a nuisance headache, slight tenderness of the skin (pain), minor cold symptoms that can be self-treated (infection).

2: *Moderate problem, limited impact on functioning*. Comparatively minor levels of formal assistance are likely to be required. For example, a diet that does not address the person's nutritional needs (*nutrition*), mild dehydration (*fluid balance*), tiredness that interferes with the person's enjoyment of normal activities (*weakness and fatigue*).

3: *Major problem; siginificant impact on functioning.* For example, pronounced difficulty in maintaining appropriate responses in a conversation (social skills), inability to go to work some days due to low mood (mood), significant deficit in ability to wash (hygiene).

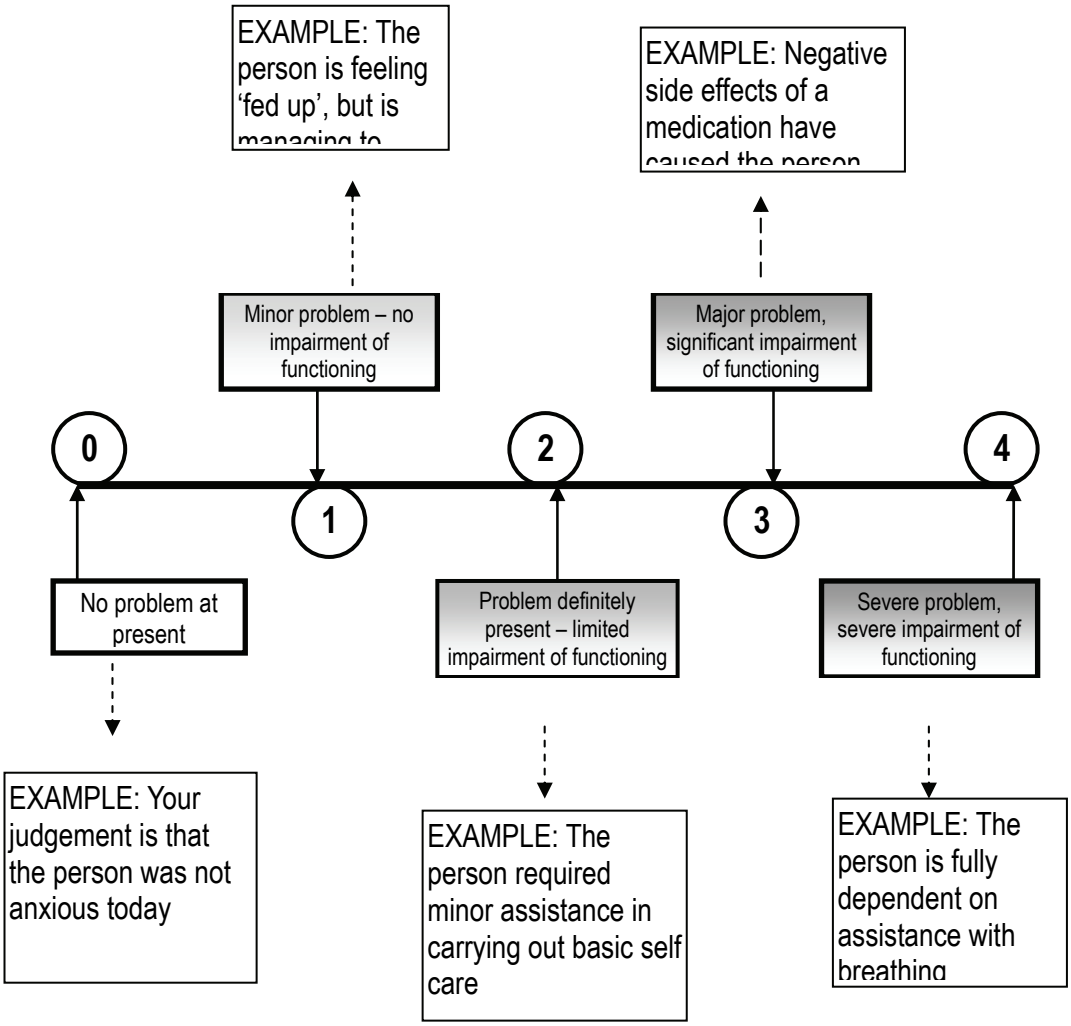
4: *Severe problem; severe impact on functioning.* For example, complete social isolation where this is not the person's choice (*level of social support received from significant others*), pain that reaches excruciating levels at times (*pain*), extreme auditory hallucination (*thought and cognition*).

DIAGRAM 2. DESCRIPTION OF THE PROBLEM RATING SCALE

PROBLEM RATING SCALE

0. ***No problem****;* adequate functioning in all of the areas covered by the item.
1. ***A minor problem with one or more of the areas covered by the item****;* functioning is not impaired and assistance is not required.
2. ***A moderate problem with one or more of the areas covered by the item****;* limited impairment of functioning and some assistance required.
3. ***A major problem with one or more of the areas covered by the item;*** significant impairment in functioning and significant assistance required.
4. ***A severe problem with one or more of the areas covered by the item;*** severe disability or incapacity in functioning.

DIAGRAM 3. GRAPHICAL DEPICTION OF THE PROBLEM RATING SCALE, WITH EXAMPLES.



3.4 Completing the Intervention Rating Scale

The Intervention Rating Scale is used to record the nursing interventions performed in relation to a particular patient or client over the previous 24 hour period. Intervention ratings indicate the kind of direct nursing care that was given to that person during that time. You are asked to give a rating for interventions because, while the same intervention may be performed for two people, there is often a difference in the level of the nursing work required to address their needs. For this reason, you are asked to give a rating to each of the interventions carried out.

Some of the I-NMDS interventions are easily observable (e.g., bathing or washing a patient – an example of the *hygiene* intervention), while others are less observable (e.g., reassuring the person – an example of *providing informal psychological support*). The purpose of the I-NMDS is to record as much as possible of the nursing work that is performed for the person. Please bear this in mind when identifying the various formal, informal, observable and more subtle nursing interventions that are carried out to support a particular patient. Further details and examples are given below:

Overview of the Intervention Rating Scale

- Each nursing intervention is completed on a five point scale (0-4), which indicates the degree to which nursing interventions were required over the previous 24-hour period or, for community settings, during the time period for which the person was in contact with nursing staff. The rating is intended the represent the highest level of nursing intervention over that period.
- If an intervention was not carried out, then 0 is recorded. If an intervention was carried out, it can be recorded at one of four levels of intensity (1-4), from a *minimal level* of intervention (1) through to a *very highly intensive* intervention (4).

Further details and examples of ratings are given below:

0. The intervention was not carried out during the time period

1. Minimal intervention level
- Low task complexity and skill requirement
- Intervention performed only once
- Minimal time and resource demand

2. Moderate intervention level
- Moderate level of task complexity and skill requirement
- Intervention performed more than once but in a routine way
- Moderate time and resource demand

3. High intervention level
- High level of task complexity and skill requirement
- Intervention procedure tailored to the person and carried out a number of times
- High time and resource demand

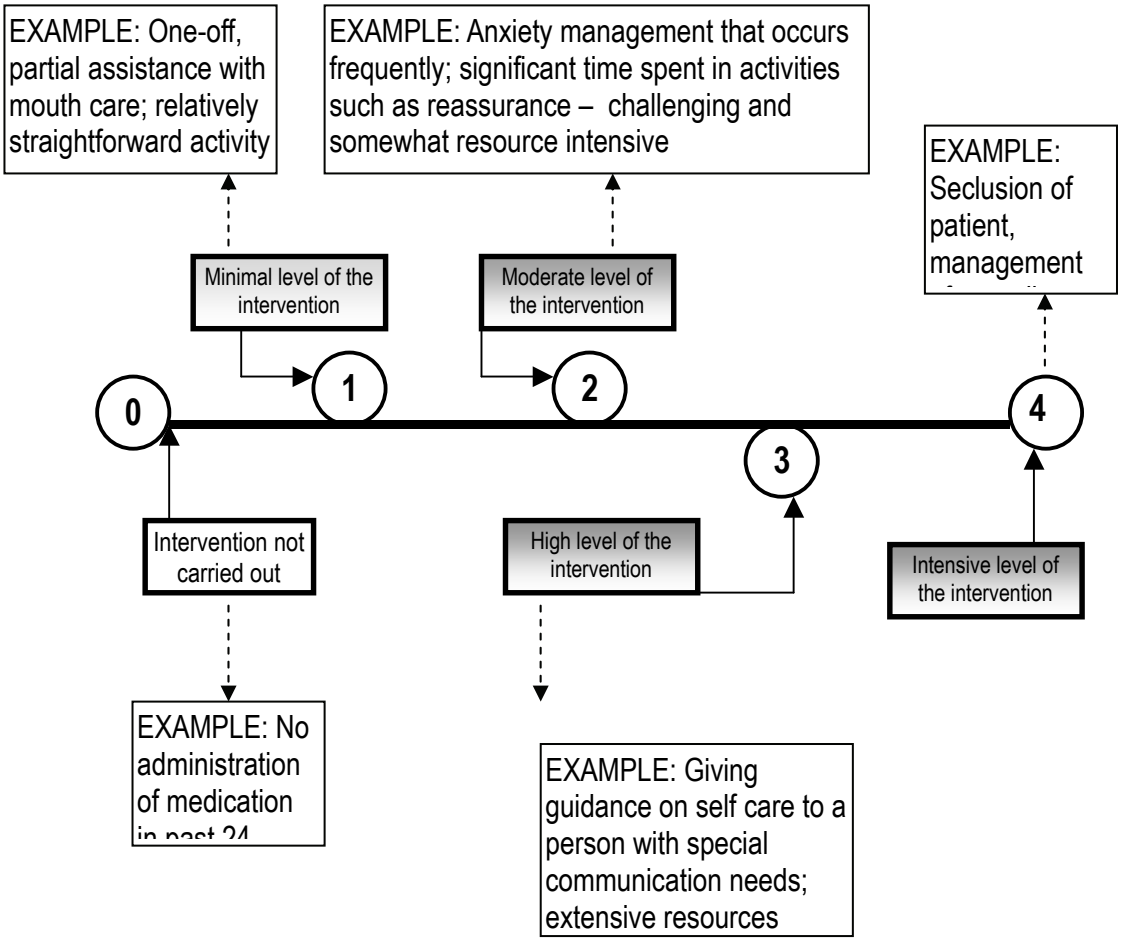
4. Intensive intervention level
- Intensive task complexity and specialist skill requirement
- Intervention was tailored to the person and continual to respond to the person's specific needs
- Extensive commitment of time and resources

DIAGRAM 4. DESCRIPTION OF THE INTERVENTION RATING SCALE

INTERVENTIONS RATING SCALE

0. *The intervention was not carried out during the time period.*
1. *Minimal lvel of intervention*; e.g., routine performance of a task, uncomplicated procedure, intervention performed only once or presents minimal time demand.
2. *Moderate level* of intervention e.g., relatively complex task performance, procedure was tailored to the person, intervention carried out on several occasions or requires significant time commitment.
3. *High level of intervention*; e.g., highly complex task performance, extensive work was needed to respond to the person's specific needs, intervention carried out often or continuously, required extensive commitment of time and resources.
4. *Intensive level of intervention,* e.g., task performance of a very high complexity, extremely extensive work required, intervention carried out continuously or at a very high frequency, requiring the highest level of resource and time commitment.

DIAGRAM 5. GRAPHIC OF THE INTERVENTION RATING SCALE WITH EXAMPLES.



NOTE: Take these features of task performance into account when you what level of intervention was provided

In making a rating, consider the following features of the intervention:
Frequency; commitment of time and other resources; task complexity; required skill level; routine / non-routine

3.5 Completing the Intervention Rating Scale for Co-Ordination and Organisational Tasks

The Intervention Rating Scale is also used for rating Co-Ordination and Organisational Tasks. These are indirect nursing actions performed in relation to a particular patient over the previous 24 hour period. These ratings indicate the kind of activities that underpinned the delivery of care to that person over that time. Similar tasks may be performed for two patients, but the patients could differ in the intensity of the co-ordination or organisational work that was required to support their direct care. For this reason, you are asked to give a rating to each of the co-ordination and organiational tasks carried out in respect of the individual.

Some of the I-NMDS Co-Ordination and Organisational Tasks are easily observable (e.g., admitting a patient, an example of *admitting and initial assessment of patient*; documenting their care: *documentating and planning the patient's care*), while others are less observable (e.g., seeking the opinion of a colleague: *focused discussion with other nurses*). The purpose of the I-NMDS is to record as much as possible of the nursing work that is performed for the person. Please bear this in mind when identifying the various formal, informal, observable and more subtle co-ordination and organisational tasks that are carried out.

Overview of Co-Ordination and Organisational Task Rating

- Each co-ordination of care function is completed on a five point scale (0-4). This indicates the level of co-ordination intervention that was required over the previous 24 hours. The rating is intended to represent the highest level of the co-ordination work required over that period.
- If a co-ordination of care task was not carried out, then 0 is recorded. If a co-ordination function was carried out, it can be scored at one of four levels of intervention in a manner similar to the nursing intervention section.

Further details and examples of ratings are given below:

0. *The co-ordination / organisational task was not carried out during the previous 24 hours,* or for community settings, during the working day.
1. *Minimal level of the intervention of co-ordination / organisational task. The co-ordination / organisational task was carried out, and is a necessary part of nursing care, but the level of the intervention is comparatively low.* For example, routine discussion of the patient at nursing handover, updating patient progress notes, making a telephone call on behalf of the person, making a straightforward inquiry to a family member about the person's medical history, routine referral of the person to another health professional.
2. *Moderate level of the intervention of co-ordination / organisational task*. For example, carrying out a three day review of a care plan, shared decision making with colleagues regarding the person's situation or condition, contacting several external agencies to address a particular issue, non-routine follow up of test results involving a significant time commitment.
3. *High level of the intervention of co-ordination / organisational task.* For example, carrying out a full scale nursing assessment of a patient on admission, dealing with a problematic patient transfer or discharge, attending several meetings with external agencies to address the person's accommodation needs, multidisciplinary case review.

4. *Intensive level of the intervention of co-ordination / organisational task.* For example, dealing with extreme complications in the discharge process or participating in a special case conference called to deal with a specific urgent issue with regard to a case.

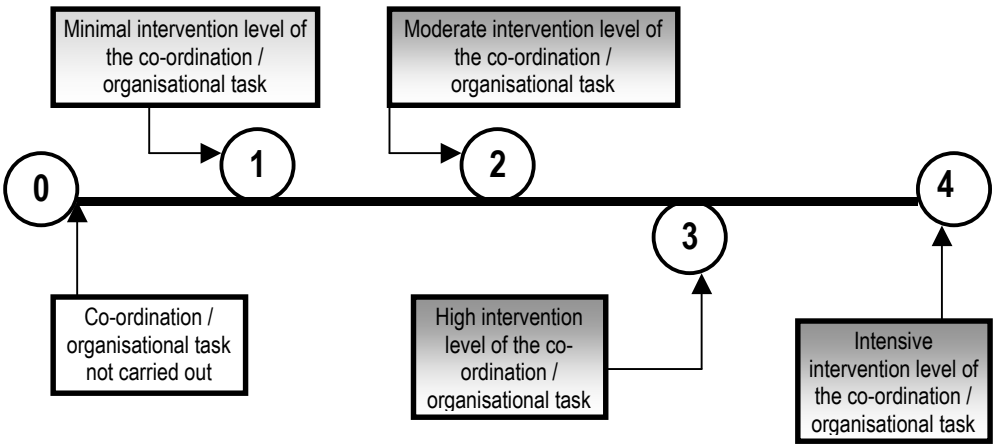
DIAGRAM 6. COORDINATION/ORGANISATION TASK RATING

CO-ORDINATION OF CARE / ORGANISATIONAL TASK RATING

0. The co-ordination / organisational task was not carried out during the time period.

1. *Minimal intervention level of the co-ordination / organisational activity*; e.g., routine performance of a task, relatively uncomplicated actions, straightforward co-ordination of actions with professionals or agencies, one-off activity or minimal time demand.
2. *Moderate intervention level of the co-ordination / organisational task*; e.g., somewhat complex task performance, need to co-ordinate actions with several other professionals or agencies, activity carried out on several occasions or requires significant time commitment.
3. *High intervention level of of the co-ordination / organisational task;* e.g., highly complex task performance, extensive co-ordination with other professionals or agencies, extensive commitment of time and / or other resources is required.
4. *Intensive intervention level of the co-ordination / organisational activity*, e.g., task performance of very high complexity, maximal level of co-ordination with other professionals and/or agencies, highly extensive time and resource commitment required.

DIAGRAM 7. GRAPHICAL DEPICTION OF THE INTERVENTION RATING SCALE FOR CO-ORDINATION / ORGANISATION TASK RATING, WITH EXAMPLES.



In making a rating, consider the following features of the task:
Frequency; commitment of time and other resources; task complexity; required skill level; routine / non-routine communication or co-ordination with other professionals or agencies

4 Definitions of I-NMDS items

This section of the I-NMDS User Manual provides a definition and a set of examples for each of the items included in the I-NMDS record form (apart from items related to background information on the person). The examples are given to help represent the areas covered by the item. The examples are not intended to be exhaustive or inclusive of all aspects of the item. Ultimately, your professional judgement is required to decide whether the patient's experience matches a certain problem label and whether a particular nursing action matches a certain nursing intervention.

Items related to Problems, Interventions and Outcomes have been organised into Physical, Psychological and Social categories. This is based on feedback from pilot research work indicating that it is more effective to organise items into categories.

Section B: Client / Service User Problems

4.1 PHYSICAL PROBLEMS

4.1.1 PHYSICAL COMFORT

Definition: An overall physical state that expresses some degree of physical distress or unease.

Examples include: problems relating to soreness, positioning.

4.1.2 PHYSICAL SIDE-EFFECTS FROM TREATMENTS / MEDICATIONS

Definition: An adverse, physical response to a drug or therapy.

Examples include: anaphylactic shock, nausea, vomiting, fatigue, lethargy drowsiness, tachycardia, hypotension, dehydration, cholinergic effect, dyskinesia.

4.1.3 WEAKNESS AND FATIGUE

Definition: A general feeling of exhaustion/lethargy or of lack of strength in one part of the body.

Examples include: decreased capacity for physical or mental work at a usual level, general malaise or tiredness, focal weakness (e.g., limb or facial muscles).

4.1.4 PAIN

Definition: An unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described by the person in terms of such damage (Mersky, 1979).

Examples include: soreness, aching and discomfort; may be acute or chronic and relate to one or more body sites.

4.1.5 NUTRITION

Definition: Problems relating to the ingestion, absorption and digestion of food and drink.

Examples include: weighs 10% more than average, weighs 10% less than average, unbalanced diet, non-adherence to prescribed diet, unexplained/progressive weight loss, hypoglycaemia and hyperglycaemia, altered appetite, fasting, special diet.

4.1.6 ELIMINATION

Definition: Difficulty or impairment in the process of discharging waste matter from the body.

Examples include: constipation, diarrhoea, bowel incontinence, urinary incontinence, altered urinary excretion, altered bowel excretion.

4.1.7 HYGIENE

Definition: Impaired ability or motivation to successfully perform bathing / washing, changing and grooming activities for oneself.

Examples include: problems relating to adequate skin care, eye care, oral care, ear care, foot care, putting on or taking off clothing.

4.1.8 BREATHING

Definition: Difficulty or impairment in relation to inhalation, exhalation or the process of gaseous exchange from the body.

Examples include: wheezing, coughing, difficulty in breathing, secretions, cyanosis, shortness of breath, dyspnoea and need for oxygen therapy.

4.1.9 FLUID BALANCE

Defintion: Inadequate or excess fluid volume.

Examples include: dehydration, fluid retention, fluid overload.

4.1.10 SLEEP

Definition: The person's sleep patterns are negatively affected/altered.

Examples include: Early morning wakening, poor sleep associated with pain, poor sleep associated with discomfort.

4.1.11 OVERALL PHYSICAL WELLBEING

Defintion: An overall judgement of the person's physical health status.

Examples include: the overall impact of any health difficulties on the person's physical health status (e.g., the combined effect of the physical health problems experienced by a person, such as pain, lack of mobility, etc.).

4.2 PSYCHOLOGICAL PROBLEMS

4.2.1 ANXIETY OR FEAR LINKED TO CURRENT STRESSORS

Definition: A feeling of apprehension or dread, associated with the anticipation of a threat or danger – in short-term anxiety the emotional discomfort experienced by the person has a specific focus that is regarded as anxiety-inducing (e.g., a health difficulty, an impending health intervention or a particular stressor).

Examples include: Anxiety is manifested through physiological, cognitive, behavioural and emotional responses. These include: somatic signs (e.g., racing heart, tremors), restlessness, agitated behaviour, worry, muscle tension, sleep disturbance.

Note: Short-term anxiety is in response to one or more stressors currently experienced, normally not lasting in excess of six months, and should be differentiated from a long-term anxiety problem (see item *Longstanding Anxiety*).

4.2.2 LONGSTANDING ANXIETY

Definition: A feeling of apprehension or dread, associated with the anticipation of a threat or danger; in long term anxiety the emotional discomfort experienced by the person may have an irrational fear (e.g., a phobia), does not have a specific focus (i.e., is generalised) or has become a habitual feature of the person's responses to challenge and difficulty.

Examples include: Anxiety is manifested through physiological, cognitive, behavioural and emotional responses; these include: somatic signs (e.g., racing heart, tremors), restlessness, agitated behaviour, worry, muscle tension, sleep disturbance.
Long term anxiety is a chronic problem or a long standing feature of the person's experience (i.e., lasting in excess of six months), and may be reflected in phenomena such as phobias (e.g., a simple phobia, social phobia), generalised feelings of anxiety throughout the day, the experience of panic reactions, obsessive-compulsive routines or post-traumatic stress reactions.

Note: Long-term anxiety should be differentiated from short-term anxiety (see item *anxiety or fear in response to current stressors)*.

4.2.3 MOOD

Definition: A disturbance in affective state ranging from feeling low or down to mania and/or elation.

Examples include: difficulties related to *low mood* (e.g., somatic signs such as early morning waking and changes in appetite; feelings of low self-esteem and poor self worth, depressive thinking, 'poor form', 'bad humour') or associated difficulties in fulfilling usual familial, social and occupational responsibilities.
Difficulties related to *elated mood* (e.g., somatic signs such as sleep disturbance; inappropriate emotional responses to events, a flight of ideas, unrealistic planning and impulsive behaviour) or associated difficulties in fulfilling usual responsibilities.

4.2.4 THOUGHT AND COGNITION

Defintion: Difficulty or impairment with perceptual functions and / or belief systems.

Examples include: difficulties in perceptual functions (e.g., hallucinating) and / or belief systems (e.g., delusional thinking, a break with reality, paranoid beliefs, lacking insight on the inappropriateness of particular fixed beliefs).

4.2.5 COPING & ADJUSTMENT TO CONDITION OR CHANGE IN CIRCUMSTANCES

Definiton: Difficulty dealing with issues that pose a problem or successfully adapting to changes in circumstances.

Examples include: coping behaviours that are generally ineffective or not supportive of successful adaptation to a change in circumstances. For example, the person distancing him/herself from or avoiding an important issue, irritable or aggressive responses, adopting problem solving methods that are counterproductive or without a reasonable chance of success.
Note: This problem should be differentiated from anxiety. Anxiety is focused on the experience of apprehension or fear (and associated behavioural responses, such as agitation); a coping and adjustment problem concerns the person's plan or actions in response to a problem or a change in circumstance.

4.2.6 CLIENT KNOWLEDGE DEFICIT REGARDING ILLNESS OR TREATMENT

Definition: The person is not aware of or does not fully understand, or is seeking information on certain or all aspects of their illness/diagnosis/prognosis or treatment.

Examples include: Not knowing about or seeking information on the side effects of treatment, tests, diet, the extent of their disease, or the care provided.

4.2.7 CHALLENGING BEHAVIOUR

Defintion: Violent and/or aggressive behaviour that can have a particular focus or be indiscriminate. This behaviour may or may not be psychopathological. It may have premeditated intent, or it may be carried out by a person with no particular conscious intent, e.g., in a distressed state.

Examples include: Threats or acts of physical violence, aggressive behaviour, or other such behaviour that is socially inappropriate in that it (wittingly or unwittingly) affects or threatens to affect the safety of others or their belongings.

4.2.8 COMMUNICATION

Definition: **Inability, total or partial, to interact with others**

Examples include: **Difficulty initiating communication or providing appropriate responses, hearing what is said or speaking, language difficulties**

4.2.9 LEVEL OF MOTIVATION

Definition: Any problem with the person's arousal to action towards a goal and/or whereby there is a low level of purpose and direction to behaviour.

Examples include: Person not being motivated to maintain own personal hygiene

4.2.10 TRUST IN OTHERS

Definition: The degree to which the person trusts other people- those providing care, fellow service users, and/or significant others.

Examples include: Lack of trust in ability of health professional to deliver care, lack of trust in significant others to have the person's best interests at heart, lack of trust in fellow service users to not to post a threat to the person. Does *not* include psychopathological paranoia.

4.2.11 SPIRITUAL NEEDS

Definition: Needs concerned with sacred matters or with religion or affecting the spirit or the soul.
Examples include: The person wishing to speak with a chaplain, wanting to have the sacrament of the sick, or wishing to talk about spiritual matters.

4.2.12 ADHERENCE TO TREATMENT OR MEDICATION

Defintion: Partial or non-compliance with a medication, or treatment regime, as prescribed or advised.

Examples include: a level of non-compliance with a treatment regime that is clinically

significant, not following treatment / advice post-operatively, dietary non-compliance.

4.2.13 PSYCHOLOGICAL SIDE EFFECTS OF TREATMENT OR MEDICATION

Definition: An adverse psychological response to a drug or therapy.

Examples include: adverse mental or emotional responses (as opposed to physical) such as an increase in aggression, hostility, or disorientation.

4.2.14 OVERALL PSYCHOLOGICAL WELLBEING

Definition: An overall judgement of the person's mental and emotional state

Examples include: the overall impact of any mental or emotional difficulties on the person's psychological status (e.g., the combined effect of the psychological difficulties experienced by a person, such as low mood, unsuccessful coping responses, etc.).

4.3 SOCIAL PROBLEMS

4.3.1 SOCIAL DISADVANTAGE

Definition: A compromised social situation or material deprivation.

Examples include: Poverty, lack of adequate facilities or essential services, financial problems, homelessness, unemployment

4.3.2 APPROPRIATENESS OF THE CARE ENVIRONMENT

Definition: The placement of the person in a particular ward/unit is problematic in that the ward/unit is not suited to the meeting of that person's needs.

Example include: lack of privacy, confinement in small space, noise level, concerns about safety, dissatisfaction with being in the care environment

4.3.3 DELAYED DISCHARGE

Definiton: Postponement of the person's discharge from the care setting

Examples Include: delays of several hours, days or weeks

4.3.4 LEVEL OF SOCIAL SUPPORT FROM SIGNIFICANT OTHERS

Definition: A deficit in the degree of help and / or support received from close relatives, friends and neighbours.

Examples include: a lack of support to maintain the patient at their preferred level of social or occupational functioning.

4.3.5 FAMILY (OR SIGNIFICANT OTHER) KNOWLEDGE DEFICIT REGARDING ILLNESS OR TREATMENT

Definition: Seeking information on certain or all aspects of the person's illness, diagnosis, prognosis or treatment**.**

Examples include: **Not knowing or seeking information about the side effects of treatment, tests, diet, the extent of the disease, the care provided.**

4.3.6 FAMILY COPING

Definition: Family difficulty in dealing with issues around their relative's disorder and subsequent treatment.

Examples include: Family coping that is not effective or not supportive of successful adaptation to a change in circumstances. For example, family members distancing themselves from, or avoiding important issues, adopting problem solving methods that are counterproductive or without a reasonable chance of success.

4.3.7 INDEPENDENT LIVING

Definition: Difficulty or impaired ability to function independently outside the healthcare setting

Examples include: inadequate, occupational or domestic skills and difficulty coping with activities such as budgeting, meal preparation and self-care.

4.3.8 SOCIAL STIGMA

Definition: Negative stereotyping of a person in response to their own perceptions and the perceptions of others.

Examples include: Reactions to illness and hospitalisation, the association of cancer with a poor prognosis and death.

4.3.9 SOCIAL SKILLS

Defintion: **Difficulty in maintaining appropriate social interactions.**

Examples include: initiating and maintaining social contacts, making appropriate social responses across a range of situations and relationships.

4.3.10 OVERALL SOCIAL WELLBEING

Definition: An overall judgement of the person's social independence and social adjustment

Examples include: the overall impact of any difficulties in social independence and social adjustment on the person's social functioning (e.g., the combined effect of the difficulties the person experiences in a social context, such as a problem in maintaining him/herself at home, social isolation, etc.)

4.4.1 GENERAL WELLBEING

Definition: A general overall state of good health, comfort and general content
Examples include: Good physical, psychological and social health and functioning

Section C: Nursing Interventions and Activities

PHYSICAL NURSING INTERVENTIONS

4.5.1 ADMINISTERING MEDICATION, FLUIDS OR BLOOD PRODUCTS

Definition: Actions relating to the preparing, giving and evaluating of prescription drugs and substances.

Examples include: pharmacological or nutritional substances or solutions or blood products administered via oral, intravenous, intramuscular, subcutaneous, nasogastric or rectal routes.

4.5.2 MONITORING, ASSESSING OR EVALUATING PHYSICAL CONDITION

Definition: Actions relating to on-going or periodic assessment of the patient or a judgement of the patient's physical state, as opposed to psychological or spiritual state.

Examples include: physical assessment, checking a patient's status.

4.5.3 ATTENDING TO HYGIENE

Definition: Actions relating to assisting the patient to perform or complete bathing, washing, grooming activities or carrying out these activities on behalf of the patient.

Examples include: changing, washing, bathing, mouth care, eye care, assisting the patient to meet his or her own hygiene needs where a self-care deficit exists.

4.5.4 RESPONDING TO EXTREME SITUATIONS

Definition: Actions relating to response to emergency situations.
Examples include: nursing activities in response to cardiac or respiratory arrest, bleeding control, restraint and de-escalation.

4.5.5 CONTROLLING INFECTION

Definition: Actions relating to the prevention, detection and control of patient infection.

Examples include: the identification of factors that predispose person to infection, monitoring patients for signs of infection, taking action to address infection and prevent the spread of infection.

4.6 PSYCHOLOGICAL NURSING INTERVENTIONS

4.6.1 DEVELOPING AND MAINTAINING TRUST

Definition: Actions intended to build a therapeutic relationship, or rapport, with a person; so that they feel they can relate their problems to the nurse.

Examples include: **talking to individuals, sitting with them and active listening, the formation of positive interactions and connections.**

4.6.2 ENCOURAGING ADHERENCE TO TREATMENT OR INTERVENTIONS

Definition: Actions intended to persuade a person to take prescribed medication or undergo treatment.

Examples include: **talking through difficulites with treatment or medication regime, advising a person of the consequences of not adhering to treatment or medication regime.**

4.6.3 INFORMALLY MONITORING, ASSESSING OR EVALUATING PSYCHOSOCIAL FUNCTIONING

Defintion: Actions related to on-going or periodic assessment of the person or a judgement of the person's psychological state, as opposed to physical state.

Examples include: assessing the person's emotional and mental status, including the person's mood, using formal and/ or informal techniques.

4.6.4 STRUCTURED OBSERVATION

Definition: Planned formal observation of a service user for a specific purpose, e.g, to minimise the risk of the person from self-harming or absconding.

Examples include: Special one-to-one nursing of a person, nursing of a person in a high observation or intensive care area, having a person on 15 minute observation checks.

4.6.5 RESPONDING TO ALTERED THOUGHT AND COGNITION

Defintion: Actions intended to address problems with perceptual functions and / or belief systems.

Examples include: reality orientation, risk management, cognitive / behavioural techniques.

4.6.6 PROVIDING INFORMAL PSYCHOLOGICAL SUPPORT

Definition: Actions relating to “being there” for the individual to help them deal with their situation.

Examples include: helping individuals to deal with concerns and uncertainty, providing reassurance, and relieving emotional discomfort.

4.6.7 MANAGING MOOD

Defintion: Actions intended to stabilise or enhance a person’s mood state

Examples include**: use of problem solving and counselling techniques.**

4.6.8 MANAGING ANXIETY

Definition: Actions intended to assist a person to adapt to perceived stressors and / or to allay feelings of apprehension.

Examples include: encouraging the person to ask questions and express anxieties, providing reassurance and teaching anxiety management techniques

4.6.9 TEACHING SKILLS AND PROMOTING HEALTH

Definition: Actions intended to promote the person’s engagement in behaviour aimed at enhancing their physical or psychological well-being.

Examples include: general or informal encouragement and guidance with care and independence rehabilitation, communication and the provision of information.

4.6.10 DEALING WITH THE PERSON’S INFORMATION NEEDS

Definition: Actions relating to the provision of information regarding the person’s health status and related issues, in a way that is appropriate and sensitive to their needs.

Examples include: providing information or responding to questions regarding clinical issues such as diagnosis, post-operative phase of recovery, diet; or service issues such as appointment times, access to services.

4.6.11 ADVOCATING

Defintion: Actions intended to support the person’s choices and beliefs.

Examples include: **helping the person to ask questions or speaking up for them, where they might not be able to express what they really want to say. Engaging with other professionals or agencies on a person’s behalf (e.g. the medical team or the community welfare officer).**

4.6.12 MANAGING SUBSTANCE DEPENDENCE OR MISUSE

Definition: Actions intended to assist the person to deal with the physical and psychological consequences of inappropriate or problematic misuse of unprescribed drugs, including alcohol.

Examples include: assisting people to deal with impairment or distress resulting from drug misuse such as failure to fulfill major role responsibilities by means of counselling and encouraging problem solving

4.7 SOCIAL NURSING INTERVENTIONS

4.7.1 SUPPORTING THE FAMILY (OR SIGNFICANT OTHER)

Defintion: Actions intended to provide emotional support to family members and / or address skills deficits that arise from a person's needs.

Examples include: therapeutic presence of a nurse, skills teaching and health promotion initiatives.

4.7.1 WORK IN RELATION TO SOCIAL SKILLS

Definition: Actions to promote preson's skills that relate to initiating and maintaining social interactions

Examples include: Encouraging group social interaction, guidance and discussion about appropriate social responses and interactions, feedback and reflection on the person's social experiences and role-playing

4.8 Organisation and Co-ordination of Care Activities

4.8.1 SUPPORTING AND MANAGING CARE DELIVERY

Definition: Actions related to liaising with people, and/or health agencies, with the aim of setting up, putting in motion or following up elements of care so that the person receives the care that has been planned for them.

Examples include: referral of the person to other health professionals, transport to and from to tests, therapy sites, settings and appointments. Preparation for medical tests or surgery, ensuring that scheduled tests have been done and medications are charted, organising an appointment with a dentist for a patient, arranging placement in a sheltered work environment, contacting a radiotherapy department

4.8.2 FACILITATING EXTERNAL ACTIVITIES

Definition: Involvement in arranging, or helping to make possible, the service-user's involvement in non-clinical pursuits outside the care environment.

Examples include: contacting voluntary agencies and arranging weekend passes and

day passes, setting up arrangements for the person to have some time outside of the clinical setting.

4.8.3 FACILITATING LINKS BETWEEN FAMILY OR SIGNIFICANT OTHER AND MULTIDISCIPLINARY TEAM

Definition: Actions relating to the provision of information to the multidisciplinary team from the family regarding the person's health status and related issues.

Examples include: providing a doctor with collateral history from a significant other, seeking information from the family on behalf of the multidisciplinary team.

4.8.4 FOCUSED DISCUSSION WITH OTHER NURSES

Definition: Actions carried out with other nurses with the aim of sourcing, using and integrating patient specific information.

Examples include: Includes seeking a colleague's opinion, making shared judgements and decisions, participating in nursing handovers.

4.8.5 DOCUMENTING AND PLANNING THE PATIENT'S CARE

Definition: Actions related to design of a package of care to meet the needs of the individual and the subsequent recording of pertinent patient data in a clinical record.

Examples include: care planning and documentation, goal setting, entries in the nursing care plan and updates to patient progress notes.

4.8.6 LIAISING WITH MULTIDISCIPLINARY TEAM MEMBERS OTHER THAN NURSES

Definition: **Actions relating to interactions with other healthcare professionals about patient-specific issues.**

Examples include: conveying and/or relaying information on behalf of the patient, helping to solve problems, shared decision-making, participating in case conferences, arranging referrals.

4.8.7 ADMITTING AND INITIAL ASSESSMENT OF PATIENT

Definition: Actions relating to the person's initial reception to the healthcare setting and the identification of their specific needs as the baseline for further assessment.

Examples include: **Include taking a person's history, orientation to the clinical setting, formal and informal assessment of a person's physical, psychological and social needs and problems on admission.**

4.8.8 PLANNING DISCHARGE

Definition: **Actions relating to the co-ordination and organisation of a person's discharge from the care setting, with the aim of pre-empting complications following discharge.**

Examples include: liaising with the hospital team, relatives and community services, nursing transfer letters, organising transport.

5 Significant Events in the Past 48 Hours

The purpose of this section on the form is to record any major events, clinical or non-clinical, that might have had an impact on the service user over the previous 48 hours. Significant clinical events that might be recorded here include the person having had electroconvulsive therapy, being reviewed by their consultant, or having a meeting with their social worker. The purpose of this is to record clinical interventions that occur that primarily involve people other than nurses. “Major other events” are events that similarly have an impact on the service-user but are not clinical interventions. The person might be assaulted by a fellow patient, or assault another person, including a nurse. Other examples include the person absconding, hearing of the death of a relative or being engaged in a quarrel with relatives and/or a significant others. Such non-clinical events can be of a positive nature also – hearing some good news regarding a relative or significant other, contact from previously estranged relatives or significant others or receiving confirmation of job security, for example.

APPENDIX D

Comparison Across NMDS Tools

Table 1 Table Comparison of Content of I-NMDS (MH) with those of Other Nursing Minimum Data Sets

I-NMDS Mental Health	BNMDS	NMDSN	NMDS
Nutrition	N/A	Problems with food and fluid; functional problems with ADL	Altered dentition; altered nutrition – less than body requirements/ more than body requirements; self-care deficit – feeding; impaired swallowing
Physical side effects of treatments /medications	N/A	*Difficulty in managing therapy/regime	
Breathing	N/A	Breathing problems	Breathing pattern ineffective – 'inspiration and/or expiration that does not provide adequate ventilation' Airway clearance ineffective – 'inability to clear secretions or obstructions from the respiratory tract to maintain a clear airway' Impaired gas exchange
Hygiene	N/A	Self-care limitations (specify); functional problems with ADL	Self-care deficit – bathing/hygiene
Pain	N/A	Pain	An unpleasant sensory and emotional experience arising from actual or potential tissue damage, sudden or slow onset of any intensity from mild to severe with an anticipated or predictable end and a duration of less than six months; Chronic pain
Fluid balance	N/A	Problems with fluids	Fluid volume deficit; Fluid volume excess; risk of fluid volume imbalance
Weakness/fatigue	N/A	N/A	Fatigue; Adult failure to thrive
Elimination	N/A	Impairments in elimination; functional problems with ADL	Constipation; diarrhoea; bowel incontinence; self-care deficit – toileting; altered urinary elimination; functional urinary incontinence; reflex, stress, total and urge urinary incontinence; urinary retention
Physical comfort	N/A	N/A	N/A
Sleep		Restlessness; Problems with rest/sleep	Sleep pattern disturbance/sleep
Anxiety/fear in response to current stressors	N/A	Fear; Difficulties with stressful situations (coping)	A vague uneasy feeling of discomfort or dread accompanied by an autonomic response; the source is often non-specific or unknown to the individual; a feeling of apprehension caused by anticipation of danger. It is an altering signal that warns of impending danger and enables the individual to take measures to deal with threat; 'Death anxiety; Fear;

Table 1 Table Comparison of Content of I-NMDS (MH) with those of other Nursing Minimum Data Sets Continued.

I-NMDS Mental Health	BNMDS	NMDSN	NMDS
Mood (e.g. low mood, low self esteem, mania)	N/A	N/A	Body image disturbance; self-esteem disturbance/chronic low/situational low
Coping and adjustment rehabilitation	N/A	Insufficient insight into health situation; Difficulties with stressful situations (coping)	Ineffective individual coping; Adjustment impaired – 'inability to modify life style/ behaviour in a manner consistent with a change in health'; Decisional conflict; Defensive coping;
Anxiety – as a more longstanding feature	N/A	N/A	Hopelessness
Level of social support received from significant others	N/A	Problems in contact with family	Caregiver role strain; ineffective community coping; ineffective families management of therapeutic regimen; compromised/ineffective family coping; social isolation/ impaired social interaction
Thought and cognition		Disorientation in time, place, activity or person; Memory problems/confusion; Insufficient insight into health situation;	Sensory/perceptual alterations – auditory/ visual
Client knowledge deficit regarding illness or treatment		Need for information, knowledge and learning of skills; Insufficient insight into health situation	Knowledge deficit
Challenging behaviour		Behavioural problems	
Communication		Problematic communication	Impaired verbal communication
Level of motivation		Lack of motivation to co-operate in treatment and care; Functional problems with ADL	Activity intolerance
Trust in others		N/A	Impaired social interaction
Spiritual needs		N/A	N/A
Adherence to treatment or medication		N/A	Non-compliance
Psychological side effects of treatment or medication		N/A	N/A

Table 1 Table Comparison of Content of I-NMDS (MH) with those of other Nursing Minimum Data Sets Continued.

Interventions			
I-NMDS	**BNMDS**	**NMDSN**	**NMDS**
Administration of medication, fluids and/or blood products	Administration medication IM/SC/ID/IV	Medication: IV/Other than IV	Treatment/ applications
Monitoring, observing and evaluating physical condition	Monitoring vital signs	Continuous observation and monitoring; Registration of vital and physiological signs	Surveillance and/ or observation
Attending to hygiene	Hygiene/bathing	Hygiene care	Assistive measure
Responding to extreme situations	N/A	N/A	N/A
Controlling infection	Infection control (isolation)	N/A	Treatment
Developing and maintaining trust	Emotional support	Psychosocial support	Emotional support and/or counselling
Dealing with the persons information needs	Teaching	Teaching skills; Giving information	Teaching
Teaching skills and promoting health	Teaching	Teaching skills	Teaching
Encouraging adherence to treatment or interventions	N/A	N/A	N/A
Providing informal psychological support	Emotional support	Psychosocial support	Emotional support and/or counselling
Anxiety (e.g. anxiety management techniques)	Cognitive therapy	Psychosocial support	Therapeutic activities
Mood (e.g. problem solving)	Cognitive therapy	Psychosocial support	Therapeutic activities
Informally monitoring, observing or evaluating psychological condition	N/A	Continuous observation or monitoring	Monitoring and/or surveillance
Advocacy (e.g. information on rights, alternatives to treatment, decision support)	N/A	N/A	Protection; Coordination and collaboration of care
Thought and cognition (e.g. reality orientation, symptom management, validation therapy)	Cognitive therapy	N/A	Therapeutic activities
Structured observation	N/A	N/A	Surveillance and/ or observation
Responding to altered thought and cognition	N/A	N/A	N/A
Managing substance dependence or misuse	N/A	N/A	N/A
Supporting the family	N/A	Involve family in care	N/A
Work in relation to social skills	N/A	Psychosocial support	N/A

Table 1 Table Comparison of Content of I-NMDS (MH) with those of other Nursing Minimum Data Sets Continued.

Comparison of Organisation/Coordination of Care Activities Across Nursing Minimum Data Sets			
INMDS Mental Health	BNMDS	NMDSN	NMDS
Focused discussion with other nurses	N/A	N/A	Coordination and collaboration of care
Documentation and planning of client's care	N/A	N/A	Coordination and collaboration of care
Liaising with multidisciplinary team members other than nurses	N/A	N/A	Coordination and collaboration of care
Admitting and assessing clients	N/A	N/A	N/A
Planning discharge	N/A	N/A	Coordination and collaboration of care
Facilitating links between the family /significant other and multidisciplinary team	N/A	N/A	Coordination and collaboration of care
Facilitating external activities	N/A	N/A	Coordination and collaboration of care
Supporting and managing care delivery	N/A	Transport for the patient	Coordination and collaboration of care

APPENDIX E

Appendices for the Pilot Study

Content Validation Sheet

Thank you for agreeing to participate in the content validation of the Irish Nursing Minimum Data Set. We need you to tell us whether or not the items we have included on the I-NMDS reflect the nursing work activity you engage in. As you can see, the
I-NMDS form consists of four sections as follows:

Section A Consists of the client/patient problems that nurses come across in their clinical nursing work

Section B Consists of the interventions and organisation/coordination of care activities that nurses engage in

Section C Consists of outcomes of nursing care

Please read though the items on the I-NMDS form, section by section using the definitions in the Users Manual provided and answer the questions below.

Patient Problems

Q1 Looking at the list of patient problems and their corresponding definitions (in the User Manual) were there any items that you found unclear or difficult to understand? Please list them below and let us know why?

.

Q 2 Do the patient problem items reflect the types of patient problems you come across in your day-to-day nursing work? If there are any items that do not reflect your day-to-day nursing work can you list them below and explain to us why?

Q 2. Are there any patient problems that are not included on the form that should be included? If there are any patient problems that have been omitted can you tell us what they are in the space provided below?

Nursing Interventions

Q1 Looking at the list of nursing interventions and their corresponding definitions (in the Users Manual) were there any items that you found unclear or difficult to understand? Please list them below and let us know why?

.

Q 2 Do the nursing interventions items reflect the types of nursing interventions you carry out in your day-to-day nursing work? If there are any items that do not reflect your day-to-day nursing work can you list them below and explain to us why?

Q 3 Are there any nursing interventions that are not included on the form that should be included? If there are any nursing interventions that have been omitted can you tell us what they are in the space provided below?

.

Organisation and Coordination of Care Activities

Q1 Looking at the list of coordination and organisation of care activities and their corresponding definitions (in the Users Manual) were there any items that you found unclear or difficult to understand? Please list them below and let us know why?

.

Q 2 Do the coordination and organisation of care activity items reflect the types of nursing interventions you carry out in your day-to-day nursing work? If there are any items that do not reflect your day-to-day nursing work can you list them below and explain to us why?

Q 3 Are there any coordination and organisation of care activities that are not included on the form that should be included? If there are any coordination and organisation of care activities that have been omitted can you tell us what they are in the space provided below?

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INSTRUCTIONS FOR COMPLETION OF I-NMDS

Thank you for taking the time to assist us in developing the Irish Nursing Minimum Data Set (I-NMDS). Please refer to the instructions below to help you complete the I-NMDS Form.

General Instructions for Completing the I-NMDS

- Please complete one I-NMDS form for each of your patients/clients every day for the five consecutive days of this study
- The same I-NMDS form should be used for each specific patient/client regardless of change in nursing staff
- Please complete The I-NMDS form retrospectively following 24 hours of care delivery for the patient/client

Instructions for completion of Section A of the I-NMDS:

Background Information

- The Completion Date boxes refer to the date on which The I-NMDS Form was completed for the patient/client, over the five consecutive days of this study. Please insert the date of completion of the I-NMDS Form, as appropriate.
- In the box referring to the Nurse initials, please insert your initials in the appropriate box on the day you complete the form.
- Patient Details
  Please complete this section of the form by indicating in the boxes provided the patient/clients:

•Age
•Sex
•Date of admission
•Date of discharge
•Ward or unit name
• Reason for admission
•Medical diagnosis
•The patient/clients DSMIV or ICD 10 Code
• The area of residence of the patient

Instructions for completion of Section B of the I-NMDS:

Patient Problems

The patient/clients problems can be physical, psychological or social problems. Using a tick in the appropriate box, please indicate the problems this patient had today, and impact of the problem on patient functioning, according to the scale outlined below:

Problem Rating Scale Scoring Key

N/A = Not assessed
0 = Problem is not present
1 = Minor problem, no impact on functioning
2 = Problem has limited impact on functioning
3 = Moderate problem, significant impact on functioning
4 = Severe problem, severe impact on functioning
P = Problem is absent, with an elevated risk of it happening within three days

Instructions for completion of Section C of the I-NMDS:

Nursing interventions and coordination /organisation of care activities

Using the intensity scale below, please indicate, by placing a tick in the relevant box, which nursing interventions/ coordination and organisation of care activities have been carried out for this patient and the intensity of each intervention and coordination/organisation of care activity.

Interventions Rating Scale Scoring Key

0 = No intervention undertaken
1 = Once off minimal intervention in a routine way
2 = Intermittent or regular interventions and/or of a more complex nature
3 = Continuous or multiple interventions and/or of a more complex nature and/or requiring more than one nurse and specialist nursing skills

Instructions for completion of Section D of the I-NMDS: Outcomes of Nursing Care

The outcomes of nursing care can be physical, psychological or social problems and are rated on a scale as follows:

Nursing Sensitive Outcomes Scale

N/A = Not assessed
-2 = Major deterioration in problem status
-1 = Moderate deterioration in problem status
-0 = No change in problem – a negative outcome
+0 = No change in problem – a positive outcome
1 = Moderate improvement in problem status
2 = Major improvement in problem status

Using this scale please indicate with a tick, which of the outcomes of nursing care this patient had at the end of day 5, or upon discharge if this occurs sooner.

THANK YOU FOR YOUR HELP

Content Validation Responses According to Categories Problems, Interventions, Coordination and Organisation of Care and Outcomes of Care

Problems:

P1 Interventions and outcomes scales were quicker and easier to use than the problems scale

P1 I did not think anything needed to be added in terms of problems

P2 Non- adherence to a treatment or medication, I was unclear as to whether treatment referred to the care plan or intervention that was planned for the client

P2 All other problems items seemed fine in manual and on the I-NMDS form

P3 Pain item is not a major problem in community mental health

P3 Weakness and fatigue doubles up with negative physical side effects of treatment or medication

P3 The item nutrition is very broad. It is important to note weight loss/gain related to medication, lifestyle and mental health presentation

P3 The item care environment is not very clear – you need to go to the definition in the manual to find its relevance/importance to mental health.

P3 Problems scale was fine but would be good to breakdown items for easier reading

P3 Does stigma mean social or personal stigma?

P4 One item missing here was risk of aggression and preventative measures

P5 No problem with the physical problems clarity and definitions

P5 Without using the manual the item anxiety, longstanding was difficult to comprehend…suggest, long term anxiety

P5 Noted that violence can be a big problem

P5 Overall, very applicable to MH nursing

P6 Had some difficulty with the problem items 'client knowledge deficit', the care environment' and 'coping and adjustment'. The first two items need more clarity, the item 'coping and adjustment' overlaps with 'anxiety'

P7 Not very clear what is meant by anxiety or fear in response to current stressors, this may be better as 'short term anxiety'

P8 There is some overlap between problems, or at least the potential for it. E.g. a person who is bereft after a separation form a partner may be identified as having problems with mood, coping and adjustment, social disadvantage, social support, anxiety or fear.

I think some of the problems need thinking through. For example, is non-adherence to medication a problem? There may be a problem associated with more potential for relapse or delayed recovery, but not taking medication may not be a problem in itself. It may be associated with particular problems.

I think an adequate range of problems are identified but perhaps at the expense of specificity e.g. thought and cognition is just a broad category

Content Validation Responses According to Categories Problems, Interventions, Coordination and Organisation of Care and Outcomes of Care

Interventions:

P1 Did not quite understand the definition of encouraging adherence

P1 Found physical interventions were not very relevant to MH (controlling infection, administering medication/blood products) this would be different in the acute inpatients setting to the community

P1 Thought that encouraging social interaction should be an added item

P2 No difficulty with the interventions included on the INMDS – they are all relevant to mental health care

P3 In the community setting, medication administration is oral only

P3 In terms of the item 'responding to emergency situations', environmental emergencies are relevant to community mental health e.g. fire alarm going off due to smoking in bedroom etc…this can occur every 2 weeks at times

P3 Intervention scale was fine

P4 In relation to the item 'teaching skills'… group work is a major part of nursing work in the acute setting. Most of the day is taken up with group work e.g. client general knowledge, art, education and encouragement of social interaction. This is how many nurses observe patient mental status/social skills/mood.

P5 Risk assessment is important in mental health nursing. The main problems with risk assessment include: self harm, harming others, self neglect.

Maintaining a safe environment and identifying history of aggression are also important aspects of mental health nursing

In terms of 'teaching skill/promoting health', activities involved in this should be more explicit e.g. therapies should be more explicit – relaxation, stress management, visitor talks (from Aware etc.) exercises, arts and crafts

Escourting should be noted somewhere as an intervention

P7 One nursing intervention not included is providing formal psychosocial support

P8 It should be recognised that the term 'intervention' reflects a particular view of practice that is not universally shared. Second, I do not think that monitoring, observing etc. can be properly called interventions. Third, I think the use of 'managing' is often inappropriate. Nurses do not manage mood or manage anxiety…if anyone manages these it is the clients.

In the limited work I do with clients, I try not to 'intervene' but to 'enable' persons to work at their goals, recognise their strengths and do

more of what works for them. In my opinion, nurse should do a lot more intervening.

A broad range of items are covered but may be defined in different ways. E.G. certain activities like group work might be viewed as an intervention.

Content Validation Responses According to Categories Problems, Interventions, Coordination and Organisation of Care and Outcomes of Care

Coordination and Organisation of Care Activities:

P1 Coordination of care section was the easiest to complete

P1 Further explanation of the items facilitating external links and support and management of care delivery would be good

P5 The title 'organisation/coordination of care is not very clear. Improved wording might include e.g. non-intervention related nursing work (although some of the items are indirect interventions, maybe group differently)

P7 Really need to capture the volume of paperwork nurses engage in

P8 Assessing category reflects the nurse centred rather than the client centred perspective

Outcomes of care:

P1 Should be another separate section redefining the outcomes in the user manual

P1 Didn't really understand nutrition as an outcome

P5 Pain as an outcome, is it physical or emotional?

How relevant is breathing as an outcome in mental health? Not very, it maybe relates to nebulisers, swallowing problems

Coping and adjustment, in what context? Maybe expain more i.e. how is aperson adjusting to being in hospital, an how is this adjustment conceived as an outcome?

The item care environment is ambiguous in this section although it is relevant overall as people in mental health can be in a number of different care environments throughout care term.

Bereavement might be included as an outcome

P8 On the face of it these items are easy to follow

General Comments:

P1 In the community the I-NMDS form will not be completed for 24hrs – it would be for more like 6 hours (taking lunch and preparation in to account)

P1 Thought that the I-NMDS form should be kept with the patients care plan

P3 On the front page the ICD10 should stay in for data purposes but may not be relevant to all nurses working in community care

P3 It is important to have the patients age on the form. Age is a major factor in mental health. In the community setting, many people are between the age of 20 and 35

Content Validation Responses According to Categories Problems, Interventions, Coordination and Organisation of Care and Outcomes of Care

General Comments:

P3 Issues relating to implementation of the form include the following:
Work is based on a primary nurse model
Patients stay averages at 6 yrs
Chronological recording of interventions
12 hour shifts - 3 days @ 11.23 hrs, 1 day at 5 hrs
Every client has a primary and associate nurse whereby when the primary nurse is off the associate nurse takes over. Every nurse functions as both a primary and associate nurse.
Documentation usually completed every 72 hrs. Only relevant entries go in

P4 Felt that these recordings were very important for mental health nurses to make.

P6 All sections of the form were relevant to the nurse's work, and she felt that the form was "very comprehensive"

P6 There were no items that were seen as not relevant to nursing work and I did not feel that any items needed to be added.

P6 The I-NMDS form would be best kept at the front of the service-user's case notes.

P7 Initial difficulty with how to indicate response on the form

Table 1 Descriptive Statistics for Outcomes Section of the Draft I-NMDS (MH)

	N	Minimum	Maximum	Mean	Std. Deviation
D5 Physical discomfort	16	0	6	3.75	1.342
D5 Elimination	16	0	5	3.06	1.879
D5 Weakness and fatigue	16	3	6	4.00	.966
D5 Pain	16	0	5	3.56	1.094
D5 Nutrition	16	0	4	3.31	1.138
D5 Negative physical side effects from treatments / medications	16	2	5	4.19	.834
D5 Dependence with hygiene needs	16	0	5	3.69	1.195
D5 Breathing	16	0	5	3.56	1.263
D5 Fluid balance	16	0	4	3.38	1.258
D5 Overall physical well-being	16	2	5	3.88	.885
D5 Anxiety (longstanding)	16	2	5	3.69	.946
D5 Anxiety or fear	16	2	6	4.06	1.124
D5 Spiritual needs	16	0	5	2.81	1.974
D5 Sleep disturbance	16	2	5	4.13	.806
D5 Trust in those providing care	16	2	6	4.31	.946
D5 Coping and adjustment	16	3	5	3.94	.929
D5 Non-adherence to a treatment or medication	16	2	5	3.81	.834
D5 Low level of motivation	16	2	6	4.06	1.124
D5 Stigma	16	0	5	3.44	1.504
D5 Difficulty communicating	16	2	5	3.94	.929
D5 Thought and cognition	16	2	5	3.94	1.063
D5 Mood	15	3	6	4.40	.986
D5 Client knowledge deficit regarding illness or treatment	16	3	5	4.19	.750
D5 Overall psychological well-being	15	3	5	4.40	.737
D5 Independent living	16	0	6	3.38	1.408
D5 Social skills	16	2	5	3.50	1.033
D5 Social disadvantage	16	2	5	3.44	.727
D5Care environment	16	2	5	3.63	.957
D5 Delayed discharge	16	0	5	3.25	1.183
D5 Level of social support from significant others	16	0	5	3.88	1.204
Valid N (listwise)	15				

APPENDIX F

The Revised I-NMDS (MH)

NURSING MINIMUM DATA SET (I-NMDS): COMPLETION BOOKLET

Mental Health Nursing

General Instructions:

*This booklet contains **five I-NMDS forms, one for each day of data collection** and **one background information sheet**

*Please complete **one booklet for each client in your care**

***Please keep the I-NMDS booklet with the client's nursing documentation**

*Please complete this booklet thinking **only about the previous 24 hours** - **actual problems** the client experienced and the **actual nursing care** delivered in the **previous 24 hours**

*Please complete the **background information form** on the **first day of the study period**

*Please **complete one I-NMDS form every second day for the next 10 days** of the client's hospital stay / attendance at your service or until the client is discharged. If your service operates Monday to Friday please complete the forms every second day for days on which the service is operational. The form should be completed at the end of your shift

*The purpose of the 'Client Name' box below is to avoid confusion when completing this booklet. On completion of the booklet, **please tear off this page and discard it** as it is for the nurse's information only and should be treated as confidential waste.

*Upon completion of this booklet, please **place it in the collection box** provided on the ward / day centre, etc., or if pre-arranged **give it back to the researcher**

*A comment sheet is included with this booklet for you to note any feedback you wish to provide to us

Please refer to the User Manual for details of the rating system, definitions of items and general information on the Irish Nursing Minimum Data Set

A member of the research team is available to answer any queries that you may have.
Contact details:

Client Name and Medical Record Number:

This is for the nurses use only, please to tear out this page and discard it before returning the I-NMDS booklet.

I-NMDS
Background Information

Please complete this form for your client at the beginning of the study

PATIENT DETAILS (Please complete the following patient details)

INMDS Index Number		**Ward/Unit/Service Type:** Day Hospital, Day Centre, Acute Admissions, Home Based Care	
Client Date of Birth		**Expected length of stay:** Up to 4 weeks One to six months Six months to one year More than one year	
Client Gender		**Temporary or Voluntary Admission?**	
Date of Admission		**First Admission or Readmission?**	
Reason for Admission		**Date of Discharge?**	
Medical Diagnosis (if different from above)		**Discharged to?** e.g. own home, hostel, day hospital etc	

When this booklet is completed, please place it in an envelope and place it in the data collection box marked I-NMDS or hand it to the researcher if pre-arranged

Day 5

Day of Week: (For example: Monday, Tuesday e **Date:**

Nurse Initials:

Section A: Client Problems

Please indicate, by placing a tick in the appropriate box, the degree to which the client has actually experienced the following set of problems in **the last 24 hours**.

Client Problems	Degree of Problem				
	Problem not present	Minor problem, no impact on functioning	Moderate problem, limited impact on functioning	Major problem, significant impact on functioning	Severe problem, severe impact on functioning
Physical Problems in Relations to ...	0	1	2	3	4
Physical comfort					
Physical side-effects from treatments/medications *(e.g., nausea)*					
Weakness and fatigue *(e.g., general tiredness, focal weakness)*					
Pain *(e.g., acute pain, chronic pain)*					
Nutrition *(e.g., malnourishment, unbalanced diet)*					
Elimination *(e.g., constipation, incontinence)*					
Hygiene *(e.g., problem with washing or dressing)*					
Breathing *(e.g., coughing, shortness of breath)*					
Fluid balance *(e.g., dehydration, fluid retention)*					
Sleep *(e.g., insomnia, disturbed sleep pattern)*					
Overall physical wellbeing *(e.g., overall impact of any physical difficulties)*					
Psychological Problems Related to ...	0	1	2	3	4
Anxiety or fear linked to current stressors *(e.g., restlessness, worry)*					
Longstanding anxiety *(e.g., anxiety persisting for 6 months+)*					
Mood *(e.g., low mood, elation)*					
Thought and cognition *(e.g., delusional thinking, break with reality)*					
Coping and adjustment to condition or change in circumstances *(e.g., ineffective problem solving, distancing, withdrawal)*					
Client knowledge deficit regarding illness or treatment *(e.g., lack of knowledge about condition)*					
Challenging behaviour *(e.g, aggression, inappropriate behaviour)*					
Communication *(e.g., language difficulty, problem with hearing)*					
Level of motivation *(e.g., apathy, lack of social interest)*					
Trust in others *(e.g., trust in health professionals)*					
Spiritual needs *(e.g., concern over spiritual matters)*					
Adherence to treatment or medication *(e.g., not taking medication or advice)*					
Psychological side effects of treatment or medication *(e.g., disorientation due to medication)*					
Overall psychological wellbeing *(e.g., overall impact of any psychological difficulties)*					
Social Problems Related to ...	0	1	2	3	4
Social disadvantage *(e.g., unemployment, homelessness)*					
Appropriateness of the care environment *(e.g., unsuitable environment, lack of privacy)*					
Delayed discharge *(e.g., temporary delay in discharge)*					
Level of social support from significant others *(e.g., few coping resources available from others)*					
Family (or significant other) knowledge deficit regarding illness or treatment *(e.g., family members unaware of treatment or nature of illness)*					
Family coping *(e.g., ineffective problem solving, distancing, withdrawal)*					
Independent living *(e.g., skills such as budgeting, meal preparation)*					
Social stigma *(e.g., negative self labelling, exclusion by others)*					
Social skills *(e.g., maintaining social relationships, skills of conversation)*					
Overall social wellbeing *(e.g., overall impact of any social difficulties)*					
General wellbeing *(overall impact of any difficulties on the person's wellbeing)*					

(PTO ⟶)

Section B: Nursing Interventions and Organisation / Co-ordination of Care

Please indicate, by placing a tick in the appropriate box, the degree to which the client's care has involved the following nursing interventions and organisation/co-ordination of care activities, over the **last 24 hours**,
Please rate each intervention / co-ordination task by thinking about the task complexity, skill requirement, time and resource demand associated with the client's care.

Nursing Interventions	Intervention level (e.g. task complexity, skill, time & resource demand)				
	Intervention not carried out	Minimal level of intervention	Moderate level of intervention	High level of intervention	Intensive level of intervention
Physical Nursing Interventions	0	1	2	3	4
Administering medication, fluids or blood products					
Monitoring, assessing or evaluating physical condition					
Attending to hygiene *(e.g., mouth care, assistance with self care)*					
Controlling infection					
Psychological Nursing Interventions	0	1	2	3	4
Developing and maintaining trust *(e.g., active listening, establishing rapport)*					
Encouraging adherence to treatment or interventions					
Informally monitoring, assessing or evaluating psychosocial functioning					
Structured observation *(e.g., seclusion, special observation)*					
Responding to altered thought and cognition *(e.g., reality orientation)*					
Providing informal psychological support *(e.g., reassurance, emotional comfort)*					
Managing mood *(e.g., problem solving, counselling techniques)*					
Managing anxiety *(e.g., anxiety management techniques)*					
Teaching skills and promoting health *(e.g., guidance on rehabilitation)*					
Dealing with the person's information needs *(e.g., providing information on diagnosis, information on accessing services)*					
Advocating *(e.g., engaging with other professionals on person's behalf)*					
Managing substance dependence or misuse *(e.g., relapse prevention, harm minimisation)*					
Responding to extreme situations *(e.g., conflict de-escalation, managing challenging behaviour)*					
Social Nursing Interventions	0	1	2	3	4
Supporting the family (or significant other) *(e.g., skills teaching or emotional support for family members)*					
Work in relation to social skills *(e.g., encouragement with social interactions, role playing)*					
Organisation and Co-ordination of Care Activities	0	1	2	3	4
Supporting and managing care delivery *(e.g., arranging tests, referral)*					
Facilitating external activities *(e.g., arranging weekend leave)*					
Facilitating links between the family or significant other and the multidisciplinary team *(e.g., seeking information for the family)*					
Focused discussion with other nurses *(e.g., discussing patient's condition)*					
Documenting and planning the patient's care *(e.g., writing care notes, care planning)*					
Liaising with multidisciplinary team members other than nurses *(e.g., taking part in case conferences)*					
Admitting and initial assessment of the client *(e.g., history taking, orientation to the service)*					
Planning discharge *(e.g., contacts with relatives, organising transport)*					

Please Note: Significant Events in the Past 48 Hours

Major clinical event *e.g. ECT, consultant review etc.. Please specify..*

Major other event *e.g. Assault of/by another client, absconding etc.. Please specify..*

APPENDIX G

Preliminary Findings

MISSING VALUES ANALYSIS

Table 1 Missing Values Analysis per Variable

Client Problems	*N*	*Mean*	*Std. Deviation*	*Missing*	
				Count	Percent
Physical comfort	346	.68	1.038	15	4.2
Physical side effects of treatment/ medication	354	.57	.869	7	1.9
Weakness or fatigue	354	1.00	1.087	7	1.9
Pain	356	.46	.905	5	1.4
Nutrition	358	.80	1.081	3	.8
Elimination	356	.40	.868	5	1.4
Hygiene	357	.82	1.128	4	1.1
Breathing	356	.32	.765	5	1.4
Fluid balance	358	.26	.712	3	.8
Sleep	357	1.23	1.237	4	1.1
Overall physical well-being	316	1.17	1.017	45	12.5
Anxiety - current	359	1.74	1.225	2	.6
Anxiety – long lasting	351	1.49	1.362	10	2.8
Mood	357	1.94	1.289	4	1.1
Thought and cognition	355	1.25	1.357	6	1.7
Coping and adjustment	358	1.81	1.258	3	.8
Client knowledge deficit regarding illness and/or treatment	359	1.68	1.302	2	.6
Challenging behaviour	354	.65	1.078	7	1.9
Communication	356	.47	.947	5	1.4
Motivation	360	1.70	1.217	1	.3
Trust in others	355	1.06	1.192	6	1.7
Spiritual needs	357	.30	.747	4	1.1
Adherence to treatment and/or medication	357	1.16	1.341	4	1.1
Psychological side effects of treatment or medication	358	.34	.749	3	.8
Overall psychological well being	349	1.74	1.163	12	3.3
Social disadvantage	357	1.04	1.301	4	1.1
Appropriateness of the care environment	359	.70	1.165	2	.6
Delayed discharge	342	.41	1.029	19	5.3
Level of social support	358	1.14	1.262	3	.8
Family knowledge deficit regarding illness	357	1.00	1.205	4	1.1
Family coping	357	1.34	1.287	4	1.1
Independent living	357	1.44	1.355	4	1.1
Social stigma	359	1.19	1.262	2	.6
Social skills	357	1.54	1.250	4	1.1
Overall general well-being	353	1.73	1.131	8	2.2

Table 1 Missing Values Analysis per Variable Continued.

Nursing intervention	*N*	*Mean*	*Std. Deviation*	*Missing*	
				Count	Percent
Nursing Interventions					
Administration of medication	359	1.44	1.407	2	.6
Monitoring physical condition	358	1.47	1.247	3	.8
Hygiene – attending to	353	.80	1.165	8	2.2
Responding to emergency situations	359	.61	1.100	2	.6
Controlling infection	349	.37	.840	12	3.3
Developing and maintaining trust	361	2.47	1.072	0	.0
Encouraging adherence to treatment and/or medication	359	2.31	1.144	2	.6
Informally monitoring physical condition	359	2.22	1.136	2	.6
Structured observation	351	.62	1.189	10	2.8
Altered thought and cognition	357	1.09	1.269	4	1.1
Providing informal psychological support	359	2.32	1.097	2	.6
Managing mood	361	2.08	1.238	0	.0
Managing mood	359	1.72	1.299	2	.6
Teaching skills and promoting health	359	1.97	1.179	2	.6
Dealing with the persons information needs	359	1.72	1.253	2	.6
Advocating	357	1.61	1.269	4	1.1
Managing substance dependence or misuse	355	.70	1.205	6	1.7
Supporting the family	359	1.16	1.221	2	.6
Work in relation to social skills	357	1.31	1.220	4	1.1
Supporting and managing care delivery	359	1.48	1.326	2	.6
Facilitating external activities	344	.58	1.069	17	4.7
Facilitating links between family and multidisciplinary team	356	1.18	1.299	5	1.4
Discussion with other nurses	360	2.02	1.163	0	.0
Documenting and planning care	359	2.43	1.081	2	.6
Liaising with the multidisciplinary team	357	1.87	1.346	4	1.1
Admitting and assessing	354	1.16	1.477	7	1.9
Planning discharge	348	.74	1.232	13	3.6

Table 2 Mann Whitney U Results

			Delayed discharge	Overall physical well-being
Mann-Whitney U- for independent sample- the correct test			7547.500	9676.500
Wilcoxon W- for paired samples			20588.500	17932.500
Z			-5.882	-.928
Asymp. Sig. (2-tailed)			.000	.353
	Sig.		.000(a)	.354(a)
		Lower Bound	.000	.342
		Upper Bound	.000	.366
	Sig.		.000(a)	.180(a)
		Lower Bound	.000	.170
		Upper Bound	.000	.189

Table 3a Problems Percentage and Frequency Scores Per Variable

	Rank	Valid % (level of problem)				
Problem Category	**Variable**	Not present	Minor	Moderate	Major	Severe
Physical	Fluid balance	84.9	8.1	3.9	2.2	0.8
Psychological	Spiritual needs	82.1	10.6	3.9	2.2	1.1
Social	Delayed discharge	81.9	7.9	2	3.5	4.7
Physical	Breathing	80.6	11	4.8	2.8	0.8
Physical	Elimination	77.5	11.2	6.2	3.7	1.4
Psychological	Psychological side effects of treatment or medication	77.4	15.4	4.2	2	1.1
Psychological	Communication	75	11.8	7	3.9	2.2
Physical	Pain	74.2	12.1	9	3.1	1.7
Social	Appropriateness of the care environment	66.6	12.5	10.3	5.6	5
Psychological	Challenging behaviour	66.1	14.4	11.9	3.7	4
Physical	Physical comfort	63.6	15	13.3	6.4	1.7
Physical	Physical side effects of treatment / medications	63.3	20.3	12.7	3.1	0.6
Physical	Hygiene	57.7	16	16.5	6.4	3.4
Physical	Nutrition	55.9	20.4	13.4	8.4	2
Social	Social disadvantage	52.1	15.1	17.4	7.8	7.6
Social	Family knowledge deficit illness or treatment	48.9	20.2	18.5	6.7	5.6
Psychological	Adherence to treatment or medication	47.3	16.8	16.5	11.2	8.1
Psychological	Thought and cognition	45.6	13.2	19.4	14.1	7.6
Social	Level of social support from significant others	45.5	17.3	20.9	10.3	5.9
Psychological	Trust in others	44.5	23.7	18.9	7.6	5.4
Physical	Weakness and fatigue	44.4	24.6	19.8	9.6	1.7
Social	Social Stigma	41.6	22.6	15.9	14.8	5
Physical	Sleep disturbance	39.6	21.1	21.6	12.6	5.1
Social	Independent Living	35.3	19.6	20.2	15.4	9.5
Psychological	Longstanding anxiety	34.6	18.6	19.7	18	9.1
Social	Family coping	34.2	26.3	19.6	11.2	8.7
Physical	Overall Physical well-being	31	32.9	26.3	7.9	1.9
Social	Social skills	26.4	24.2	26.7	14.6	8.1
Psychological	Client knowledge deficit regarding illness or treatment	24.2	22	26.7	15.9	11.1
Social	Overall social wellbeing	21.5	26.6	27.7	17.5	6.8
Psychological	Level of motivation	20.3	24	30.1	17	8.6
Psychological	Anxiety or fear linked to current stressors	19.8	23.5	28.8	19.6	8.4
Psychological	Coping and adjustment	19.3	21.8	28.3	20.2	10.4
Psychological	Mood	19.1	17.1	26.1	25.8	11.8
Psychological	Overall psych well being	18.7	22.7	29.3	24.4	4.9
Social	General well-being	15.6	28.1	30.7	19.3	6.3

Table 3b Interventions Percentage and Frequency Scores per Variable

	Rank	Valid % (level of intervention)				
Intervention Category	**Variable**	Not carried out	Minimal	Moderate	High	Intensive
Physical	Controlling infection	79.4	10	6.3	2.9	1.4
Psychological	Structured observation	73.8	7.7	6.6	6.6	5.4
Co/Org of Care	Facilitating external activities	70.1	14	8.1	3.5	4.4
Physical	Responding to extreme situations	69.6	12.8	8.4	5	4.2
Psychological	Managing substance dependence or misuse	67.6	12.7	7	7	5.6
Co/Org of Care	Planning discharge	67.2	10.6	8.3	8.3	5.5
Physical	Attending to hygiene	58.9	17.6	12.2	6.8	4.5
Co/Org of Care	Admitting and initial assessment of the patient	54.8	9.9	10.7	13.3	11.3
Psychological	Responding to altered thought and cognition	46.8	20.7	15.4	10.9	6.2
Co/Org of Care	Facilitating links between family or sig other & MDT	44.1	18.5	19.9	9.8	7.6
Social	Supporting the family	40.7	23.4	20.3	10	5.6
Physical	Administering medication	40.1	12.8	19.8	17.8	9.5
Social	Work in relation to social skills	35.1	22.2	25.6	11.5	5.6
Co/Org of Care	Supporting and managing care delivery	33.1	19.2	23.4	15.3	8.9
Physical	Monitoring, assessing & evaluating physical condition	26.3	31.3	19.8	14.5	8.1
Psychological	Advocating	26.1	20.4	29.1	15.4	9
Psychological	Managing Anxiety	24.6	18.2	27.9	19.6	9.8
Co/Org of Care	Liaising with multidisciplinary team members other than nurses	21.8	18.5	23.5	22.7	13.4
Psychological	Dealing with the person's information needs	19.8	26.5	25.3	18.4	10
Psychological	Managing mood	13.3	19.2	28.1	25.8	13.6
Psychological	Teaching skills & promoting health	12.3	22.9	31.6	22.1	11.2
Co/Org of Care	Focused discussion with other nurses	10	23.6	33.1	20.6	12.8
Psychological	Informally monitoring or evaluating psychological functioning	7	20.1	31.8	26.5	14.5
Psychological	Encouraging adherence to treatment or interventions	6.7	17.8	30.1	28.7	16.7
Psychological	Providing informal psychological support	5.3	18.4	29.9	31.8	14.5
Co/Org of Care	Documenting & planning the patient's care	4.5	15.4	29.9	33	17.3
Psychological	Developing & maintaining trust	4.2	15	28.6	35	17.2

Table 3c Problems Percentage & Frequency Scores per Variable Acute Inpatient Unit

	Rank		Valid % (level of problem)			
Problem Category	Variable	Not present	Minor	Moderate	Major	Severe
Physical	Fluid balance	79.2	10.7	5.7	3.1	1.3
Physical	Breathing	77.8	13.9	5.7	1.9	0.6
Psychological	Spiritual needs	77.8	12.7	4.4	2.5	2.5
Physical	Elimination	74.7	14.5	5.7	3.8	1.9
Psychological	Communication	70.7	15.9	7.6	2.5	3.2
Psychological	Psychological side effects of treatment or medication	70.4	20.1	6.3	1.9	1.3
Physical	Pain	69.6	14.6	8.9	3.2	3.8
Social	Delayed discharge	67.3	12.8	2.6	7.7	9.6
Physical	Physical side effects of treatment / medications	61.4	22.8	13.3	1.9	0.6
Physical	Physical comfort	59.7	17.5	11	9.1	2.6
Physical	Hygiene	57.6	14.6	15.2	8.2	4.4
Psychological	Challenging behaviour	57.1	14.7	17.9	4.5	5.8
Physical	Nutrition	56.3	21.3	11.9	8.8	1.9
Social	Appropriateness of the care environment	50.9	17	15.1	8.2	8.8
Social	Family knowledge deficit illness or treatment	48.1	17.5	20.6	7.5	6.3
Psychological	Adherence to treatment or medication	46.5	15.1	16.4	12.6	9.4
Physical	Weakness and fatigue	43.9	25.2	20.6	9	1.3
Social	Level of social support from significant others	43.4	11.9	25.2	11.9	7.5
Physical	Sleep disturbance	41.5	18.9	23.9	11.3	4.4
Social	Social disadvantage	40.3	17.6	20.8	10.7	10.7
Social	Social Stigma	38.4	20.8	15.1	19.5	6.3
Psychological	Thought and cognition	37.4	9.7	24.5	18.7	9.7
Psychological	Trust in others	34.4	24.2	22.3	10.2	8.9
Physical	Overall physical well-being	33.6	31.4	24.8	8.8	1.5
Social	Independent Living	27.8	17.1	22.8	19.6	12.7
Psychological	Client knowledge deficit regarding illness or treatment	26.3	18.1	23.1	18.8	13.8
Social	Family coping	26.3	28.1	18.8	15	11.9
Psychological	Longstanding anxiety	25.7	21.1	23.7	23.7	5.9
Social	Social skills	24.8	21.7	24.2	20.4	8.9
Social	Overall social well-being	22.3	18.5	24.8	25.5	8.9
Psychological	Level of motivation	18.2	22	31.4	17.6	10.7
Psychological	Overall psychological well-being	16.4	22.4	30.3	25	5.9

	Rank	Valid % (level of problem)				
Problem Category	**Variable**	Not present	Minor	Moderate	Major	Severe
Psychological	Coping and adjustment	15.8	22.8	24.7	25.3	11.4
Psychological	Anxiety or fear linked to current stressors	13.8	23.9	37.1	20.8	4.4
	General well-being	13.6	23.4	26.6	28.6	7.8
Psychological	Mood	11.5	11.5	31.2	33.8	12.1

Table 3d Problems Percentage & Frequency Scores per Variable Community Mental Health

	Rank	Valid % (level of problem)				
Intervention Category	**Variable**	Not present	Minor	Moderate	Major	Severe
Social	Delayed discharge	94.1	3.8	1.6	0	0.5
Physical	Fluid balance	89.4	6	2.5	1.5	0.5
Psychological	Spiritual needs	85.4	9	3.5	2	0
Psychological	Psychological side effects of treatment or medication	82.9	11.6	2.5	2	1
Physical	Breathing	82.8	8.6	4	3.5	1
Physical	Elimination	80.2	8.6	6.6	3.6	1
Social	Appropriateness of the care environment	79	9	6.5	3.5	2
Psychological	Communication	78.4	8.5	6.5	5	1.5
Physical	Pain	77.8	10.1	9.1	3	0
Psychological	Challenging behaviour	73.2	14.1	7.1	3	2.5
Physical	Physical comfort	66.7	13	15.1	4.2	1
Physical	Physical side effects of treatment / medications	64.8	18.4	12.2	4.1	0.5
Social	Social disadvantage	61.6	13.1	14.6	5.6	5.1
Physical	Hygiene	57.8	17.1	17.6	5	2.5
Physical	Nutrition	55.6	19.7	14.6	8.1	2
Psychological	Trust in others	52.5	23.2	16.2	5.6	2.5
Psychological	Thought and cognition	52	16	15.5	10.5	6
Social	Family knowledge deficit illness or treatment	49.5	22.4	16.8	6.1	5.1
Psychological	Adherence to treatment or medication	48	18.2	16.7	10.1	7.1
Social	Level of social support from significant others	47.2	21.6	17.6	9	4.5
Physical	Weakness and fatigue	44.7	24.1	19.1	10.1	2
Psychological	Longstanding anxiety	44.4	16.7	16.7	13.6	11.6
Social	Independent Living	41.2	21.6	18.1	12.1	7
Social	Family coping	40.6	24.9	20.3	8.1	6.1
Physical	Sleep disturbance	38.1	22.8	19.8	13.7	5.6
Physical	Overall physical well-being	29.1	34.1	27.4	7.3	2.2
Social	Social skills	27.6	26.1	28.6	10.1	7.5
Psychological	Mood	25.1	21.6	22.1	19.6	11.6
Psychological	Anxiety or fear linked to current stressors	24.6	23.1	22.1	18.6	11.6
Social	Social Stigma	24.2	24.1	16.6	11.1	4
Psychological	Client knowledge deficit regarding illness or treatment	22.6	25.1	29.6	13.6	9
Psychological	Coping and adjustment	22.1	21.1	31.2	16.1	9.5
Psychological	Level of motivation	22	25.5	29	16.5	7
Social	Overall social well-being	20.8	33	29.9	11.2	5.1
Psychological	Overall psychological well-being	20.4	23	28.6	24	4.1
	General well-being	17.2	31.8	33.8	12.1	5.1

Table 3e Interventions Percentage & Frequency Scores per Variable Acute Inpatient Units

	Rank	Valid % (level of intervention)				
Problem Category	**Variable**	Not carried out	Minimal	Moderate	High	Intensive
Physical	Controlling infection	66.3	17.1	12	5.1	2.5
Psychological	Managing substance dependence or misuse	66	13.8	5	7.5	7.5
Psychological	Structured observation	59.9	12.1	10.2	8.3	9.6
Physical	Responding to extreme situations	56.9	16.9	12.5	7.5	6.3
Co/Org of Care	Planning discharge	56.1	15.9	11.5	9.6	8.9
Co/Org of Care	Facilitating external activities	55.8	21.4	11.7	3.9	7.1
Co/Org of Care	Admitting and initial assessment of the patient	49.7	12.6	12.6	11.3	13.8
Physical	Attending to hygiene	44.9	22.4	16	9	7.7
Social	Work in relation to social skills	38	18.4	25.3	13.9	4.4
Co/Org of Care	Facilitating links between the family or significant other and multidisciplinary team	37.3	24.1	20.9	9.5	8.2
Psychological	Responding to altered thought and cognition	37.1	22.6	18.2	12.6	9.4
Co/Org of Care	Supporting and managing care delivery	33.1	14.4	21.3	20.6	10.6
Social	Supporting the family	31.3	28.1	25	11.3	4.4
Psychological	Advocating	28.5	14.6	32.3	15.2	9.5
Psychological	Managing Anxiety	22.8	18.4	32.9	16.5	9.5
Psychological	Dealing with the person's information needs	22	28	21.4	16.4	11.9
Psychological	Teaching skills & promoting health	17.1	24.7	27.2	20.9	10.1
Physical	Monitoring, assessing and evaluating physical condition	17	28.9	19.5	20.1	14.5
Physical	Administering medication	16.3	16.3	23.8	25.6	18.1
Psychological	Managing mood	13.8	16.9	26.9	26.9	15.6
Co/Org of Care	Liaising with multidisciplinary team members other than nurses	13.3	19.6	23.4	25.3	18.4
Psychological	Encouraging adherence to treatment or interventions	7.5	15.1	25.8	30.8	20.8
Psychological	Informally monitoring or evaluating psychological functioning	6.3	19.5	33.3	24.5	16.4
Psychological	Providing informal psychological support	6.3	17.7	29.7	33.5	12.7
Co/Org of Care	Focused discussion with other nurses	6.3	21.9	33.1	22.5	16.3
Co/Org of Care	Documenting & planning the patient's care	4.4	12.6	26.4	35.8	20.8
Psychological	Developing & maintaining trust	1.9	11.9	28.8	36.9	20.6

Table 3f Interventions Percentage & Frequency Scores per Variable Community Mental Health

	Rank	Valid % (level of intervention)				
Intervention Category	**Variable**	Not carried out	Minimal	Moderate	High	Intensive
Physical	Controlling infection	92.7	4.2	1.6	1	0.5
Psychological	Structured observation	85.1	4.1	3.6	5.2	2.1
Co/Org of Care	Facilitating external activities	81.6	7.9	5.3	3.2	2.1
Physical	Responding to extreme situations	79.9	9.5	5	3	2.5
Co/Org of Care	Planning discharge	76.4	6.3	5.8	8.9	2.6
Physical	Attending to hygiene	70.1	13.7	9.1	5.1	2
Psychological	Managing substance dependence or misuse	68.9	11.7	8.7	6.6	4.1
Physical	Administering medication	59.3	10.1	16.6	11.6	2.5
Co/Org of Care	Admitting and initial assessment of the patient	59	7.7	9.2	14.9	9.2
Psychological	Responding to altered thought and cognition	54.5	19.2	13.1	9.6	3.5
Co/Org of Care	Facilitating links between the family or significant other and multidisciplinary team	49.5	14.1	19.2	10.1	7.1
Social	Supporting the family	48.2	19.6	16.6	9	6.5
Physical	Monitoring, assessing and evaluating physical condition	33.7	33.2	20.1	10.1	3
Co/Org of Care	Supporting and managing care delivery	33.2	23.1	25.1	11.1	7.5
Social	Work in relation to social skills	32.8	25.3	25.8	9.6	6.6
Co/Org of Care	Liaising with team members other than nurses	28.6	17.6	23.6	20.6	9.5
Psychological	Managing Anxiety	26	18	24	22	10
Psychological	Advocating	24.1	25.1	26.6	15.6	8.5
Psychological	Dealing with the person's information needs	18.5	25	28.5	20	8.5
Psychological	Managing mood	13	21	29	25	12
Co/Org of Care	Focused discussion with other nurses	13	25	33	19	10
Psychological	Teaching skills & promoting health	8.5	21.5	35	23	12
Psychological	Informally monitoring or evaluating psychological functioning	7.5	20.6	30.7	28.1	13.1
Psychological	Developing & maintaining trust	6	17.5	28.5	33.5	14.5
Psychological	Encouraging adherence to treatment or interventions	6	20	33.5	27	13.5
Psychological	Providing informal psychological support	4.5	19	30	30.5	16
Co/Org of Care	Documenting & planning the patient's care	4.5	17.6	32.7	30.7	14.6

Table 4 Skewness and Kurtosis Statistics for Physical Problems

	Overall Physical well-being	Physical comfort	treatment / medications	Weakness and fatigue	Pain	Nutrition	Elimination	Hygiene	Breathing	Fluid balance	Sleep disturbance
Skewness	.550	1.399	1.44	.778	2.08	1.178	2.34	1.20	2.68	3.139	.611
Std. Error of Skewness	.137	.131	.130	.130	.129	.129	.129	.129	.129	.129	.129
Kurtosis	-.342	.940	1.37	-.42	3.79	.347	4.977	.429	7.07	10.04	-.758
Std. Error of Kurtosis	.273	.261	.259	.259	.258	.257	.258	.257	.258	.257	.257

Table 5 Skewness and Kurtosis Statistics for Psychological Problems

	Anxiety or fear linked to current stressors	Longstanding anxiety	Mood	Thought and cognition	coping and adjustment	Client knowledge deficit regarding illness or treatment	Challenging behaviour	Communication	Level of motivation	Trust in others	Spiritual needs	treatment or medication	Psychological side effects of treatment or medication	Overall psychological well-being
S	.144	.372	-.096	.620	.100	.257	1.673	2.167	.199	.928	2.95	.803	2.685	-.021
Std. Error of S	.129	.130	.129	.129	.129	.129	.130	.129	.129	.129	.129	.129	.129	.131
K	-.930	-1.16	-1.08	-.96	-.99	-1.001	1.964	4.013	-.860	-.090	8.99	-.655	7.775	-.977
Std. Error of K	.257	.260	.257	.258	.257	.257	.259	.258	.256	.258	.257	.257	.257	.260

Table 6 Skewness and Kurtosis Statistics for Social Problems

	Social disadvantage	Appropriateness of the care environment	Delayed discharge	Level of social support from significant others	Family knowledge deficit illness or treatment	Family coping	Independent Living	Social Stigma	Social skills	Overall social well-being	General well-being
Skewness	.979	1.586	2.608	.758	1.002	.650	.459	.684	.352	.249	.158
Std. Error of Skewness	.129	.129	.132	.129	.129	.129	.129	.129	.129	.129	.130
Kurtosis	-.266	1.393	5.65	-.585	.006	-.669	-1.051	-.770	-.875	-.860	-.751
Std. Error of Kurtosis	.257	.257	.263	.257	.257	.257	.257	.257	.257	.258	.259

Table 7 Skewness and Kurtosis Statistics for Physical Interventions

	Administering medication	Monitoring, assessing and evaluating Physical condition	Attending to hygiene	Responding to extreme situations	Controlling infection
Skewness	.401	.519	1.341	1.800	2.497
Std. Error of Skewness	.129	.129	.130	.129	.131
Kurtosis	-1.232	-.759	.744	2.225	5.877
Std. Error of Kurtosis	.257	.257	.259	.257	.260

Table 8 Skewness and Kurtosis Statistics for Psychological and Social Interventions

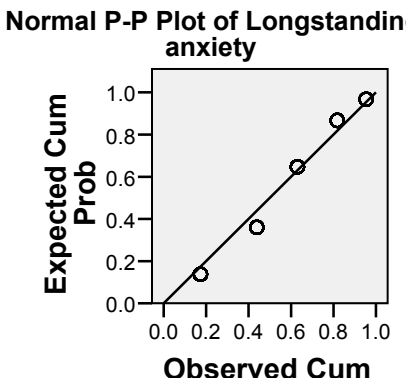
	Developing and maintaining trust	Encouraging adherence to treatment or interventions	Informally monitoring or evaluating psych functioning	Structured observation	Responding to altered thought and cognition	Providing informal psychological support	Managing mood	Managing Anxiety	Teaching skills and promoting health	Dealing with the person's information needs	Advocating	Managing substance dependence or misuse	Supporting the family	Work in relation to social skills
Skewness	-.36	-.22	-.12	1.78	.885	-.23	-.13	.123	.013	.233	.262	1.61	.758	.531
Std. Error of Skewness	.128	.129	.129	.130	.129	.129	.128	.129	.129	.129	.129	.129	.129	.129
Kurtosis	-.53	-.73	-.75	1.83	-.41	-.67	-.94	-1.1	-.81	-.95	-.94	1.32	-.46	-.73
Std. Error of Kurtosis	.256	.257	.257	.260	.257	.257	.256	.257	.257	.257	.257	.258	.257	.257

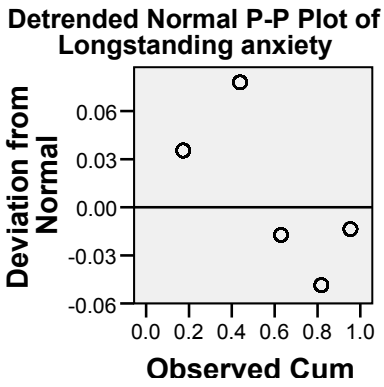
Table 9 Skewness and Kurtosis Statistics for Coordination/Organisation of Care Activities

	Supporting and managing care delivery	Facilitating external activities	and multidisciplinary team	Focused discussion with other nurses	Documenting and planning the patient's care	multidisciplinary team members other than nurses	Admitting and initial assessment of the patient	Planning discharge
Skewness	.398	1.935	.766	.058	-.310	.023	.813	1.480
Std. Error of Skewness	.129	.131	.129	.128	.129	.129	.130	.131
Kurtosis	-1.032	2.892	-.589	-.761	-.564	-1.190	-.911	.843
Std. Error of Kurtosis	.257	.262	.258	.256	.257	.257	.259	.261

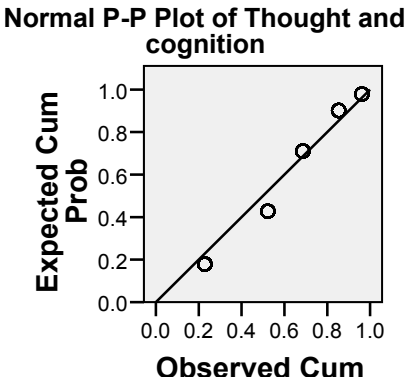
P-Plots and Detrended P-Plots

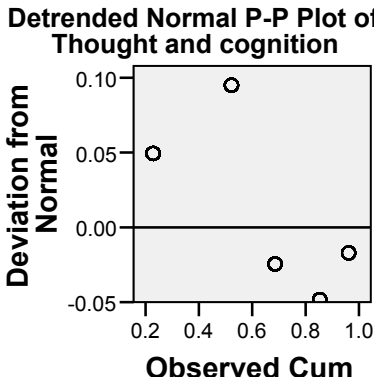
Longstanding anxiety



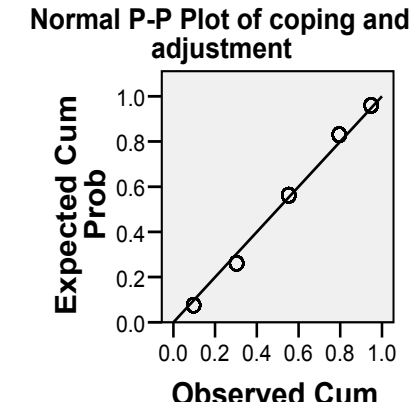


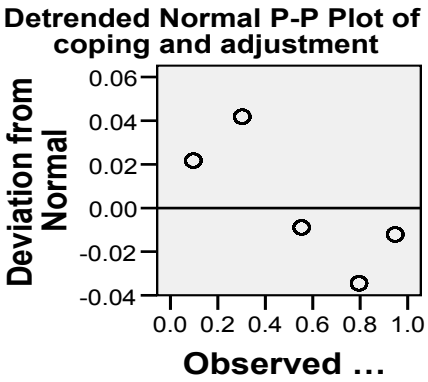
Thought and cognition



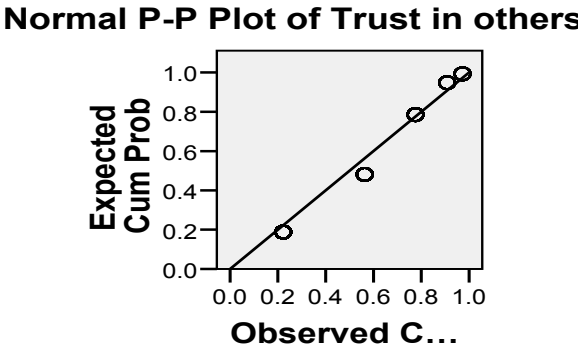


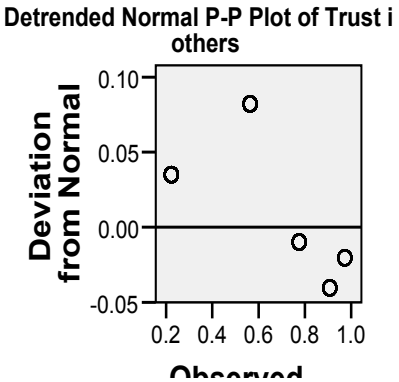
Coping and adjustment



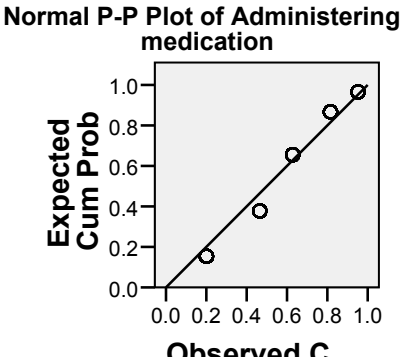


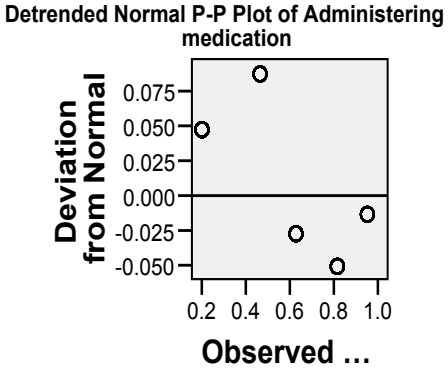
Trust in others



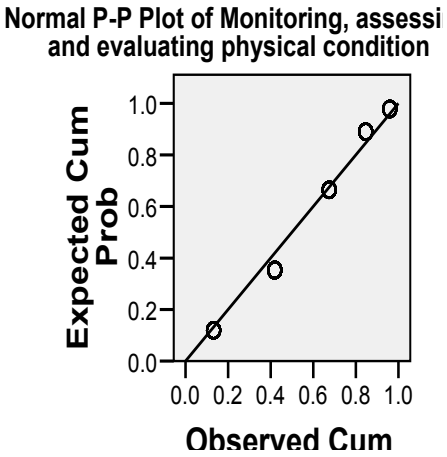


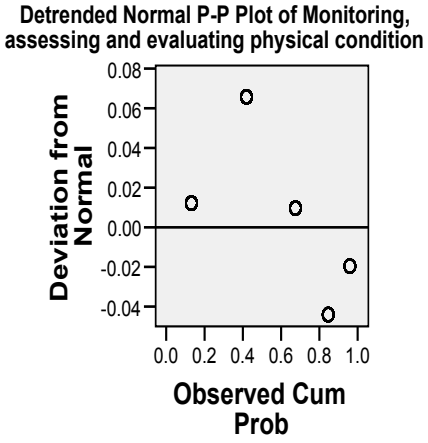
Administering medication



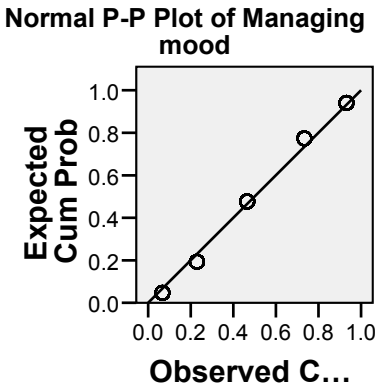


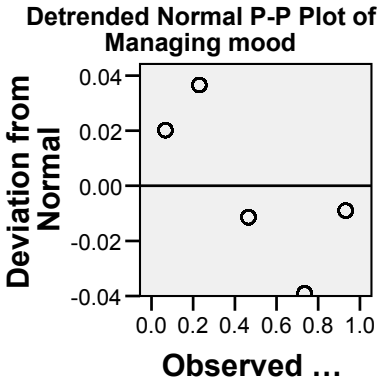
Monitoring, assessing and evaluating Physical condition



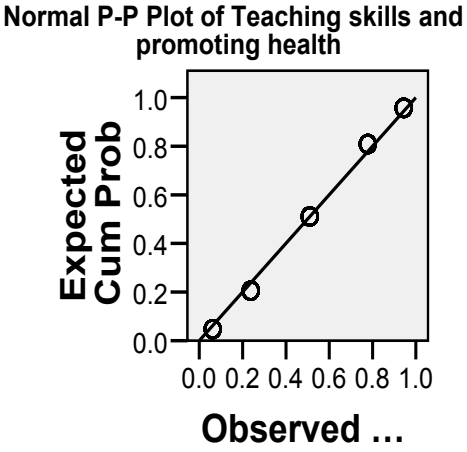


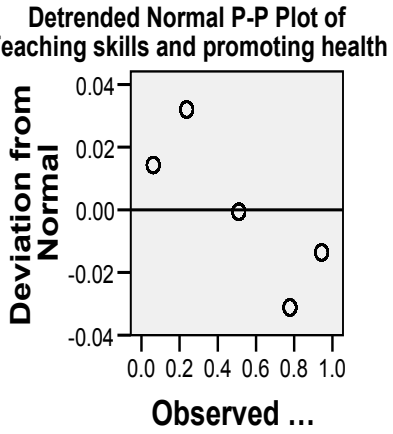
Managing mood





Teaching skills and promoting health

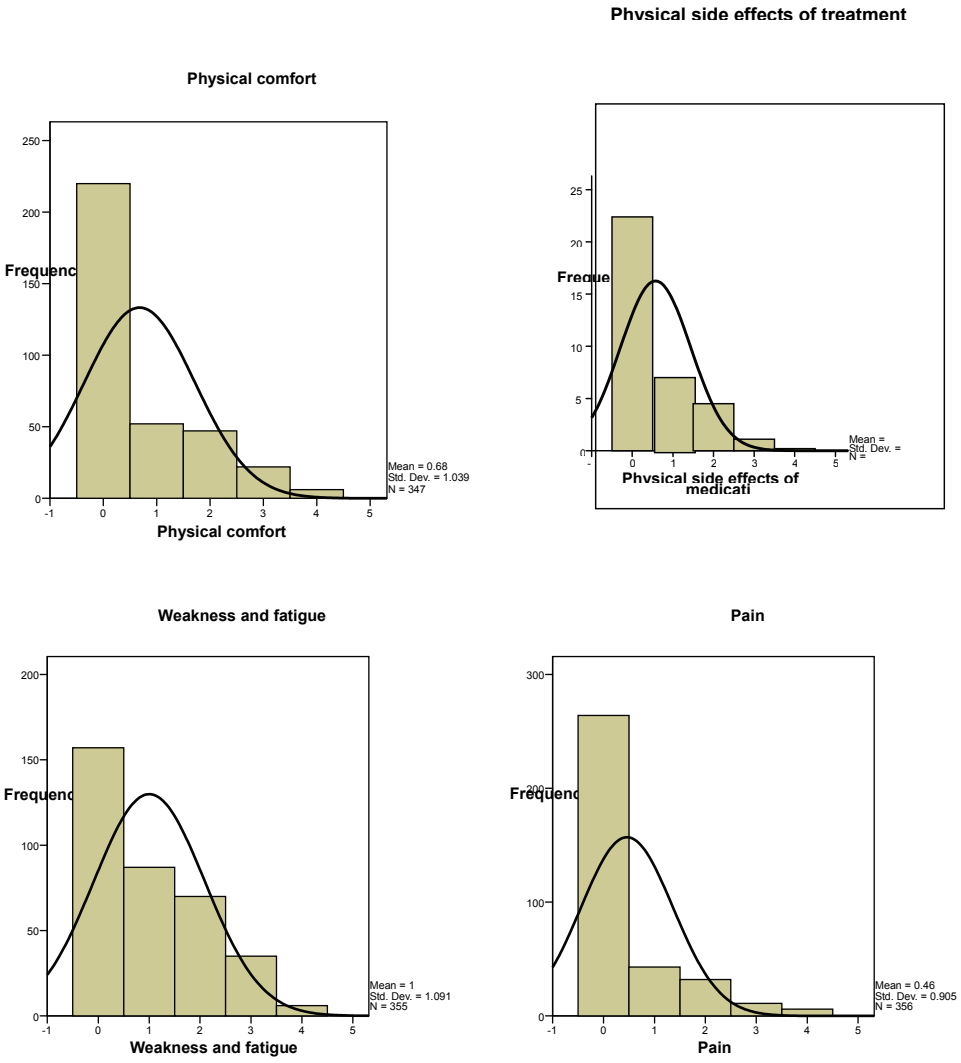


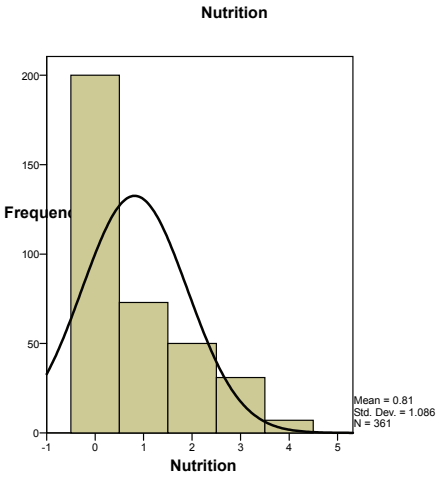


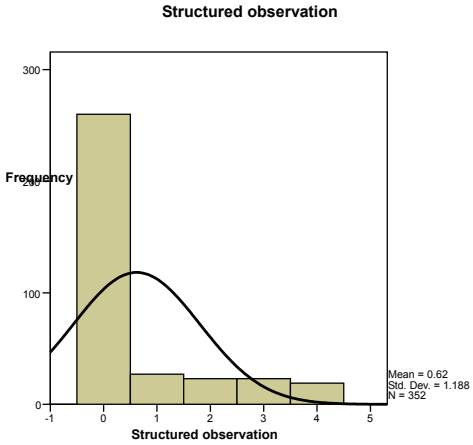
A Detailed Overview of the Process of Transformation of Skewed Variables

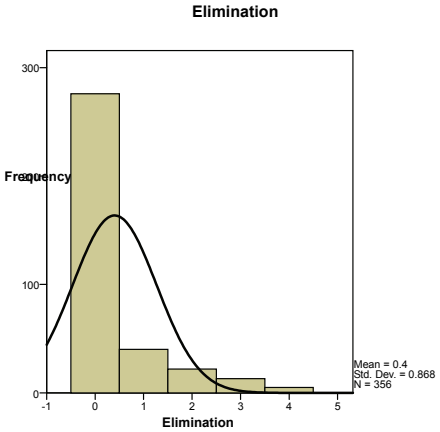
Examination of the skewness for the Day 1 variables, using histograms, indicated skewness in a positive direction. The histograms for the variables on Day 1 are outlined below.

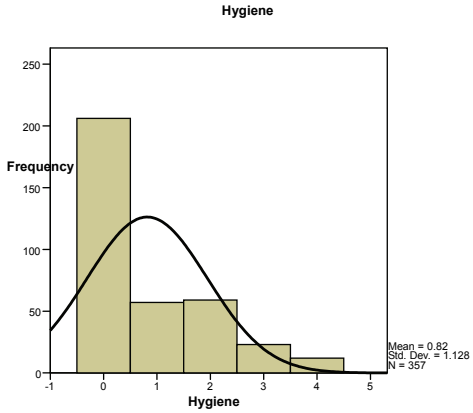
Histograms

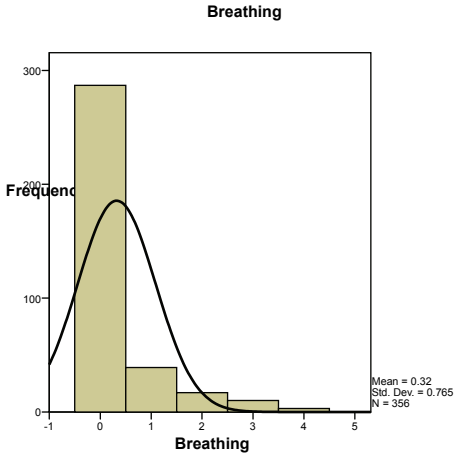


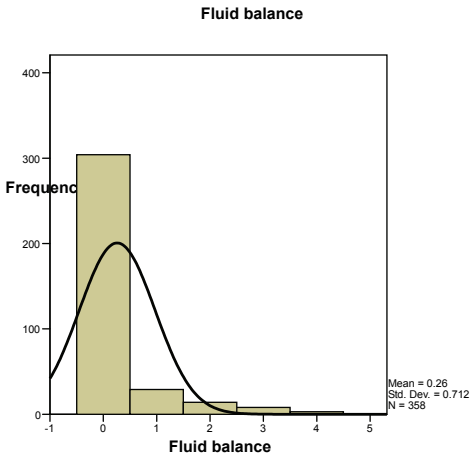

Nutrition
Frequenc
200
150
100
50
0
-1
0
1
2
3
4
5
Nutrition
Mean = 0.81
Std. Dev. = 1.086
N = 361

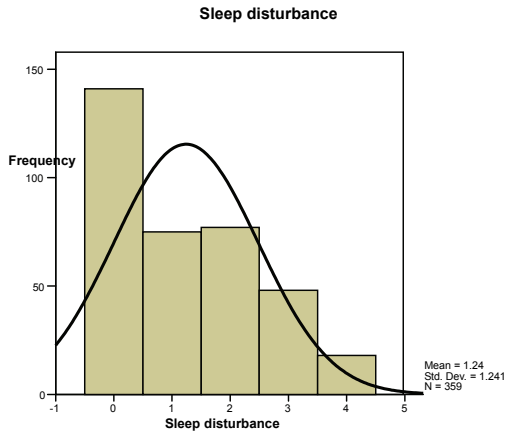

Structured observation
Frequency
300
100
0
-1
0
1
2
3
4
5
Structured observation
Mean = 0.62
Std. Dev. = 1.188
N = 352

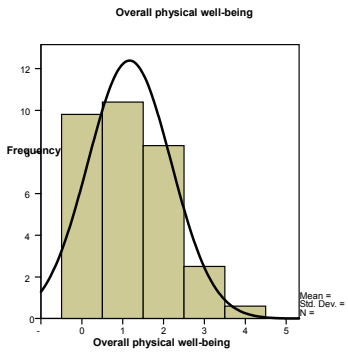

Elimination
Frequency
300
100
0
-1
0
1
2
3
4
5
Elimination
Mean = 0.4
Std. Dev. = 0.868
N = 356

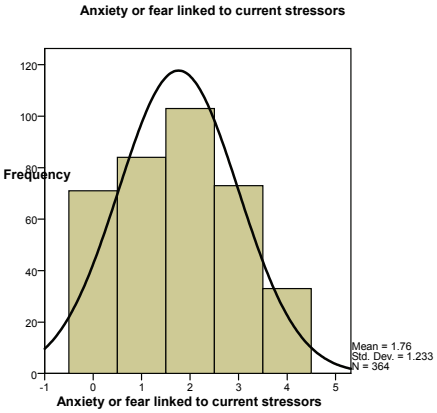

Hygiene
Frequency
250
200
150
100
50
0
-1
0
1
2
3
4
5
Hygiene
Mean = 0.82
Std. Dev. = 1.128
N = 357

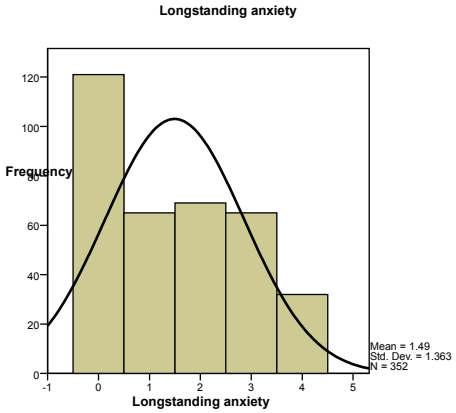

Breathing
Frequenc
300
200
100
0
-1
0
1
2
3
4
5
Breathing
Mean = 0.32
Std. Dev. = 0.765
N = 356

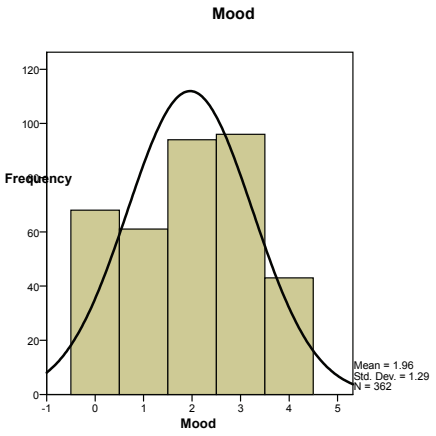

Fluid balance
Frequenc
Mean = 0.26
Std. Dev. = 0.712
N = 358
Fluid balance

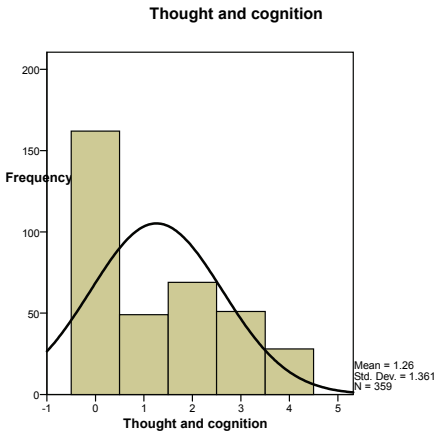

Sleep disturbance
Frequency
Mean = 1.24
Std. Dev. = 1.241
N = 359
Sleep disturbance

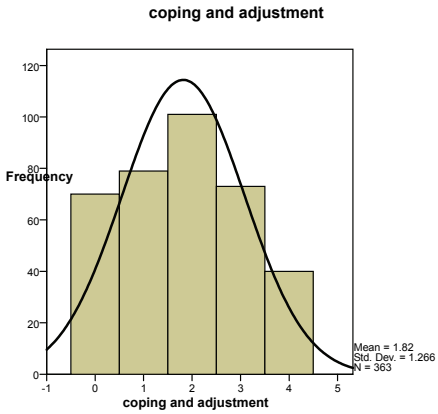

Overall physical well-being
Frequency
Overall physical well-being

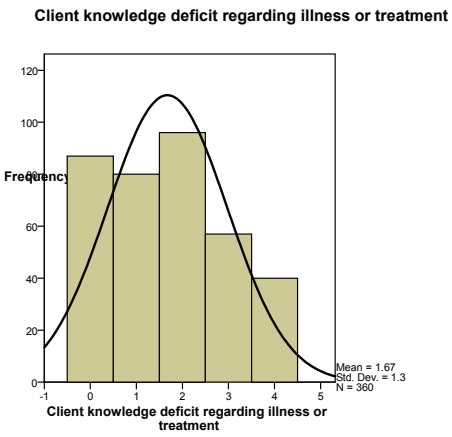

Anxiety or fear linked to current stressors
Frequency
Mean = 1.76
Std. Dev. = 1.233
N = 364
Anxiety or fear linked to current stressors

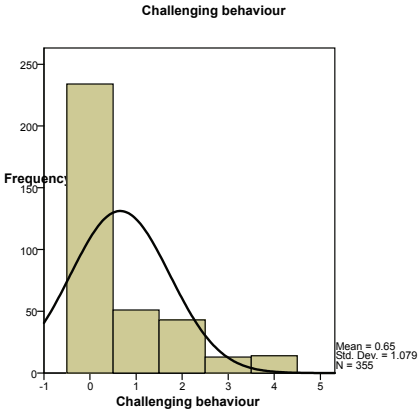

Longstanding anxiety
Frequency
Mean = 1.49
Std. Dev. = 1.363
N = 352
Longstanding anxiety

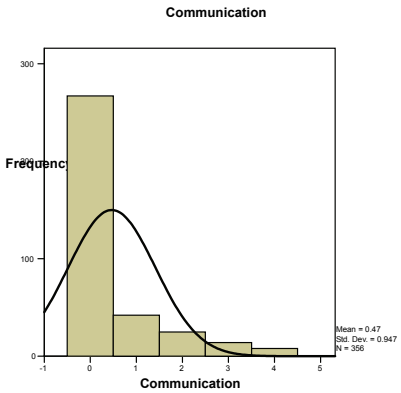

Mood
Frequency
Mean = 1.96
Std. Dev. = 1.29
N = 362
Mood

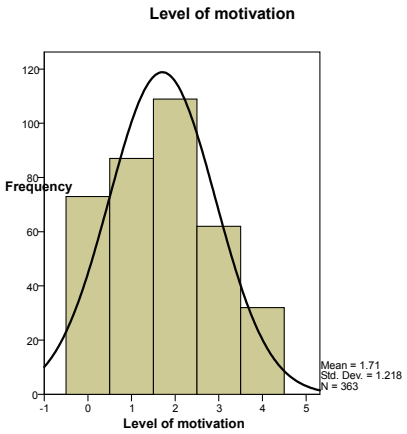

Thought and cognition
Frequency
Mean = 1.26
Std. Dev. = 1.361
N = 359
Thought and cognition

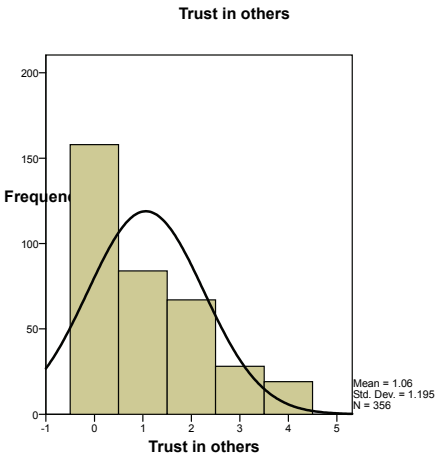

coping and adjustment
Frequency
Mean = 1.82
Std. Dev. = 1.266
N = 363
coping and adjustment

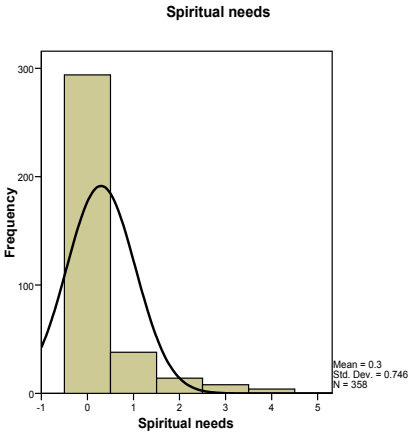

Client knowledge deficit regarding illness or treatment
Mean = 1.67
Std. Dev. = 1.3
N = 360
Client knowledge deficit regarding illness or treatment

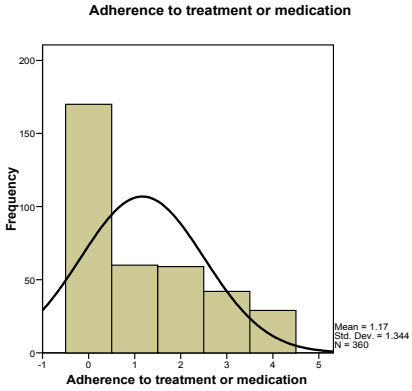

Challenging behaviour
Frequency
Mean = 0.65
Std. Dev. = 1.079
N = 355
Challenging behaviour

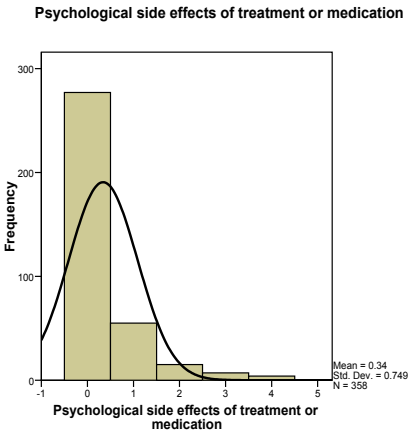

Communication
Mean = 0.47
Std. Dev. = 0.947
N = 356
Communication

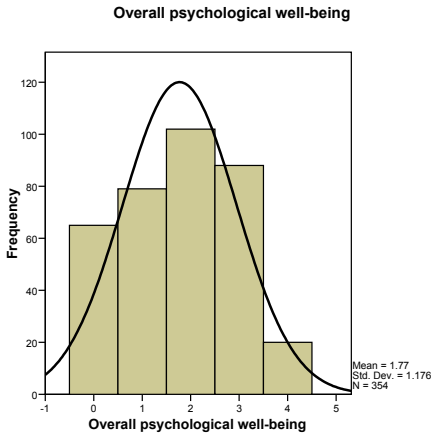

Level of motivation
Frequency
Mean = 1.71
Std. Dev. = 1.218
N = 363
Level of motivation

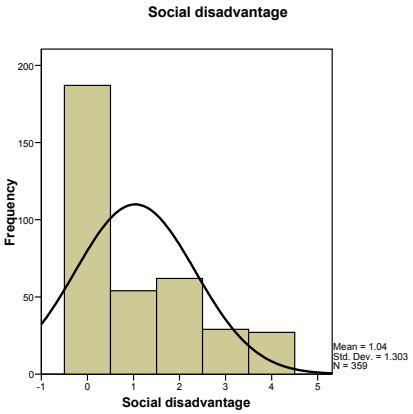

Trust in others
Mean = 1.06
Std. Dev. = 1.195
N = 356
Trust in others

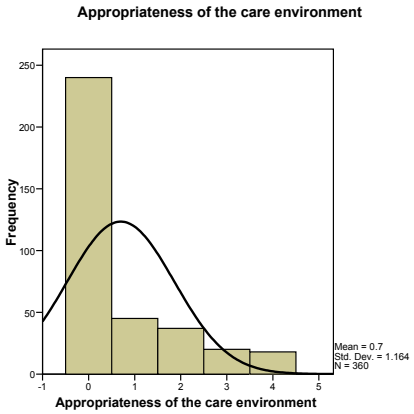

Spiritual needs
Frequency
Mean = 0.3
Std. Dev. = 0.746
N = 358
Spiritual needs

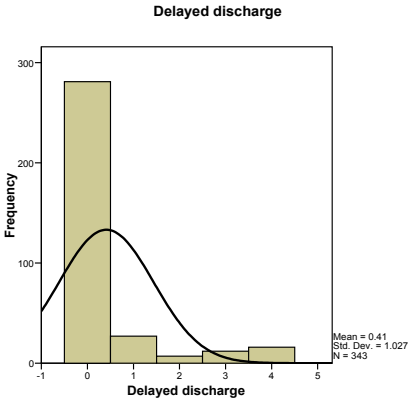

Adherence to treatment or medication
Frequency
Mean = 1.17
Std. Dev. = 1.344
N = 360
Adherence to treatment or medication

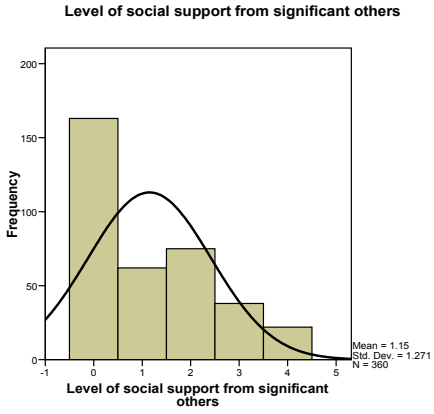

Psychological side effects of treatment or medication
Frequency
Mean = 0.34
Std. Dev. = 0.749
N = 358
Psychological side effects of treatment or medication

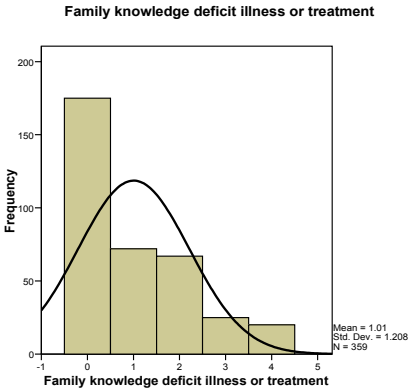

Overall psychological well-being
Frequency
Mean = 1.77
Std. Dev. = 1.176
N = 354
Overall psychological well-being

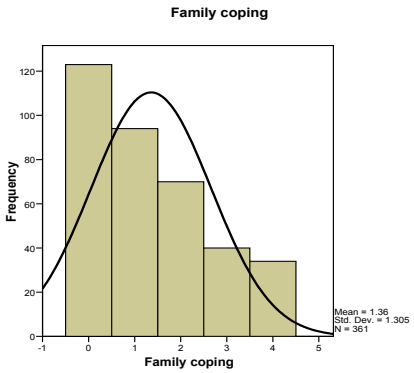

Social disadvantage
Frequency
Mean = 1.04
Std. Dev. = 1.303
N = 359
Social disadvantage


Appropriateness of the care environment
Frequency
Mean = 0.7
Std. Dev. = 1.164
N = 360
Appropriateness of the care environment

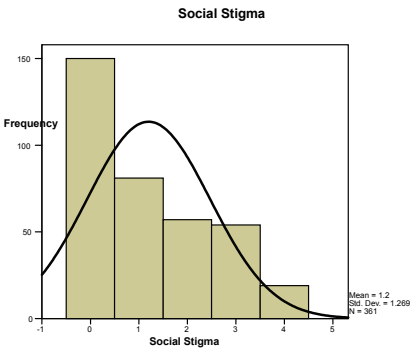

Delayed discharge
Frequency
Mean = 0.41
Std. Dev. = 1.027
N = 343
Delayed discharge

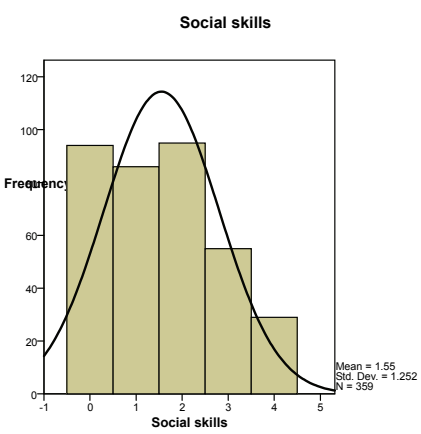

Level of social support from significant others
Frequency
Mean = 1.15
Std. Dev. = 1.271
N = 360
Level of social support from significant others

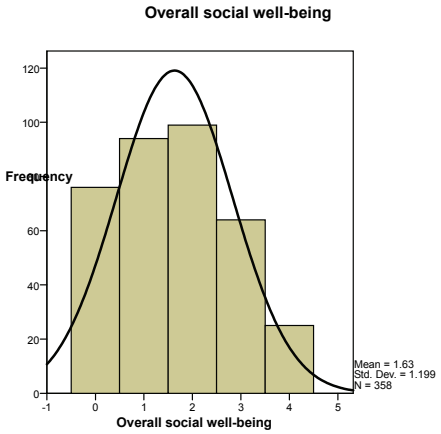

Family knowledge deficit illness or treatment
Frequency
Mean = 1.01
Std. Dev. = 1.208
N = 359
Family knowledge deficit illness or treatment

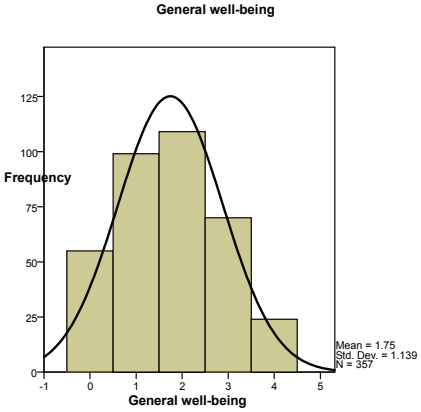

Family coping
Frequency
Mean = 1.36
Std. Dev. = 1.305
N = 361
Family coping

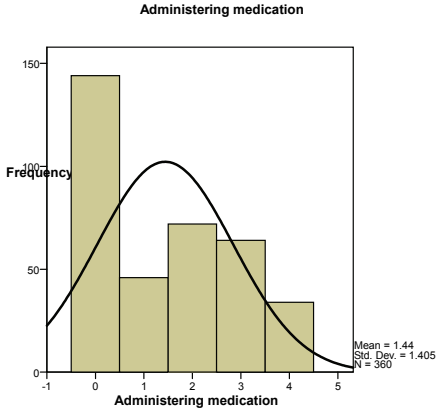

Independent Living
Frequency
Mean = 1.45
Std. Dev. = 1.357
N = 359
Independent Living

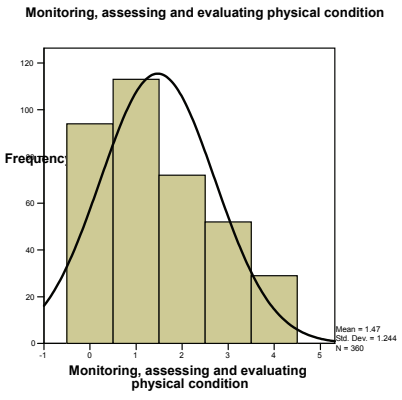

Social Stigma
Frequency
Mean = 1.2
Std. Dev. = 1.269
N = 361
Social Stigma

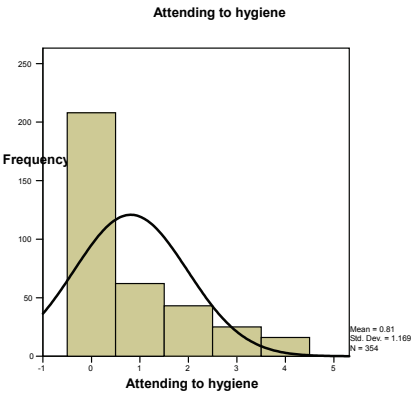

Social skills
Frequency
Mean = 1.55
Std. Dev. = 1.252
N = 359
Social skills

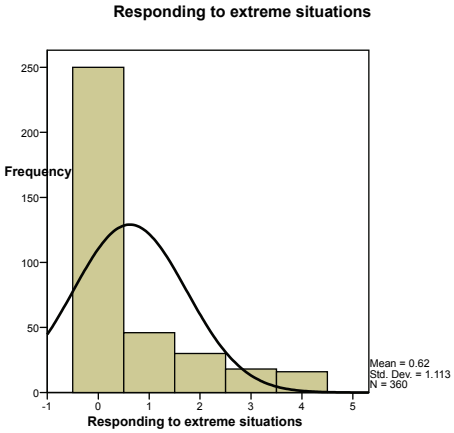

Overall social well-being
Frequency
Mean = 1.63
Std. Dev. = 1.199
N = 358
Overall social well-being

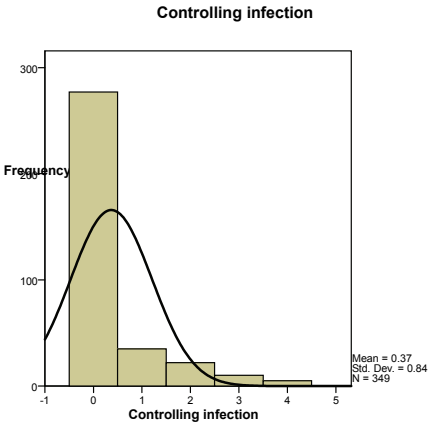

General well-being
Frequency
Mean = 1.75
Std. Dev. = 1.139
N = 357
General well-being

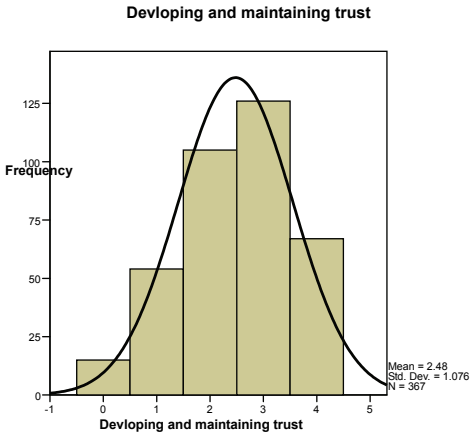

Administering medication
Frequency
Mean = 1.44
Std. Dev. = 1.405
N = 360
Administering medication

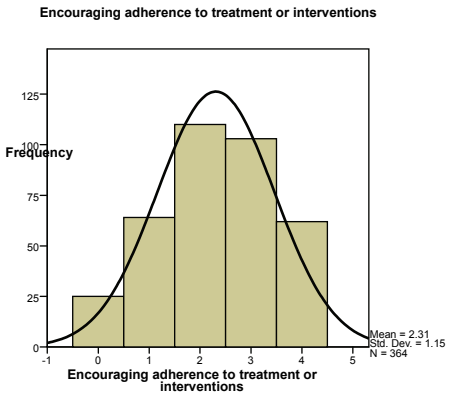

Monitoring, assessing and evaluating physical condition
Frequency
Mean = 1.47
Std. Dev. = 1.244
N = 360
Monitoring, assessing and evaluating physical condition


Attending to hygiene
Frequency
Mean = 0.81
Std. Dev. = 1.169
N = 354
Attending to hygiene

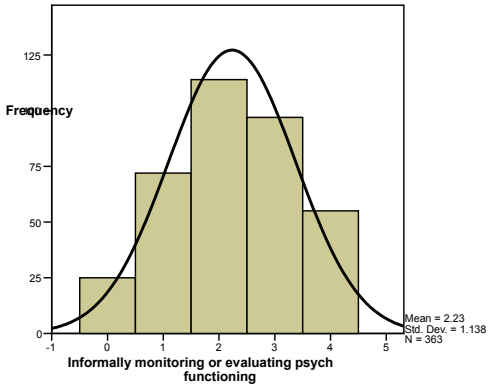

Responding to extreme situations
Frequency
Mean = 0.62
Std. Dev. = 1.113
N = 360
Responding to extreme situations


Controlling infection
Frequency
Mean = 0.37
Std. Dev. = 0.84
N = 349
Controlling infection

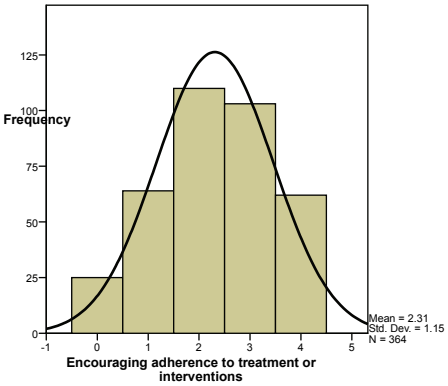

Devloping and maintaining trust
Frequency
Mean = 2.48
Std. Dev. = 1.076
N = 367
Devloping and maintaining trust


Encouraging adherence to treatment or interventions
Frequency
Mean = 2.31
Std. Dev. = 1.15
N = 364
Encouraging adherence to treatment or interventions

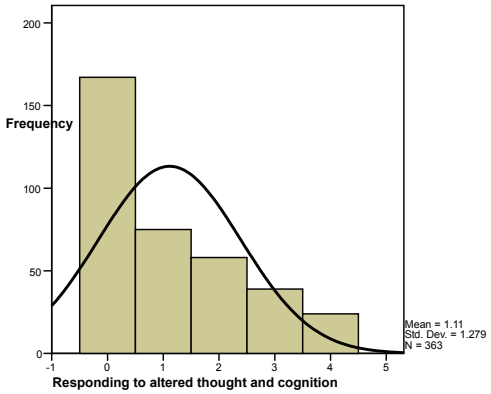
Informally monitoring or evaluating psych functioning

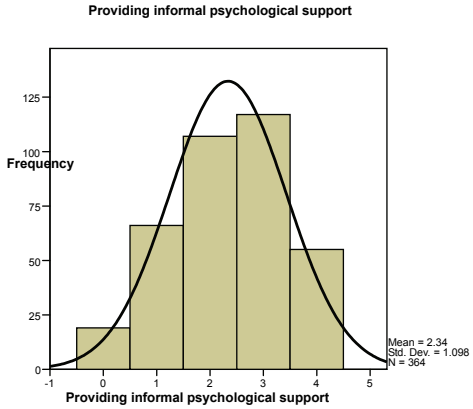


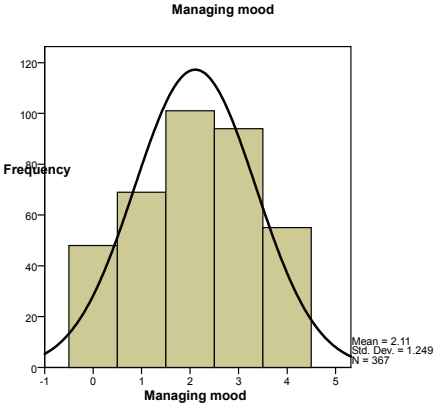
Encouraging adherence to treatment or interventions

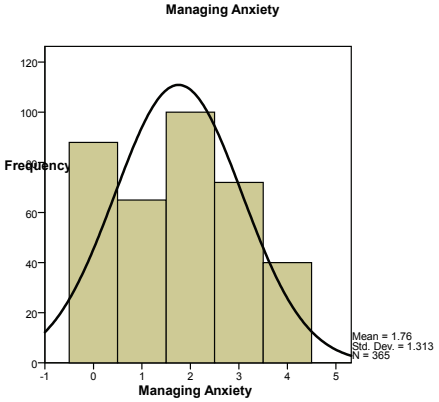


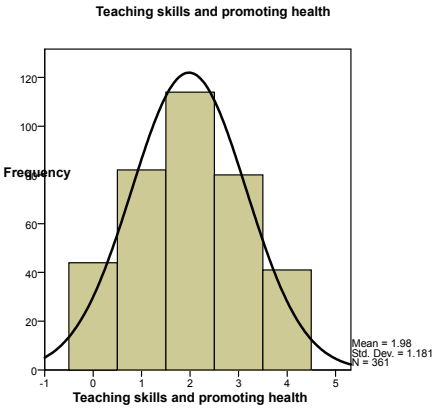
Responding to altered thought and cognition

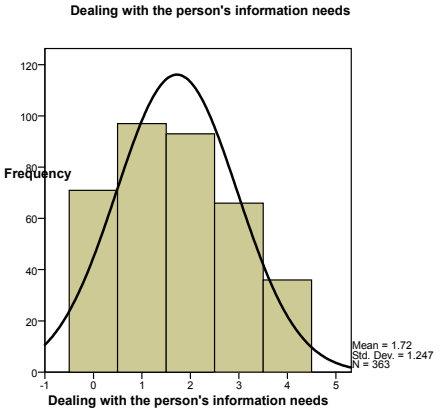


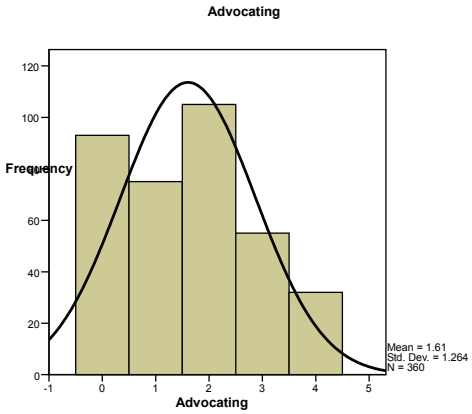

Providing informal psychological support
Frequency
Mean = 2.34
Std. Dev. = 1.098
N = 364
Providing informal psychological support

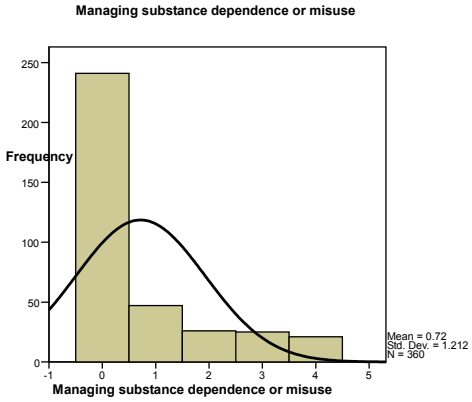

Managing mood
Frequency
Mean = 2.11
Std. Dev. = 1.249
N = 367
Managing mood

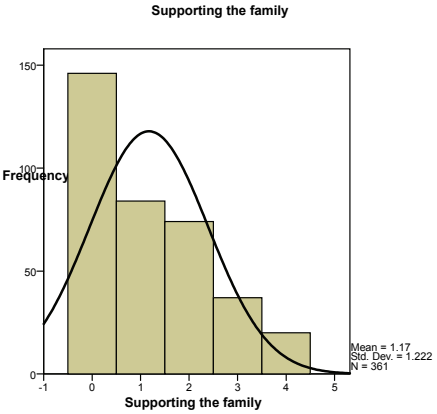

Managing Anxiety
Frequency
Mean = 1.76
Std. Dev. = 1.313
N = 365
Managing Anxiety

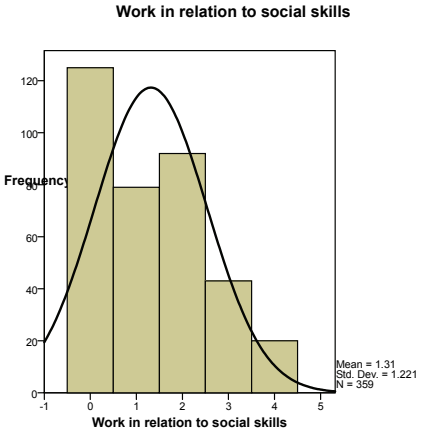

Teaching skills and promoting health
Frequency
Mean = 1.98
Std. Dev. = 1.181
N = 361
Teaching skills and promoting health

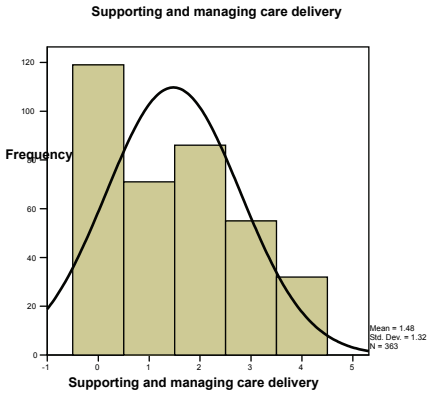

Dealing with the person's information needs
Frequency
Mean = 1.72
Std. Dev. = 1.247
N = 363
Dealing with the person's information needs

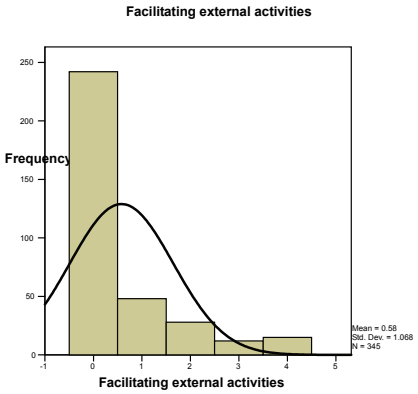

Advocating
Frequency
Mean = 1.61
Std. Dev. = 1.264
N = 360
Advocating

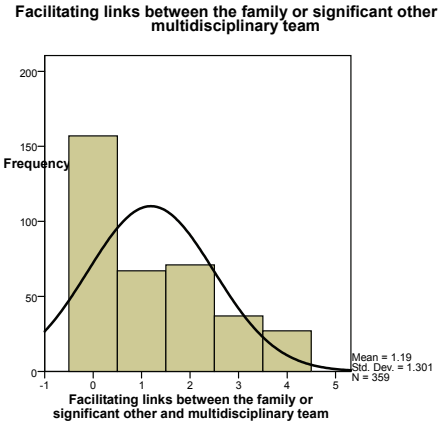

Managing substance dependence or misuse
Frequency
Mean = 0.72
Std. Dev. = 1.212
N = 360
Managing substance dependence or misuse

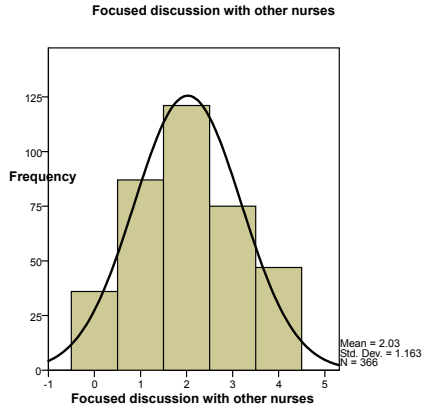

Supporting the family
Frequency
Mean = 1.17
Std. Dev. = 1.222
N = 361
Supporting the family

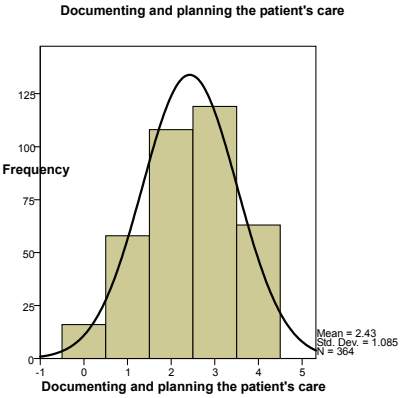

Work in relation to social skills
Frequency
Mean = 1.31
Std. Dev. = 1.221
N = 359
Work in relation to social skills

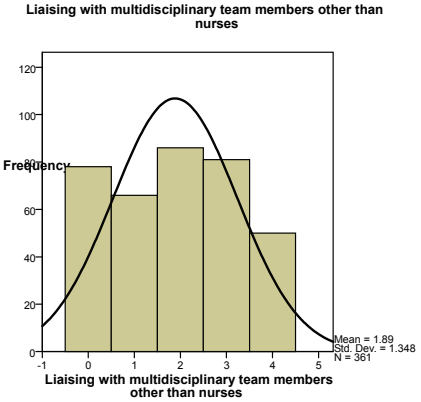

Supporting and managing care delivery
Frequency
Mean = 1.48
Std. Dev. = 1.32
N = 363
Supporting and managing care delivery

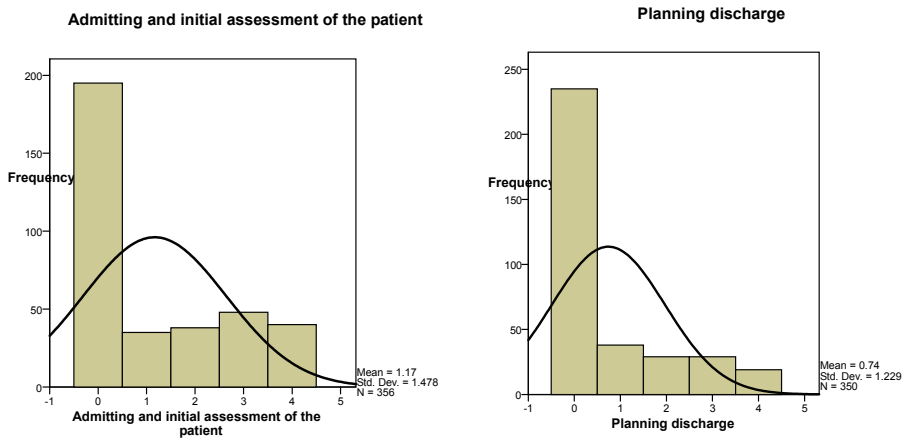

Facilitating external activities
Frequency
Mean = 0.58
Std. Dev. = 1.068
N = 345
Facilitating external activities


Facilitating links between the family or significant other and multidisciplinary team
Frequency
Mean = 1.19
Std. Dev. = 1.301
N = 359
Facilitating links between the family or significant other and multidisciplinary team


Focused discussion with other nurses
Frequency
Mean = 2.03
Std. Dev. = 1.163
N = 366
Focused discussion with other nurses


Documenting and planning the patient's care
Frequency
Mean = 2.43
Std. Dev. = 1.085
N = 364
Documenting and planning the patient's care


Liaising with multidisciplinary team members other than nurses
Mean = 1.89
Std. Dev. = 1.348
N = 361
Liaising with multidisciplinary team members other than nurses

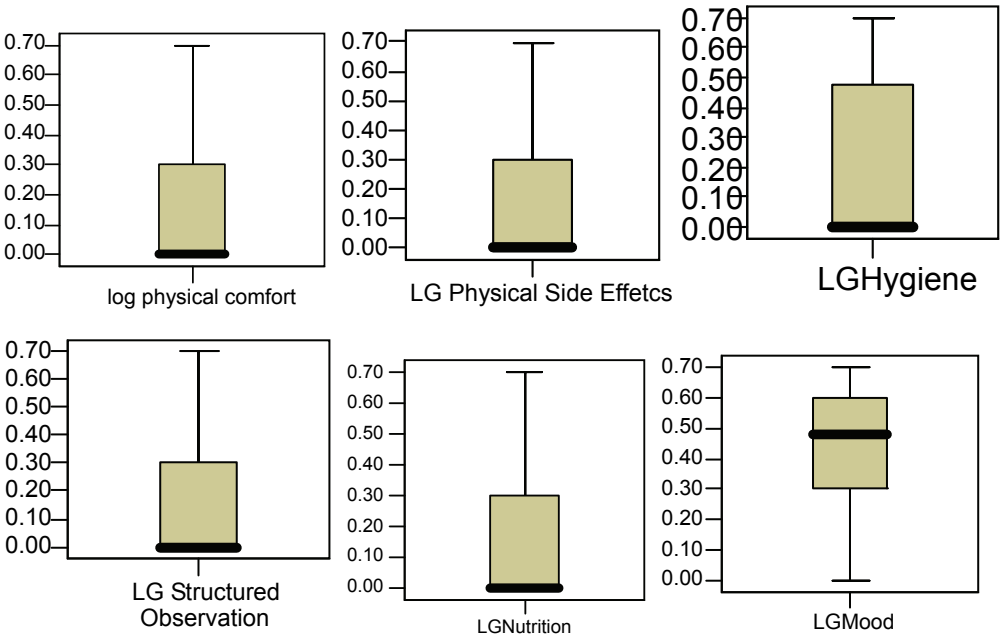


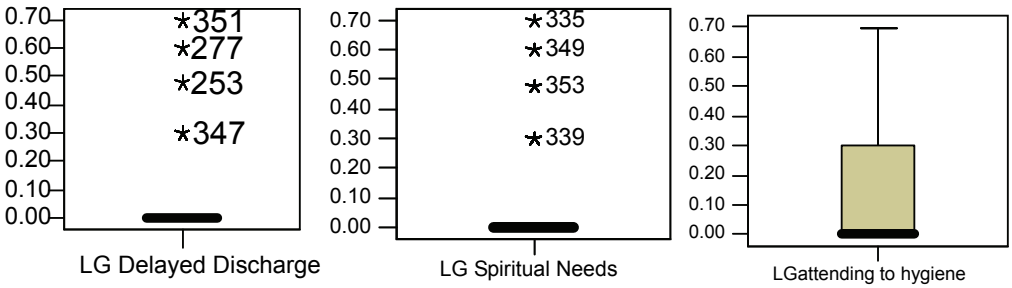
Deciding on what transformation to use is based on the direction of the skewness observed in the data. Tabachnik et al (2006) recommended that variables that are positively skewed should be transformed using a logarithm. 'Taking the logarithm of a set of numbers squashes the right tail of the distribution and is a good way to reduce positive skew' (Field, 2005, p 81). If the level of positive skewness is moderate, a square root transformation is used, as it has the effect of bringing large scores closer to the centre of the distribution. If the variable data is severely positively skewed, an inverse transformation should be used. Inverse transformation, which is achieved by dividing the variable score by 1 serves to reduce positive skew by essentially reversing the value of the original score e.g. a score of 4 on the I-NMDS (MH) scale would become a score of 1 post transformation. Both the logarithm and the inverse transformations are sensitive to zero and, as the I-NMDS scale has a zero point, it is necessary to add 1 (or another such constant) to the data scores prior to transforming them.

It was considered worthwhile trying different transformations for the different skewed variables to see which transformation had the best effect on the data, i.e. bringing it closest to '0'. As such, all skewed variables (including those only slightly over +/-1, which could potentially be left in their original state) were transformed using each of the three transformations discussed. This resulted in 4 possible skewness and kurtosis scores for comparison i.e. the original score, the LG10 (logarithm) score, the square root score and the inverse score (as per Hair

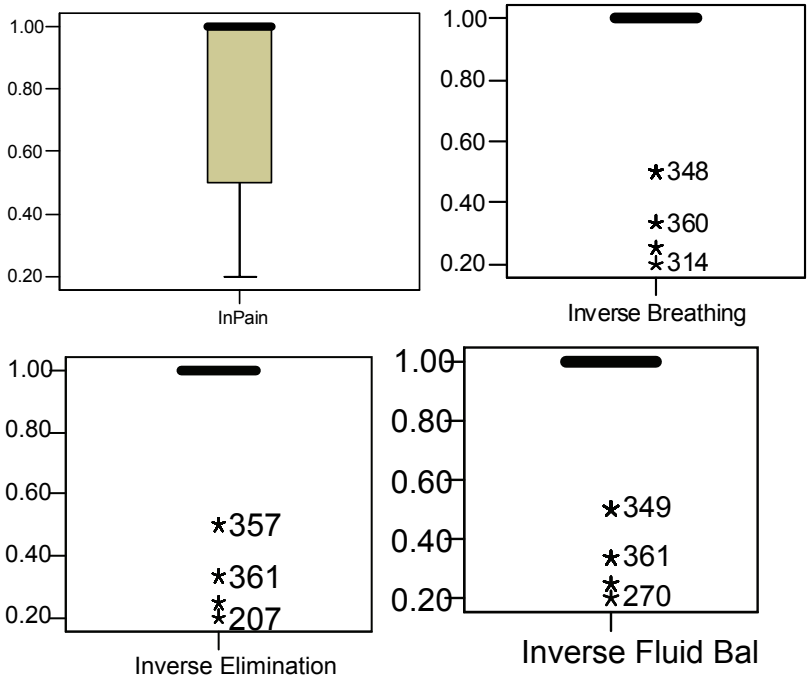
et al 2005). These comparisons are outlined in Table 10, below.

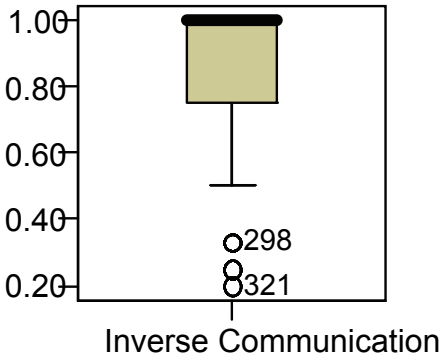
As can be seen from this table, variables that would be most appropriately dealt with using the LG10 transformation included 'Physical comfort', 'Physical side effects of treatment', 'Nutrition', 'Hygiene', 'Mood', 'Spiritual needs', 'Delayed discharge', 'Attending to hygiene' and 'Structured observation'. The effects of these transformations on the skewness and kurtosis of the data resulted in a move closer to '0'. LG10 Transformation effects on outliers are illustrated in the new transformed variables boxplots below. Outliers were eliminated for all but two of the variables i.e. 'Delayed discharge' and 'Spiritual needs'. It is noteworthy that 82% of respondents rated the variable 'Spiritual needs as 'problem not present' and 82% of respondents rated the variable 'Delayed discharge' as problem not present' on the I-NMDS (MH). If the variables identified for potential exclusion from future analysis, given their adherence to the 75% or more 'problem not present' or 'intervention not carried out' benchmark, were indeed left out of future analysis, the effects of these outliers would become obsolete.

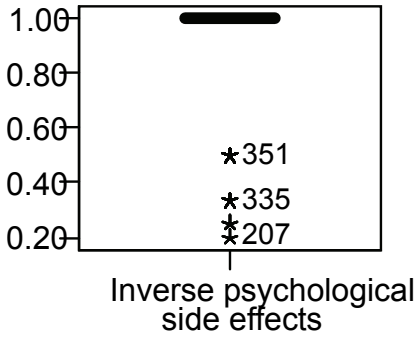


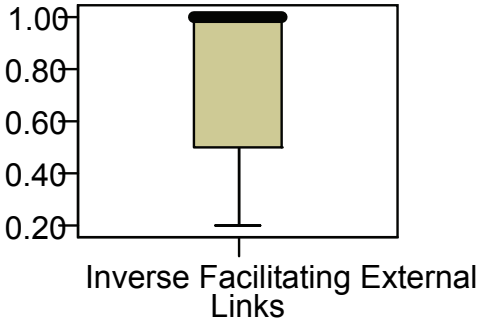


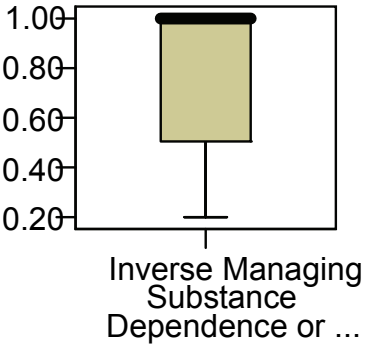
Variables that were deemed most appropriate for inverse transformation included 'Pain', 'Elimination', 'Breathing', 'Fluid balance', 'Communication', 'Psychological side effects of treatment or medication', Responding to extreme situations', 'Controlling infection', 'Managing substance dependence or misuse', 'Facilitating external activities'. The boxplots below illustrate the effects of the transformations on skewness, kurtosis and outliers. Quite a number of outliers still remained in the data after inverse transformation.

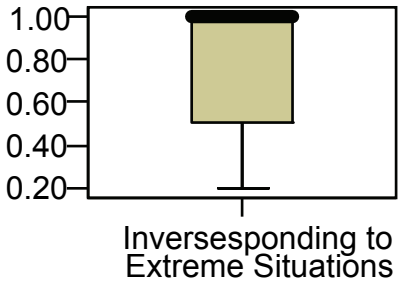


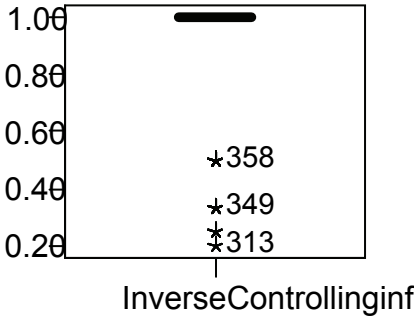

1.00
0.80
0.60
0.40
0.20
298
321
Inverse Communication


1.00
0.80
0.60
0.40
0.20
351
335
207
Inverse psychological side effects

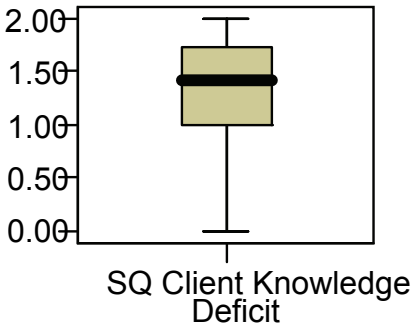

1.00
0.80
0.60
0.40
0.20
Inverse Facilitating External Links

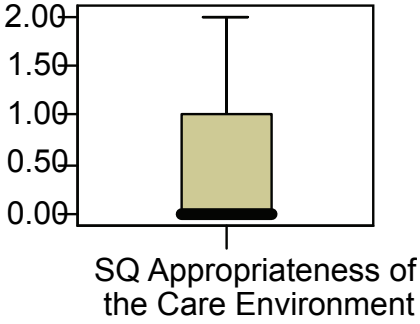

1.00
0.80
0.60
0.40
0.20
Inverse Managing Substance Dependence or ...

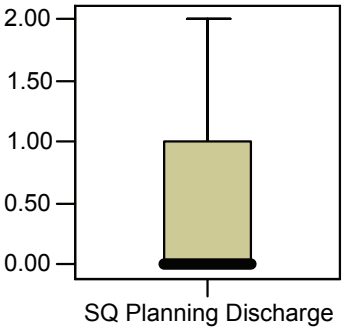

1.00
0.80
0.60
0.40
0.20
Inversesponding to Extreme Situations

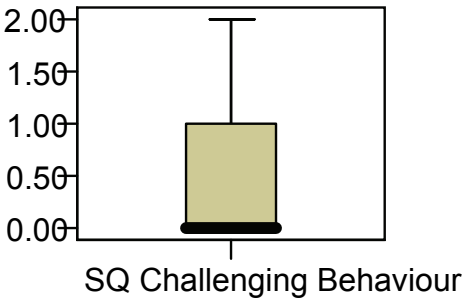

1.00
0.80
0.60
0.40
0.20
358
349
313
InverseControllinginf

The variables ‘Challenging behaviour’ and ‘Appropriateness of the care environment’ ‘Client knowledge deficit’, ‘Liasing with the multidisciplinary team’ and ‘Planning discharge’ were most appropriately transformed using the square root transformation, these variables were subsequently brought closer to ‘0’ and the outliers were eliminated from the distribution.









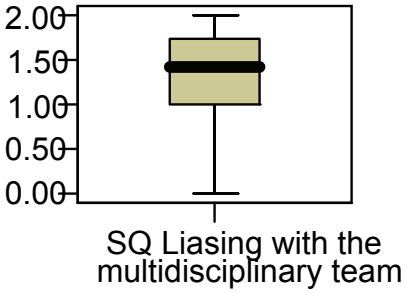


Table 10 Table of Skewness and Kurtosis Scores for Variables Pre and Post Transformation

Variable	Original Skewness	Original Kurtosis	LG Skewness	LG Kurtosis	Inverse Skewness	Inverse Kurtosis	SQ Skewness	SQ Kurtosis
Physical comfort	1.399	0.94	0.93	-0.7	-0.72	-1.346	0.82	-0.99
Physical side effects of treatment	1.44	1.37	0.92	-0.64	-0.69	-1.35	0.789	-1.04
Pain	2.082	3.8	1.5	0.85	-1.25	-0.24	1.38	0.3
Nutrition	1.178	0.35	0.667	-1.1	-0.399	-1.65	0.54	-1.34
Elimination	2.344	5.0	1.757	1.74	-1.48	0.419	1.61	1.12
Hygiene	1.201	0.43	0.699	-1.08	-0.45	-1.63	0.59	-1.31
Breathing	2.678	7.07	2.01	2.87	-1.71	1.2	1.86	2.02
Fluid balance	3.139	10.037	2.44	4.89	-2.13	2.8	2.28	3.88
Longstanding anxiety	0.372	-1.16	-0.119	-1.53	0.434	-1.6	-0.24	-1.5
Mood	-0.096	-1.078	-0.73	-0.73	1.21	-0.09	-0.9	-0.47
Client knowledge deficit regarding illness	0.257	-1.001	0.871	-0.86	0.8723	-0.86	-0.57	-0.99
Challenging behaviour	1.673	1.964	1.1041	-0.25	-0.83	-1.12	0.98	-0.62
Communication	2.167	4.01	1.593	1.145	-1.3	-0.06	1.46	0.6
Spiritual needs	2.956	9.0	-1.30	1.789	-1.85	1.74	2.0	2.74
Psychological side effects of treatment or medication	2.685	7.7	1.826	2.32	-1.47	0.46	1.6	1.33
Appropriateness of the care environment	1.586	1.393	1.105	-0.33	-0.851	-1.1	2.0	-0.637
Delayed discharge	2.608	5.65	0.25	-1.50	-1.846	1.69	2.02	2.595
Family knowledge deficit illness or treatment	1.002	0.006	0.019	-1.36	-0.125	-1.79	0.3	-1.498
Independent Living	0.459	-1.051	0.18	-1.49	0.394	-1.6	-0..2	-1.526
Administering medication	0.401	-1.232	-0.01	-1.656	0.252	-1.79	-0.1	-1.685
Attending to hygiene	1.341	0.744	0.81	-0.854	0.703	-1.06	0.69	-1.138
Responding to extreme situations	1.8	2.225	1.28	0.159	-1.01	-0.78	1.166	-0.23
Controlling infection	2.497	5.877	1.887	2.25	-1.6	0.83	1.75	1.57
Structured observation	1.783	1.829	0.367	-1.39	-1.2	-0.38	1.3	0.096
Managing substance dependence or misuse	1.608	1.315	0.168	-1.4	-0.9	-0.98	1.06	-0.51
Supporting and managing care delivery	0.398	-1.032	1.347	0.41	0.49	-1.52	-0.28	-1.46
Facilitating external activities	1.935	2.892	0.24	-1.479	-1.04	-0.69	1.21	-0.06
Liaising with multidisciplinary team members	0.023	-1.19	0.506	-1.49	1.03	-0.56	-0.73	-0.82
Planning discharge	1.48	0.843	-0.06	-1.438	2.57	7.23	1.0	-0.69

APPENDIX H

Findings of the Validity and Reliability Tests

Table 1 Correlation Matrix Problem

	Physical comfort	Physical side effects of med	Weakness and fatigue	Pain	Nutrition	Elimination	Hygiene	Breathing	Fluid balance	Sleep disturbance	Overall physical well-being	Anxiety or fear: current stressors	Longstanding anxiety	Mood	Thought and cognition	coping and adjustment	Client knowledge deficit	Challenging behaviour	Communication	Level of motivation	Trust in others	Spiritual needs	Adherence to treatment
Physical comfort	1	0.25	0.47	0.65	0.27	0.29	0.23	0.3	0.17	0.12	0.49	0.24	0.27	0.13	-0	0.1	0.04	0.03	0.08	0.13	0.06	0.08	-0
Physical side effects of treatment / medications	0.25	1	0.42	0.09	0.21	0.34	0.1	0.11	0.21	0.19	0.3	0.18	0.15	0.12	0.1	0.16	0.15	0.1	0.13	0.17	0.19	0.14	0.17
Weakness and fatigue	0.47	0.42	1	0.33	0.4	0.29	0.16	0.21	0.2	0.31	0.58	0.34	0.27	0.32	0.09	0.27	0.14	0.02	0.1	0.33	0.15	0.06	0.09
Pain	0.65	0.09	0.33	1	0.21	0.26	0.16	0.35	0.17	0.05	0.4	0.1	0.16	0.09	0.01	0.03	0.07	0.09	0.17	0.09	0.04	0.1	0
Nutrition	0.27	0.21	0.4	0.21	1	0.34	0.29	0.23	0.39	0.29	0.54	0.19	0.19	0.16	0.19	0.26	0.25	0.11	0.1	0.28	0.23	0.15	0.22
Elimination	0.29	0.34	0.29	0.26	0.34	1	0.43	0.3	0.41	0.13	0.4	0.05	0.13	0.13	0.07	0.13	0.18	0.14	0.22	0.2	0.08	0.18	0.14
Hygiene	0.23	0.1	0.16	0.16	0.29	0.43	1	0.19	0.29	0.04	0.31	0.04	0.11	0.05	0.17	0.19	0.21	0.17	0.29	0.3	0.16	0.15	0.17
Breathing	0.3	0.11	0.21	0.35	0.23	0.3	0.19	1	0.19	0.01	0.23	0.01	0.08	-0	0.03	-0.1	0.03	0.04	0	0.05	-0	0.01	0.08
Fluid balance	0.17	0.21	0.2	0.17	0.39	0.41	0.29	0.19	1	0.19	0.35	0.13	0.14	0.12	0.23	0.15	0.22	0.1	0.25	0.15	0.24	0.25	0.13
Sleep disturbance	0.12	0.19	0.31	0.05	0.29	0.13	0.04	0.01	0.19	1	0.47	0.38	0.33	0.43	0.15	0.3	0.14	0.04	0.09	0.2	0.13	0.12	0.2
Overall physical well-being	0.49	0.3	0.58	0.4	0.54	0.4	0.31	0.23	0.35	0.47	1	0.29	0.34	0.26	0.17	0.25	0.18	0.05	0.06	0.24	0.17	0.14	0.13
Anxiety or fear linked to current stressors	0.24	0.18	0.34	0.1	0.19	0.05	0.04	0.01	0.13	0.38	0.29	1	0.73	0.56	0.17	0.44	0.2	0.09	0.05	0.28	0.28	0.12	0.14
Longstanding anxiety	0.27	0.15	0.27	0.16	0.19	0.13	0.11	0.08	0.14	0.33	0.34	0.73	1	0.52	0.12	0.29	0.12	0.08	-0	0.3	0.22	0.15	0.11
Mood	0.13	0.12	0.32	0.09	0.16	0.13	0.05	-0	0.12	0.43	0.26	0.56	0.52	1	0.26	0.49	0.25	0.23	0.14	0.4	0.38	0.15	0.24
Thought and cognition	-0	0.1	0.09	0.01	0.19	0.07	0.17	0.03	0.23	0.15	0.17	0.17	0.12	0.26	1	0.37	0.47	0.34	0.29	0.24	0.43	0.19	0.35
coping and adjustment	0.1	0.16	0.27	0.03	0.26	0.13	0.19	-0.1	0.15	0.3	0.25	0.44	0.29	0.49	0.37	1	0.46	0.29	0.19	0.45	0.34	0.17	0.29
Client knowledge deficit regarding illness or treatment	0.04	0.15	0.14	0.07	0.25	0.18	0.21	0.03	0.22	0.14	0.18	0.2	0.12	0.25	0.47	0.46	1	0.34	0.24	0.27	0.46	0.14	0.39
Challenging behaviour	0.03	0.1	0.02	0.09	0.11	0.14	0.17	0.04	0.1	0.04	0.05	0.09	0.08	0.23	0.34	0.29	0.34	1	0.3	0.11	0.39	0.09	0.34
Communication	0.08	0.13	0.1	0.17	0.1	0.22	0.29	0	0.25	0.09	0.06	0.05	-0	0.14	0.29	0.19	0.24	0.3	1	0.23	0.29	0.12	0.13
Level of motivation	0.13	0.17	0.33	0.09	0.28	0.2	0.3	0.05	0.15	0.2	0.24	0.28	0.3	0.4	0.24	0.45	0.27	0.11	0.23	1	0.29	0.18	0.2
Trust in others	0.06	0.19	0.15	0.04	0.23	0.08	0.16	-0	0.24	0.13	0.17	0.28	0.22	0.38	0.43	0.34	0.46	0.39	0.29	0.29	1	0.18	0.4
Spiritual needs	0.08	0.14	0.06	0.1	0.15	0.18	0.15	0.01	0.25	0.12	0.14	0.12	0.15	0.15	0.19	0.17	0.14	0.09	0.12	0.18	0.18	1	0.09
Adherence to treatment or medication	-0	0.17	0.09	0	0.22	0.14	0.17	0.08	0.13	0.2	0.13	0.14	0.11	0.24	0.35	0.29	0.39	0.34	0.13	0.2	0.4	0.09	1
Psychological side effects of treatment or medication	0.18	0.33	0.16	0.16	0.13	0.25	0.19	0.19	0.18	0.14	0.16	0.15	0.2	0.11	0.28	0.15	0.19	0.22	0.19	0.16	0.22	0.36	0.22
Overall psychological well-being	0.15	0.19	0.36	0.09	0.3	0.16	0.19	0.01	0.17	0.31	0.39	0.51	0.41	0.55	0.45	0.63	0.48	0.32	0.2	0.41	0.46	0.12	0.37
Social disadvantage	0.06	0.13	0.05	-0	0.14	0.1	0.15	0.04	0.03	0.16	0.11	0.11	0.11	0.07	0.17	0.16	0.09	0.1	0.07	0.2	0.19	0.16	0.16
Appropriateness of the care environment	0.15	0.2	0.14	0.07	0.14	0.23	0.21	0.14	0.08	0.01	0.12	0.12	0.18	0.14	0.13	0.11	0.18	0.26	0.14	0.14	0.32	0.03	0.19
Delayed discharge	0.01	0.12	0	0.02	0.06	0.15	0.18	0.03	0.09	-0	-0	0.01	0.1	0.09	0.23	0.06	0.15	0.3	0.23	0.17	0.24	0.03	0.11
Level of social support from significant others	0.12	0.08	0.11	0.06	0.18	0.22	0.19	0.03	0.06	0.09	0.14	0.18	0.17	0.19	0.08	0.23	0.24	0.19	0.03	0.22	0.26	0.09	0.27
Family knowledge deficit illness or treatment	0.09	0.18	0.18	0.06	0.22	0.2	0.15	0.05	0.11	0.24	0.26	0.28	0.21	0.25	0.17	0.25	0.35	0.19	0.16	0.2	0.32	0.15	0.23
Family coping	0.12	0.14	0.15	0.13	0.2	0.18	0.23	0.13	0.05	0.17	0.23	0.26	0.24	0.27	0.28	0.27	0.32	0.29	0.17	0.18	0.37	0.11	0.28
Independent Living	0.06	0.11	0.07	0.02	0.23	0.22	0.45	0.08	0.12	0.01	0.12	0.05	0.16	0.08	0.28	0.21	0.28	0.2	0.21	0.34	0.23	0.13	0.18
Social Stigma	0.04	0.19	0.1	-0	0.28	0.12	0.16	0.05	0.14	0.23	0.19	0.27	0.22	0.27	0.32	0.36	0.31	0.27	0.2	0.37	0.35	0.17	0.21
Social skills	0.03	0.12	0.1	0.03	0.17	0.14	0.27	-0	0.09	0.14	0.11	0.2	0.19	0.24	0.35	0.39	0.4	0.34	0.32	0.42	0.3	0.12	0.3
Overall social well-being	0.05	0.18	0.14	0.04	0.25	0.16	0.29	0.04	0.14	0.17	0.2	0.3	0.27	0.29	0.39	0.4	0.33	0.35	0.3	0.43	0.4	0.16	0.31

Table 1 Correlation Matrix Problems Continued

	Psychological side effects	Overall psychological well-being	Social disadvantage	care environment	Delayed discharge	Level of social support from	Family knowledge deficit	Family coping	Independent Living	Social Stigma	Social skills	Overall social well-being	General well-being
Physical comfort	0.18	0.15	0.06	0.15	0.01	0.12	0.09	0.12	0.06	0.04	0.03	0.05	0.11
Physical side effects of treatment / medications	0.33	0.19	0.13	0.2	0.12	0.08	0.18	0.14	0.11	0.19	0.12	0.18	0.22
Weakness and fatigue	0.16	0.36	0.05	0.14	0	0.11	0.18	0.15	0.07	0.1	0.1	0.14	0.2
Pain	0.16	0.09	-0	0.07	0.02	0.06	0.06	0.13	0.02	-0	0.03	0.04	0.05
Nutrition	0.13	0.3	0.14	0.14	0.06	0.18	0.22	0.2	0.23	0.28	0.17	0.25	0.28
Elimination	0.25	0.16	0.1	0.23	0.15	0.22	0.2	0.18	0.22	0.12	0.14	0.16	0.18
Hygiene	0.19	0.19	0.15	0.21	0.18	0.19	0.15	0.23	0.45	0.16	0.27	0.29	0.3
Breathing	0.19	0.01	0.04	0.14	0.03	0.03	0.05	0.13	0.08	0.05	-0	0.04	0
Fluid balance	0.18	0.17	0.03	0.08	0.09	0.06	0.11	0.05	0.12	0.14	0.09	0.14	0.13
Sleep disturbance	0.14	0.31	0.16	0.01	-0	0.09	0.24	0.17	0.01	0.23	0.14	0.17	0.24
Overall physical well-being	0.16	0.39	0.11	0.12	-0	0.14	0.26	0.23	0.12	0.19	0.11	0.2	0.29
Anxiety or fear linked to current stressors	0.15	0.51	0.11	0.12	0.01	0.18	0.28	0.26	0.05	0.27	0.2	0.3	0.39
Longstanding anxiety	0.2	0.41	0.11	0.18	0.1	0.17	0.21	0.24	0.16	0.22	0.19	0.27	0.3
Mood	0.11	0.55	0.07	0.14	0.09	0.19	0.25	0.27	0.08	0.27	0.24	0.29	0.35
Thought and cognition	0.28	0.45	0.17	0.13	0.23	0.08	0.17	0.28	0.28	0.32	0.35	0.39	0.38
coping and adjustment	0.15	0.63	0.16	0.11	0.06	0.23	0.25	0.27	0.21	0.36	0.39	0.4	0.47
Client knowledge deficit regarding illness or treatment	0.19	0.48	0.09	0.18	0.15	0.24	0.35	0.32	0.28	0.31	0.4	0.33	0.38
Challenging behaviour	0.22	0.32	0.1	0.26	0.3	0.19	0.19	0.29	0.2	0.27	0.34	0.35	0.37
Communication	0.19	0.2	0.07	0.14	0.23	0.03	0.16	0.17	0.21	0.2	0.32	0.3	0.19
Level of motivation	0.16	0.41	0.2	0.14	0.17	0.22	0.2	0.18	0.34	0.37	0.42	0.43	0.38
Trust in others	0.22	0.46	0.19	0.32	0.24	0.26	0.32	0.37	0.23	0.35	0.3	0.4	0.43
Spiritual needs	0.36	0.12	0.16	0.03	0.03	0.09	0.15	0.11	0.13	0.17	0.12	0.16	0.21
Adherence to treatment or medication	0.22	0.37	0.16	0.19	0.11	0.27	0.23	0.28	0.18	0.21	0.3	0.31	0.33
Psychological side effects of treatment or medication	1	0.18	0.14	0.17	0.17	0.12	0.11	0.23	0.17	0.2	0.12	0.2	0.24
Overall psychological well-being	0.18	1	0.14	0.18	0.11	0.27	0.29	0.37	0.24	0.36	0.43	0.52	0.59
Social disadvantage	0.14	0.14	1	0.48	0.31	0.41	0.39	0.38	0.32	0.43	0.34	0.47	0.35
Appropriateness of the care environment	0.17	0.18	0.48	1	0.51	0.46	0.33	0.39	0.38	0.3	0.27	0.39	0.31
Delayed discharge	0.17	0.11	0.31	0.51	1	0.33	0.16	0.25	0.41	0.26	0.26	0.3	0.26
Level of social support from significant others	0.12	0.27	0.41	0.46	0.33	1	0.61	0.54	0.33	0.4	0.37	0.44	0.44
Family knowledge deficit illness or treatment	0.11	0.29	0.39	0.33	0.16	0.61	1	0.67	0.23	0.44	0.39	0.45	0.44
Family coping	0.23	0.37	0.38	0.39	0.25	0.54	0.67	1	0.31	0.46	0.43	0.51	0.49
Independent Living	0.17	0.24	0.32	0.38	0.41	0.33	0.23	0.31	1	0.34	0.53	0.58	0.48
Social Stigma	0.2	0.36	0.43	0.3	0.26	0.4	0.44	0.46	0.34	1	0.58	0.66	0.61
Social skills	0.12	0.43	0.34	0.27	0.26	0.37	0.39	0.43	0.53	0.58	1	0.74	0.6
Overall social well-being	0.2	0.52	0.47	0.39	0.3	0.44	0.45	0.51	0.58	0.66	0.74	1	0.78
General well-being	0.24	0.59	0.35	0.31	0.26	0.44	0.44	0.49	0.48	0.61	0.6	0.78	1

Table 2 Table of Communalities

	Initial	Extraction
Physical comfort	1.000	.743
Physical side effects of treatment / medications	1.000	.609
Weakness and fatigue	1.000	.620
Pain	1.000	.735
Nutrition	1.000	.545
Hygiene	1.000	.512
Sleep disturbance	1.000	.504
Overall Physical well-being	1.000	.734
Anxiety or fear linked to current stressors	1.000	.769
Longstanding anxiety	1.000	.732
Mood	1.000	.676
Thought and cognition	1.000	.538
coping and adjustment	1.000	.585
Client knowledge deficit regarding illness or treatment	1.000	.581
Challenging behaviour	1.000	.535
Communication	1.000	.414
Level of motivation	1.000	.544
Trust in others	1.000	.554
Adherence to treatment or medication	1.000	.477
Psychological side effects of treatment or medication	1.000	.471
Overall psychological well-being	1.000	.691
Social disadvantage	1.000	.557
Appropriateness of the care environment	1.000	.642
Delayed discharge	1.000	.604
Level of social support from significant others	1.000	.669
Family knowledge deficit illness or treatment	1.000	.720
Family coping	1.000	.673
Independent Living	1.000	.659
Social Stigma	1.000	.572
Social skills	1.000	.677
Overall social well-being	1.000	.778
General well-being	1.000	.677

Table 3 Correlation Matrix Interventions

	Administering medication	evaluating physical condition	Attending to hygiene	Responding to extreme situations	Controlling infection	Devloping and maintaining trust	treatment or interventions	evaluating psych functioning	Structured observation	altered thought and cognition	psychological support	Managing mood	Managing Anxiety	Teaching skills and promoting health	person's information needs	Advocating	dependence or misuse	Supporting the family	Work in relation to social skills	managing care delivery	Facilitating external activities	multidisciplinary team	Focused discussion with other nurses	planning the patient's care	team members other than nurses	initial assessment of the patient	Planning discharge
Administering medication	1	0.53	0.44	0.28	0.36	0.21	0.26	0.2	0.36	0.24	0.14	0.11	0.05	0.03	0.14	0.19	0.11	0.26	0.11	0.4	0.39	0.26	0.3	0.25	0.32	0.19	0.16
Monitoringphysical condition	0.53	1	0.51	0.33	0.41	0.32	0.37	0.39	0.36	0.25	0.27	0.27	0.16	0.2	0.29	0.34	0.26	0.3	0.28	0.43	0.32	0.31	0.39	0.34	0.33	0.27	0.16
Attending to hygiene	0.44	0.51	1	0.32	0.47	0.03	0.13	0.13	0.31	0.2	0.06	0.08	0.04	0.1	0.11	0.26	0.09	0.17	0.25	0.37	0.29	0.29	0.3	0.14	0.17	0.13	0.1
Responding to extreme situations	0.28	0.33	0.32	1	0.25	0.13	0.22	0.2	0.4	0.24	0.19	0.27	0.25	0.22	0.21	0.31	0.2	0.22	0.26	0.27	0.33	0.3	0.28	0.16	0.26	0.06	0.19
Controlling infection	0.36	0.41	0.47	0.25	1	0.08	0.16	0.12	0.29	0.17	0.09	0.12	0.02	0.04	0.17	0.21	0.24	0.27	0.14	0.28	0.22	0.27	0.22	0.16	0.2	0.2	0.2
Developing and maintaining trust	0.21	0.32	0.03	0.13	0.08	1	0.67	0.66	0.2	0.36	0.61	0.52	0.39	0.41	0.41	0.34	0.15	0.3	0.26	0.3	0.07	0.25	0.5	0.48	0.38	0.28	0.13
Encouraging adherence to treat	0.26	0.37	0.13	0.22	0.16	0.67	1	0.7	0.33	0.41	0.61	0.52	0.37	0.49	0.52	0.44	0.33	0.37	0.32	0.44	0.21	0.38	0.5	0.54	0.46	0.3	0.17
Informal monitoring psych functioning	0.2	0.39	0.13	0.2	0.12	0.66	0.7	1	0.28	0.44	0.65	0.55	0.42	0.53	0.49	0.48	0.27	0.36	0.34	0.41	0.19	0.37	0.48	0.56	0.42	0.3	0.16
Structured observation	0.36	0.36	0.31	0.4	0.29	0.2	0.33	0.28	1	0.38	0.25	0.26	0.18	0.16	0.23	0.37	0.23	0.24	0.25	0.33	0.31	0.34	0.34	0.29	0.37	0.24	0.21
Responding to altered thought	0.24	0.25	0.2	0.24	0.17	0.36	0.41	0.44	0.38	1	0.39	0.28	0.23	0.31	0.26	0.24	0.16	0.29	0.25	0.35	0.25	0.31	0.37	0.34	0.29	0.2	0.18
Providing informal psych support	0.14	0.27	0.06	0.19	0.09	0.61	0.61	0.65	0.25	0.39	1	0.65	0.52	0.59	0.52	0.39	0.25	0.33	0.35	0.37	0.08	0.32	0.46	0.53	0.39	0.24	0.12
Managing mood	0.11	0.27	0.08	0.27	0.12	0.52	0.52	0.55	0.26	0.28	0.65	1	0.63	0.56	0.55	0.49	0.3	0.4	0.36	0.38	0.09	0.4	0.41	0.45	0.42	0.3	0.2
Managing Anxiety	0.05	0.16	0.04	0.25	0.02	0.39	0.37	0.42	0.18	0.23	0.52	0.63	1	0.54	0.47	0.36	0.22	0.28	0.29	0.26	0.16	0.33	0.31	0.31	0.33	0.23	0.18
Teaching skills and promoting health	0.03	0.2	0.1	0.22	0.04	0.41	0.49	0.53	0.16	0.31	0.59	0.56	0.54	1	0.61	0.42	0.24	0.29	0.48	0.38	0.27	0.4	0.44	0.41	0.39	0.2	0.2

	Administering medication	physical condition	Attending to hygiene	extreme situations	Controlling infection	maintaining trust	treatment or interventions	psych functioning	Structured observation	altered thought and cognition	psychological support	Managing mood	Managing Anxiety	and promoting health	information needs	Advocating	dependence or misuse	Supporting the family	relation to social skills	managing care delivery	external activities	multidisciplinary team	discussion with other nurses	the patient's care	members other than nurses	assessment of the patient	Planning discharge
Dealing with the person's information needs	0.14	0.29	0.11	0.21	0.17	0.41	0.52	0.49	0.23	0.26	0.52	0.55	0.47	0.61	1	0.53	0.4	0.45	0.31	0.43	0.23	0.52	0.43	0.46	0.5	0.4	0.32
Advocating	0.19	0.34	0.26	0.31	0.21	0.34	0.44	0.48	0.37	0.24	0.39	0.49	0.36	0.42	0.53	1	0.37	0.45	0.44	0.47	0.16	0.48	0.45	0.37	0.47	0.24	0.21
Managing substance dependence or misuse	0.11	0.26	0.09	0.2	0.24	0.15	0.33	0.27	0.23	0.16	0.25	0.3	0.22	0.24	0.4	0.37	1	0.32	0.19	0.25	0.21	0.3	0.25	0.22	0.29	0.33	0.26
Supporting the family	0.26	0.3	0.17	0.22	0.27	0.3	0.37	0.36	0.24	0.29	0.33	0.4	0.28	0.29	0.45	0.45	0.32	1	0.37	0.41	0.18	0.63	0.33	0.34	0.41	0.33	0.23
Work in relation to social skills	0.11	0.28	0.25	0.26	0.14	0.26	0.32	0.34	0.25	0.25	0.35	0.36	0.29	0.48	0.31	0.44	0.19	0.37	1	0.37	0.27	0.42	0.39	0.27	0.33	0.16	0.18
Supporting &managing care delivery	0.4	0.43	0.37	0.27	0.28	0.3	0.44	0.41	0.33	0.35	0.37	0.38	0.26	0.38	0.43	0.47	0.25	0.41	0.37	1	0.34	0.57	0.51	0.49	0.53	0.31	0.35
Facilitating external activities	0.39	0.32	0.29	0.33	0.22	0.07	0.21	0.19	0.31	0.25	0.08	0.09	0.16	0.27	0.23	0.16	0.21	0.18	0.27	0.34	1	0.4	0.3	0.16	0.31	0.28	0.41
Facilitating links between the family & MDT	0.26	0.31	0.29	0.3	0.27	0.25	0.38	0.37	0.34	0.31	0.32	0.4	0.33	0.4	0.52	0.48	0.3	0.63	0.42	0.57	0.4	1	0.46	0.4	0.5	0.37	0.41
Focused discussion with other nurses	0.3	0.39	0.3	0.28	0.22	0.5	0.5	0.48	0.34	0.37	0.46	0.41	0.31	0.44	0.43	0.45	0.25	0.33	0.39	0.51	0.3	0.46	1	0.67	0.56	0.37	0.33
Documenting the patient's care	0.25	0.34	0.14	0.16	0.16	0.48	0.54	0.56	0.29	0.34	0.53	0.45	0.31	0.41	0.46	0.37	0.22	0.34	0.27	0.49	0.16	0.4	0.67	1	0.6	0.43	0.28
Liaising with MDT other than nurses	0.32	0.33	0.17	0.26	0.2	0.38	0.46	0.42	0.37	0.29	0.39	0.42	0.33	0.39	0.5	0.47	0.29	0.41	0.33	0.53	0.31	0.5	0.56	0.6	1	0.41	0.46
Admitting & assessment of the patient	0.19	0.27	0.13	0.06	0.2	0.28	0.3	0.3	0.24	0.2	0.24	0.3	0.23	0.2	0.4	0.24	0.33	0.33	0.16	0.31	0.28	0.37	0.37	0.43	0.41	1	0.55
Planning discharge	0.16	0.16	0.1	0.19	0.2	0.13	0.17	0.16	0.21	0.18	0.12	0.2	0.18	0.2	0.32	0.21	0.26	0.23	0.18	0.35	0.41	0.41	0.33	0.28	0.46	0.55	1

Table 4 Component Matrix

	Component						
	1	2	3	4	5	6	7
Physical comfort	.063	-.073	.028	.157	.275	.787	.115
Physical side effects of treatment / medications	.023	.108	-.010	.062	.555	-.009	.534
Weakness and fatigue	.004	.021	.073	.286	.617	.368	.126
Pain	.029	.048	.006	.049	.101	.848	.009
Nutrition	.146	.154	.251	-.003	.628	.200	-.056
Hygiene	.033	.137	.580	-.122	.159	.333	.070
Sleep disturbance	.108	.080	-.018	.405	.557	-.107	-.026
Overall Physical well-being	.129	.055	.116	.200	.694	.423	-.031
Anxiety or fear linked to current stressors	.145	.070	.021	.846	.139	.083	.032
Longstanding anxiety	.113	-.056	.086	.804	.084	.169	.165
Mood	.084	.277	.056	.761	.095	.031	.003
Thought and cognition	.001	.656	.253	.113	.094	-.093	.119
coping and adjustment	.076	.435	.307	.480	.209	-.050	-.135
Client knowledge deficit regarding illness or treatment	.187	.696	.171	.077	.139	.029	-.085
Challenging behaviour	.139	.639	.110	.066	-.188	.123	.202
Communication	-.095	.450	.345	-.048	-.068	.224	.161
Level of motivation	-.010	.129	.590	.356	.228	.015	.029
Trust in others	.229	.634	.081	.229	.037	.021	.200
Adherence to treatment or medication	.217	.604	.008	.029	.217	-.109	.075
Psychological side effects of treatment	-.022	.301	.034	.070	.223	.082	.563
Overall psychological well-being	.153	.497	.270	.536	.229	.042	-.080
Social disadvantage	.581	-.083	.286	.015	.111	-.138	.315
Appropriateness of the care environment	.517	.062	.176	.051	-.079	.128	.562
Delayed discharge	.238	.124	.300	.006	-.246	.042	.616
Level of social support from significant others	.787	.090	.148	.084	-.002	.087	.072
Family knowledge deficit illness or treatment	.789	.209	.054	.118	.177	.047	-.055
Family coping	.726	.303	.112	.138	.056	.127	.057
Independent Living	.231	.095	.734	-.034	-.020	.029	.237
Social Stigma	.479	.207	.449	.198	.157	-.167	.083
Social skills	.356	.309	.655	.145	-.013	-.061	-.032
Overall social well-being	.458	.272	.650	.229	.052	-.081	.100
General well-being	.425	.329	.514	.308	.150	-.050	.058

Analysis and Discussion around the Separate Direct and Indirect Interventions Factor Analysis

A decision was made to carry out some further analyses to establish whether a 3 factor solution for the physical, psychological and social interventions and a stand alone factor for the coordination an organisation of care interventions was appropriate. A 3-factor model was examined for the physical, psychological and social interventions. The resulting pattern matrix for this analysis is outlined in below.

Table 1 Pattern Matrix

	Factor		
	1	2	3
Teaching skills and promoting health	.753		
Managing Anxiety	.703		
Dealing with the person's information needs	.694		
Managing mood	.665		
Advocating	.591		
Work in relation to social skills	.534		
Managing substance dependence or misuse	.405		
Supporting the family	.401		
Developing and maintaining trust		.903	
Encouraging adherence to treatment or interventions		.737	
Informally monitoring or evaluating psych functioning		.715	
Providing informal psychological support	.396	.517	
Responding to altered thought and cognition		.381	
Attending to hygiene			.739
Administering medication			.668
Monitoring, assessing and evaluating Physical condition			.662
Controlling infection			.619
Structured observation			.462
Responding to extreme situations	.328		.401

This model made conceptual and statistical sense in that items loaded according to the biopsychosocial model of care and only one variable cross-loaded at a level that might be cause for concern i.e. ‘Providing informal psychological support’, which cross-loaded at .396. Running the analysis again without this variable resulted in a clean factor model for the data upon the application of a .35 factor loading cut off point. See Pattern matrix in Table 2 below.

Table 2 Pattern Matrix

	Factor		
	1	2	3
Teaching skills and promoting health	.756		
Dealing with the person's information needs	.710		
Managing Anxiety	.699		
Managing mood	.666		
Advocating	.605		
Work in relation to social skills	.534		
Supporting the family	.412		
Managing substance dependence or misuse	.411		
Attending to hygiene		.752	
Administering medication		.673	
Monitoring, assessing and evaluating Physical condition		.659	
Controlling infection		.627	
Structured observation		.458	
Responding to extreme situations	.319	.399	
Developing and maintaining trust			.887
Encouraging adherence to treatment or interventions			.731
Informally monitoring or evaluating psych functioning			.696
Responding to altered thought and cognition			.367

If factor labels are applied as follows: Factor One, ‘Psychosocial interventions’, Factor Two, ‘Monitoring and support’, Factor Three ‘Physical health interventions’, it is understandable that this variable would cross-load across the ‘Psychosocial interventions’ and ‘Monitoring and support’ factors.

Next the coordination and organization of care variables were independently factor analysed, again using the ML extraction method with a PROMAX rotation. In an exploratory exercise, 2 and 3 factors were extracted from the data. Heywood cases were noted for both of these analyses, indicating that these factorial models were not suited to the data. Upon re-examination of the results of the parallel analysis it was noted that 4 factors were potentially most appropriate for the combined interventions scale. A stand alone, one factor Coordination and Organisation of Care factor was subsequently investigated. A pattern matrix could not be achieved for a 1 factor model. As such, correlations among the variables in this factor as well as the variable communalities were examined. See Tables 3 and 4 below. The correlation matrix points to relatively strong or moderate (i.e. close to or above .5) level of association between many

of these variables. Although the level of communalities for the Coordination and Organisation of Care variables are not very high, (not all variable communalities are above .5) it is evident that these variables are not badly represented in this factor (communalities indicate how well variables are represented within the factors according to common variance)

Table 3 Correlation Matrix for Coordination and Organisation of Care Activities

	Supporting and managing care delivery	Facilitating external activities	Facilitating links between family or & multidisciplinary	Focused discussion with other nurses	Documenting and planning the patient's care	Liaising with multidisciplinary team members other than nurses	Admitting and initial assessment of the patient	Planning discharge
Supporting and managing care delivery	1.000	.336	.566	.515	.493	.528	.311	.348
Facilitating external activities	.336	1.000	.402	.300	.159	.306	.282	.408
Facilitating links between the family/multidisciplinary team	.566	.402	1.000	.464	.402	.503	.372	.408
Focused discussion with other nurses	.515	.300	.464	1.000	.675	.559	.369	.326
Documenting and planning the patient's care	.493	.159	.402	.675	1.000	.597	.428	.280
Liaising with multidisciplinary team members other than nurses	.528	.306	.503	.559	.597	1.000	.412	.464
Admitting and initial assessment of the patient	.311	.282	.372	.369	.428	.412	1.000	.551
Planning discharge	.348	.408	.408	.326	.280	.464	.551	1.000

Table 4 Coordination and Organisation of Care Activities Communalities for the 1-Factor Model

Factor	Communality
Supporting and managing care delivery	.484
Facilitating external activities	.190
Facilitating links between the family or significant other and multidisciplinary team	.450
Focused discussion with other nurses	.556
Documenting and planning the patient's care	.529
Liaising with multidisciplinary team members other than nurses	.593
Admitting and initial assessment of the patient	.317
Planning discharge	.310

The internal consistency of this one factor Coordination and Organisation of Care Activities scale was examined. The resulting Cronbach Alpha score was .85 with no improvement resulting from the deletion of any variable in this factor structure. The variable 'Facilitating external activities' could pose problems in future scale use given its low communality score and relatively low correlations with other variables. The major problem with this one factor solution lies with a very unsatisfactory goodness of fit score, see Table 5 below.

Table 5 Goodness-of-fit Test for Coordination and Organisation of Care Activities

Chi-Square	df	Sig.
186.825	20	.000

The Normed X^2 goodness of fit score is very high, over 9, leading to the acceptance of the initial 3-factor model including direct and indirect interventions on the I-NMDS interventions scale. Statistical and conceptual importance of the two proposed factor structures was weighed up before making a decision to accept the initial combined interventions model.

APPENDIX I

Nursing Sensitive Outcomes of Care

Figure 1

Path Model Used For SEM Nursing Sensitive Outcomes of Care Analysis

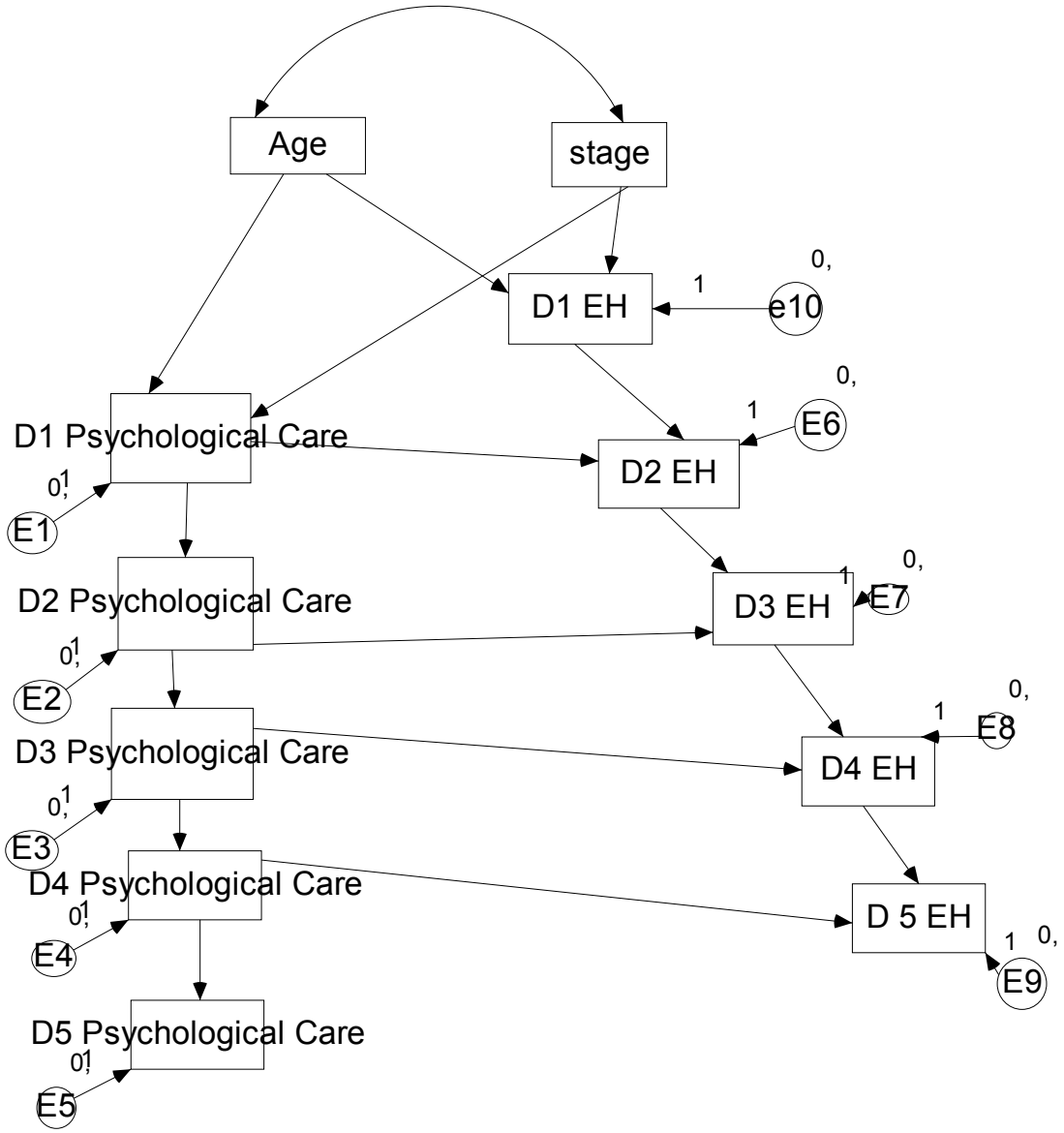


Table 1 Cross Lagged Model 3 Regression Weights

Unstandardised Regression Relationship			Overall Group		Community Group		Acute Group	
			R	P	R	P	R	P
D1 Psychological Interventions	<	Age group	.080	.025	.104	.018	.040	.501
D1 Psychological Interventions	<	Stage of admission	-.067	.018	-.126	***	.058	.242
D1Emotional Health	<	Age group	.035	.341	.038	.432	.014	.806
D1Emotional Health	<	Stage of admission	-.076	.010	-.082	.046	-.027	.562
D1Emotional Health	<	D1Psych Interventions	.571	***	.706	***	.401	***
D2 Psychological Interventions	<	D1 Psychological Interventions	.742	***	.706	***	.766	***
D2 Psychological Interventions	<	D1Emotional Health	.042	.239	.061	.127	.012	.860
D2EmotionalHealth	<	D1 Psychological Interventions	-.055	.362	-.109	.110	-.007	.942
D2EmotionalHealth	<	D1Emotional Health	.632	***	.670	***	.525	***
D2EmotionalHealth	<	D2 Psychological Interventions	.353	***	.460	***	.272	.003
D3 Psychological Interventions	<	D2 Psychological Interventions	.798	***	.742	***	.829	***
D3 Psychological Interventions	<	D2EmotionalHealth	.050	.328	.157	.027	-.048	.543
D3 Psychological Interventions	<	D1Emotional Health	-.034	.440	-.088	.122	-.031	.673
D3EmotionalStatus	<	D2 Psychological Interventions	-.162	.027	-.165	.119	-.208	.040
D3EmotionalStatus	<	D2EmotionalHealth	.718	***	.758	***	.692	***
D3EmotionalStatus	<	D1 Psychological Interventions	-.136	.009	-.171	.018	-.068	.362
D3EmotionalStatus	<	D3 Psychological Interventions	.496	***	.459	***	.520	***
D4 Psychological Interventions	<	D3 Psychological Interventions	.216	.004	.410	***	.038	.717
D4 Psychological Interventions	<	D3EmotionalStatus	-.112	.291	-.148	.266	-.065	.708

Unstandardised Regression Relationship			Overall Group		Community Group		Acute Group	
D4 Psychological Interventions	<	D1Emotional Health	-.126	.117	-.197	.105	-.010	.930
D4 Psychological Interventions	<	D2EmotionalHealth	.188	.113	.211	.236	.116	.482
D4EmotionalStatus	<	D3 Psychological Interventions	.181	.083	.158	.277	.172	.233
D4EmotionalStatus	<	D3EmotionalStatus	.285	***	.303	***	.200	.040
D4EmotionalStatus	<	D1 Psychological Interventions	-.068	.405	.136	.211	-.409	***
D4EmotionalStatus	<	D2 Psychological Interventions	-.205	.080	-.330	.039	.079	.630
D4EmotionalStatus	<	D4 Psychological Interventions	.560	***	.504	***	.690	***
D5 Psychological Interventions	<	D4 Psychological Interventions	.812	***	.853	***	.755	***
D5 Psychological Interventions	<	D4EmotionalStatus	-.023	.549	-.071	.163	.011	.848
D5 Psychological Interventions	<	D1Emotional Health	.120	.009	.082	.203	.140	.035
D5 Psychological Interventions	<	D2EmotionalHealth	-.135	.045	-.033	.721	-.224	.022
D5 Psychological Interventions	<	D3EmotionalStatus	.062	.268	.019	.783	.107	.244
D5EmotionalStatus	<	D4 Psychological Interventions	-.406	***	-.387	***	-.387	***
D5EmotionalStatus	<	D4EmotionalStatus	.780	***	.728	***	.813	***
D5EmotionalStatus	<	D1 Psychological Interventions	-.038	.479	-.007	.934	-.059	.420
D5EmotionalStatus	<	D2 Psychological Interventions	.054	.490	.035	.774	.061	.540
D5EmotionalStatus	<	D3 Psychological Interventions	-.012	.861	-.049	.638	.020	.818
D5EmotionalStatus	<	D5 Psychological Interventions	.500	***	.484	***	.508	***