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THE RELATIONSHIP BETWEEN HEALTH STATUS SCORES ON HOSPITAL ADMISSION AND THE CARE PLANNED BY THE NURSE

by

Mary T. Lush

DEDICATION

This dissertation is dedicated to:

My parents, Kenneth and Dorothy Lush,
for their love and support

My brothers and sisters,
for living with me through the process and
for their ongoing encouragement

My friends and colleagues at
Kaiser Permanente Medical Care Program
for their patience, tolerance, flexibility and support
over the last four years

The profession of nursing that I love.

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Abstract

This passive-observational, cross-sectional study used retrospective data collection to examine the relationships between the patient's health status at hospital admission and the initial care planned by the nurse. The consecutive, convenience sample of 308 subjects was drawn from five acute clinical populations: pulmonary; cerebrovascular; cardiac; gastrointestinal; and infection. The study sites were two acute care hospitals within a health maintenance organization. The primary independent variable health status, consisted of measures of functional status, engagement in care, and psychosocial well-being as measured by the Health Status Outcome Dimensions (HSOD) instrument. Logistic and multiple regression analyses were used to test the relationships between control (patient and setting) variables, health status, and the dependent variables of type of problem identified, number of problems identified, and the time required to implement interventions ordered for the patient. In seven of ten regression models, control variables of facility, age, and/or severity of illness contributed to the explained variance (range 12.0% to 45.2%) at $p < .01$. In six of ten models, the null hypothesis was rejected as at least one health status measure significantly explained variation beyond the control variables at $p < .01$. Health status scores (functional status and engagement in care) contributed at a significant level to the explained variance in only one of the four logistic regression models for type of problem identified (mobility, $p < .000$). Psychosocial well-being, engagement in care and/or functional status contributed to each of the three regression models for number of problems identified for the patient with total explained variance (adjusted R^2) ranging from 4.6% to 24.1% ($p < .000$). The explained variance for two of the intervention regression models ranged from 40.5% (activities of daily living) and 45.1% (teaching and emotional support) at $p < .001$. Study results support using data gathered during the course of care, to evaluate the process of that care. Further work is needed to understand the effects of setting and provider variables on the use of health status data in care planning.

Suzanne Bakken Henry

Suzanne Bakken Henry, RN, DNSc, FAAN
Committee Chair

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CHAPTER I

THE RELATIONSHIP BETWEEN HEALTH STATUS SCORES ON HOSPITAL ADMISSION AND THE CARE PLANNED BY THE NURSE

The Study Problem

The healthcare industry is being faced with the imperative to reduce the cost of providing healthcare while maintaining or increasing its quality for its recipients. To decrease costs, providers are changing organizational structures and processes, reducing lengths of stay, moving the location of care to less costly arenas and shifting the provision of care to less costly and less skilled caregivers (Jones, 1993). Nurses are also using the legislative forum to further restrict the technical activities which can be performed by ancillary nursing personnel. Testimony at the relevant hearings focuses on the hypothesized negative impact on the quality of care and patient outcomes when the presence of the registered nurse is decreased at the bedside.

These activities are occurring at a time when the major issues compelling the development of outcomes analysis within nursing have been the drive towards professionalism and the economic factors impacting healthcare today (Bond & Thomas, 1991). Nursing has been seeking to define its uniqueness, its autonomy as a profession. Activities supporting this goal have included the identification of a body of knowledge unique to nursing as well as the definition or classification of certain care delivery functions as requiring minimum educational or certification requirements. Nursing is now being asked to establish an accountability to the public for the quality of its practice (Relman, 1988) by demonstrating the value of nursing care in terms of improved outcomes linked to specific nursing activities or interventions (Bond & Thomas, 1991).

This need to define quality care is echoed by the recommendations of the Institute of Medicine (IOM) in its report on the adequacy of nurse staffing in hospitals and nursing homes (IOM, 1996). As a result of the incredible lack of research demonstrating the impact of nursing on patient outcomes, one of the key IOM recommendations was to create interdisciplinary private-public partnerships to develop performance and outcome measures sensitive to nursing across the healthcare continuum.

When considering outcomes sensitive to nursing, the focus is on the independent use of the nursing process by the nurse such that the nurse decides when, if, and how to carry out actions and orders (Werley & Lang, 1988). The focus in studying nursing interventions is nurse behavior, or those things nurses do to support the patient in moving towards the desired outcome (McCloskey, Bulechek & Cohen, 1990). Although research has demonstrated to some extent the value of nursing, nursing's contributions to improved patient outcomes through assessment and intervention have not been well documented (Fagin, 1990). Abraham, Chalifoux and Evers (1992) conducted an extensive review of the literature for the focus of and the methodological characteristics of studies testing the effects of nursing interventions on patients. A total of 2,746 articles published in refereed nursing scholarship or research journals from 1981 to 1990 were reviewed. Selected articles tested the effects of nursing interventions on patients with and without specified clinical conditions. During the ten year period, only 212 (7.7%) studied the effects of nursing interventions on clinical and/or administrative outcomes.

Given nursing's focus on the treatment of clients' responses to actual or potential health problems (American Nurses Association (ANA), 1980), the paucity of research examining the impact of nursing interventions on patient outcomes is intriguing. A disturbing outgrowth of this shortage of research is the result of a recent ANA sponsored process to define indicators for use across acute care healthcare institutions, as a report card of nursing quality and safety of care (ANA, 1995).

Despite an extensive review of the available literature, empirical linkages between nursing interventions and quality of care could not be defined by the ANA Advisory Committee (ANA, 1995). A total of 30 indicators were considered in the area of patient focused outcomes, 16 in the area of process of care and a total of 25 in the area of structure of care. However, due to the lack of consistent, comparable definitions, data sources and accessibility, the ANA concluded that a single set of indicators which could clearly be supported as defining nursing quality was not available. Instead a core set of five indicators was selected for initial empirical study and development with a second set of five selected for a second phase of development. Phase I indicators were all drawn from the set of structure indicators and included skill mix, nursing ratio, RN education, nursing staff turnover, and the use of agency nurses. In contrast, all of the indicators identified for Phase II development were drawn from the area of patient focused outcomes and included nosocomial infections, decubitus ulcers, medication errors, satisfaction with care and patient injury rate. It is disturbing that indicators reflecting nursing process - that area of patient care incorporating the independent intervention of the nurse - were not included in either phase of development for the ANA (1995) acute care nursing quality report card.

Just as there is minimal literature demonstrating the impact of nursing, there is little evidence of nursing practice in our current hospital, home health, nursing home, Medicare, private payor and public databases (Lang, 1993). At the time that outcome analysis was proceeding on a state and nation wide basis the availability of data was limited to that captured by business directed information systems (Cherkin, 1992). Nursing data have not been collected on a routine basis and have therefore not been readily available to support research and outcomes analysis (National Center for Nursing Research (NCNR), 1993).

Given the ready availability of administrative data and the challenges in obtaining clinical data, it is not surprising that the ANA report card project found that most nursing studies used administrative variables as outcome measures. Of the 33 nursing studies published between 1991 and 1994 designed to investigate the linkage between nursing care and patient specific outcomes, 25 used length of stay, medication error rate and patient satisfaction as their patient focused outcome criteria (ANA, 1995). Of the 31 indicators of patient outcomes considered by the ANA, nine were not considered in any of the 33 studies and the remaining 19 indicators were considered in less than five studies each. This paucity of research examining the relationships between nursing interventions and patient outcomes in the first place, and the limited use of clinical measures of patient outcomes in the second place, sets a clear stage for the lack of understanding of nursing's contribution to health which exists today.

The lack of emphasis on clinically based outcomes research within nursing science was one of the driving forces behind the NCNR (now upgraded to institute status and known as the National Institute for Nursing Research) sponsored state of the science conference on the effectiveness of nursing practice (NCNR, 1992). Conference participants agreed research was needed that:

- targeted patient populations in which outcomes would likely be affected by nursing practice;
- would explain the variation in patient outcomes attributable to nursing practice;
- used clinical databases across multiple sites of care to examine nursing interventions in relation to patient problems, patient outcomes, nursing intensity and other variables in order to support nursing effectiveness research;
- permitted analysis of the effectiveness and costs of specific interventions in achieving desired clinical outcomes for patients with a variety of nursing diagnoses.

History of Nursing's Participation in Outcomes Research

Nursing in fact, has a long history of interest in the outcomes of patient care. Early efforts in healthcare to monitor outcomes can be traced to 1855 and the work of Florence Nightingale in the Crimean War (Nightingale, 1858). Nightingale's use of statistics to quantify the effects of hygiene on reducing mortality are well known. Jenning (1991) cited the 1950s transition in nursing research from nurses, nursing administration and nursing education to studies of patient care as key to the initiation of outcomes studies. The subsequent emphasis on patient outcomes provided the key opportunity for linking theory building with research and practice. Lang and Marek (1990; 1992) provided excellent reviews of the historical development of outcomes research within nursing.

The foundation of all of the recent (1960s onwards) outcomes work in nursing has been the work of Donabedian (Henry, Partridge, Lenert, & Middleton, 1993). It was Donabedian (1968, 1982, 1988) who formalized the concept of quality and cost being related to the interactions between structure, process and outcome which has been used extensively in outcomes research (Lang & Marek, 1992).

Two contemporary forces in the analysis of outcomes of care are the Joint Commission for the Accreditation of Healthcare Organizations (JCAHO) and the Agency for Healthcare Policy and Research (AHCPR). Both the JCAHO and the AHCPR have given priority to research into using outcomes indicators to evaluate the effectiveness of patient care (McCormick, 1993). JCAHO developed its quality agenda around the principles that consumers and third party payers expected healthcare organizations to use quality management techniques to achieve an appropriate ratio of quality to cost (JCAHO, 1992). The AHCPR was established by the Omnibus Reconciliation Act of 1989 to develop and update guidelines for use in the management of clinical conditions (AHCPR, 1990). The implementation of these clinical guidelines into practice and subsequent research into their clinical effectiveness has been the topic of conferences such as the 1993 Western Regional Invitational Conference sponsored by the ANA and the AHCPR (AHCPR, 1993).

Limitations in Nursing's Current Approach to Patient Outcomes

An outcome can be defined as a change in status confidently attributable to antecedent care (Donabedian, 1988) or the prevention of a negative change in status or negative event through the implementation of protocols for high risk patients (Bond &

Thomas, 1991). Multiple factors influence outcomes of care not the least of which is the patient's own recovery power (Ozbolt, 1992). Outcomes reflect a spectrum of effects beyond either nursing interventions or to a broader extent healthcare interventions, and may or may not be observable or measurable for significant periods following the interventions (Bond & Thomas, 1991). Further complicating the issue of attribution are the assumed, unobservable interactions between the patient and the technical and interpersonal elements of care (Lohr, 1988).

In order to focus research on patient outcomes directly sensitive to nursing care, nursing must first identify and test outcome measures which fall within the scope of independent practice of the nurse. The in-depth review of the literature conducted by the ANA (1995) demonstrated that nursing interventions have a role in the prevention of negative events (morbidity, mortality, falls, infections, nosocomial infections). Conceptually different but not empirically delineated, is nursing's contribution to achieving and maximizing health given a particular client status. The first (prevention of the negative) is to prevent a movement towards illness. The second (achieving health) is to facilitate and promote the movement of the client along the health - illness continuum towards health. Defining nursing's value in supporting and maximizing health outcomes for the public needs to be considered a priority within nursing.

As a profession, the core or essence of nursing practice has historically enveloped the areas of health outcomes associated with quality of life, patient and family coping, patient and family knowledge and functional status (Cherkin, 1992; Crane, 1992; Feetham, 1992; Murdaugh, 1992; Stevic, 1992; Weisman, 1992). All of these outcome domains are compatible with ANA's definition of nursing (ANA, 1980). These health related outcomes are also in alignment with the ANA's policy statement on nursing research which states:

> Nursing research generates knowledge about health and health promotion in individuals and families and knowledge about the influences of social and physical environments on health. Nursing research also addresses the care of persons acutely or chronically ill, disabled or dying, as well as care for their families. In addition, nursing research studies therapeutic actions that minimize the negative effects of illness by enhancing the abilities of individuals and families to respond to actual or potential health problems... (ANA, 1986, p. 2)

A focus on health is not intended to minimize the role of the RN in coordinating care within the healthcare environment or the role of the nurse in quality control and quality improvement processes in healthcare. Rather, if the scope of independent nursing practice exists in the realm of the treatment of actual or potential responses to health problems (ANA, 1980) then it is within this realm that nursing should focus on defining its value to our public.

Statement of the Problem

There is an urgent need for nursing to participate in patient outcomes research. Nursing must define its value to its recipients, payers, and purchasers of care in terms of health related outcomes. Although research has demonstrated to some extent the value of nursing, nursing's contributions to improved patient outcomes through assessment and intervention have not been well documented (Fagin, 1990). If health related outcomes are to be used to define the quality and value of nursing care, then there must be a relationship between patient health outcomes and the care prescribed by the nurse. If this relationship cannot be empirically delineated, then the use of health outcomes to quantify nursing quality must be seriously questioned.

Given the complexity and dynamic nature of patient care, research is needed to demonstrate two points. First, that the nurse responds to admission assessment data by planning and documenting care specific to the patient's needs. Secondly, that the care planned by the nurse results in a change in the patient's health status. The goal of this study was to address the first step. Specifically, that the orders and interventions planned in response to admission health status data, are documented on the kardex, care plan or care path.

Purpose of the Study

The purpose of this study was to examine the relationships between the hospital admission scores on a health status instrument, and the care planned by the nurse at hospital admission for the patient.

Significance

If the results of the study demonstrate that nurses plan care based on admission health status information, as evidenced by their documentation, then the foundation for future research into the impact of nursing interventions on patient health outcomes would be provided. Data reflecting nurse behavior, and those things nurses do to support the patient in moving towards the desired outcome (McCloskey, Bulechek, & Cohen, 1990) will be available for linkage in event driven databases to patient problems, patient outcomes, and patient health and quality of life status over time (Henry, 1995; Zielstorff, 1995). Research using these event driven databases is required if the goal to demonstrate the sensitivity of health outcomes to independent nursing intervention is to be met. If this sensitivity can be empirically supported, than the quality of nursing care provided in our healthcare institutions can defined in terms of maximizing the health status of our clients.

CHAPTER II

REVIEW OF THE LITERATURE

Conceptual Framework

An outcome is a complex construct requiring diverse conceptual and measurement approaches to achieve an understanding of the phenomenon. A patient outcome reflects a spectrum of effects from nursing interventions and to a broader extent, healthcare interventions (Bond & Thomas 1991). Results may or may not be observable or measurable for significant periods following the intervention. Additionally, many factors influence outcomes of care, not the least of which is the patient's own recovery powers. The outcome may be a change in patient status attributable to antecedent care (Donabedian, 1988) or the prevention of a negative change in status or negative event through the implementation of protocols for high risk patients (Bond & Thomas, 1991). Healthcare occurs in a multi-contextual, multi-causal, multidisciplinary environment in which numerous variables can impact and interact with the relationship between an intervention and an intended outcome. A model reflecting this complexity was needed to guide the researcher in identifying important variables whose impact must be accounted for if the desired relationship is to be isolated from the multiple complexities of healthcare, and examined.

The Outcomes Model for Health Care Research (OMHCR) captured this complexity (Holzemer, 1992, 1994; Holzemer & Reilly, 1995). In this model (Table 1), the intersection of the vertical axis of client, provider and setting with the traditional Donabedian (1968, 1982, 1988) elements of input/context, process and outcome, created a nine cell matrix reflecting the major components of outcomes research as it is understood today. The value of the OMHCR rests in its ability to direct the researcher to the categories of potential co-variates which require measurement and evaluation in tangent with the primary relationship being studied. Comprehensive research into a nursing phenomenon would consider all of the nine cells, individually and in combination. Of particular interest to nursing is the relationship between independent nursing interventions (cell 5) and patient health related outcomes (cell 3). (Note: for ease of discussion, the cells in Table 1 have been numbered 1 through 9. The numbers in no way imply a rank order, degree of importance, or direction of approach.)

Table 1
<u>Outcomes Model for Health Care Research</u>

	Inputs	Processes	Outcomes
Client	1	2	3
Provider	4	5	6
Setting	7	8	9

From Holzemer, 1992, 1994; Holzemer & Reilly, 1995.

A simple research design would focus on defining the intervention and the patient outcomes to be measured (cells 5 and 3). A key contribution of the OMHCR was the focus provided the researcher on the mediating variables of provider, setting and input/context (cells 1, 2, 4, 5, 7 and 8) which could impact the intervention/outcome relationship. These variables would require measurement, but would not be manipulated by the researcher. The potential interaction of all mediating input/context, provider, setting and patient variables would need to be controlled via data analysis so the true impact of the defined process or intervention on the outcome could be teased from the multi-causal, multi-contextual whole.

The essential components required for effective research into relationships between nursing process and patient outcomes are illustrated in Table 2. The conceptual framework for this study integrated the concepts of horizontal substruction (Dulock & Holzemer, 1992) with the systems model of Holzemer (Holzemer, 1992, 1994; Holzemer & Reilly, 1995). Input variables of setting, provider and patient were considered covariates or mediating variables. These input variables mediate the effect of the independent nursing process variables on the dependent outcome variables. In this model, the process cells 2, 5, and 8 are also considered as input or mediating variables.

Table 2

Conceptual Framework for Analysis and Literature Review

INPUT						PROCESS	OUTCOMES
CO-VARIATES/MEDIATING VARIABLES						NURSING THERAPEUTICS VARIABLES	PATIENT HEALTH RELATED OUTCOMES
SETTING		PROVIDER		CLIENT			
Input	Process	Input	Process	Input	Process	X	Y
7	8	4	5^1	1	2	5^2	3

Adapted from Holzemer, 1992, 1994; Holzemer & Reilly, 1995.
5^1 Mediating nursing process variables
5^2 Nursing process variable(s) being studied

This study focused on the relationship between the client input variables of functional status, knowledge, engagement in care, and psychosocial well-being (cell 1) and the provider process variable of care planned by the nurse (cell 5^2). In addition, input and process variables were measured which could impact the relationship between admission health status assessment and the writing of the plan of care.

Input/Client Health Status Measures

There are many criteria against which health related measures can be considered. Of key interest to this researcher, is the development of a computer-based infrastructure through which patient outcomes sensitive to the independent intervention of the nurse can be evaluated. Health is a complex concept requiring measurement over time and across settings of care if the true relationships between interventions and health outcomes are to be understood (Holzemer & Reilly, 1995). It is in this light that the following evaluation criteria for health measures were established:

- that measures be generic, measuring concepts of importance to all patient populations;
- that the generic measures have demonstrated validity and reliability across multiple populations;
- that interrater reliability was established across providers in a single setting and between providers across settings;
- that ease-of-use was confirmed using data collected during normal course of care; and
- that sensitivity to changes was demonstrated over short episodes of care (hospital stay, skilled nursing facility, home care).

Finding measures compatible with the concept of an outcomes infrastructure is foundational to major, multi-site research examining the impact of nursing interventions on the health outcomes of its clients. Healthcare within a health maintenance organization (HMO) reflects this environment. Results of a random survey conducted within an HMO demonstrated nurses (n = 538) across diverse settings and specialties of care, believed outcomes in the domains of functional status, knowledge and engagement in care and psychosocial well-being of the patient, family and caregiver were sensitive to their independent practice (Lush, Jones, & Outcomes Taskforce, 1995). Instruments selected for review were those that: a) measured concepts within the domains of functional status, engagement in care, and psychosocial well-being; and b) received frequent citations in the current literature.

Generic Measures

The use of a generic measure was controversial in the literature. Given the extensive amount of variability present in each of the defining characteristics of the populations nursing serves (Holzemer & Reilly, 1995) is it reasonable or even possible to expect a generic measure to provide information of value in determining the effectiveness of practice?

Generic measures are those which are pertinent to all consumers of healthcare services whereas condition-specific measures are germane to patients with specific diagnoses or undergoing specific procedures (Zielstorff, 1995). The discussion should not be one of "either or", but rather one of which variables reflect domains of care that cross all populations, and which populations have unique characteristics that require specific variables and measures to reflect its care requirements. As nursing seeks ways in which the quality of nursing care can be quantified and provided to the public (ANA, 1995), generic measures of health which are applicable to all specialties and arenas of nursing care are essential. The use of generic measures also provides the opportunity for nursing to evaluate and monitor the impact of its care on the life continuum. An outcomes infrastructure that supports the collection of both generic and condition specific, patient linked data over time will provide the foundation for the analysis of patient outcomes resulting from nursing care. Add to this data base, the capability of linking setting, provider and client characteristics to the care provided, and comprehensive analysis of patient care can occur which considers all sources of variation conceptualized within the OMHCR matrix (Holzemer & Reilly, 1995).

Functional Status

Functional status was approached in the literature from a variety of perspectives. Some functional status measures focused solely on the ability of the individual to ambulate or to move within their environment (Hegevary, 1991). Others included criteria reflecting the ability to care for the self (Holzemer, Henry, Stewart, & Janson-Bjerklie, 1993) or one's overall perspective of their health (Kaplan & Camacho, 1983). Breslow (1989) discussed functional status from the physical perspective (vital capacity, glucose tolerance), from the mental health perspective (cognitive function) and social functioning (ability to work, interact, care for self). Leidy (1995) distinguished between functional status (the ability to meet basic needs, fulfill usual roles, and maintain health), functional capacity (the maximum capacity to perform normal daily activities), and functional performance (the extent to which people execute activities or behaviors as part of daily living). Disability has also been used as an inverse measure of both health status and functional measurement (Lohr, 1988). The Medical Outcomes Study scales include functional status measures as reflected by activities of daily living (ADLs), mobility, communication and self-care (Stewart & Ware, Jr., 1992). Hegyvary (1991) identified functional status, meaning the maintenance or improvement of physical functioning, as one of four outcome categories which were of importance to multiple providers, consumer and purchasers. For the purposes of this discussion, functional status reflects both physical performance (ambulation, ability to move within the environment) and self-care. Lang and Marek (1990, 1992) noted that functional status (physical performance) and self-care were often linked on the same instrument in the nursing literature.

Standardized surveys designed to assess functional status and well-being have been used for as many as 300 years (Ware, Jr., 1993)! Prior to 1970 however, few scales were developed using psychometric techniques. Another important change over the last 50 years was the evolution from measures focusing of the presence or absence of health status or problems, to the scaling of functional status and well-being criteria consistent with basic human values (Ware, Jr., 1993). Within nursing, there has an increasing use of functional status as an outcome indicator of the effectiveness of nursing practice in such diverse areas as self-care and readiness to return to work post childbirth (Tulman & Fawcett, 1990), and for rehabilitation programs post myocardial infarction (Burgess, Lerner, D'Agostino, Vokonas, Hartman & Gaccione, 1987).

The Karnofsky Performance Status Scale (Karnofsky & Burchenal, 1949) and the Katz Index of Activities of Daily Living (Katz, Ford, Moskowitz, Jackson & Jaffe, 1963) are two research based scales used frequently in the literature. The Karnofsky

Performance Status Scale (KPSS) is of interest in that it is a single item scale anchored by 11 descriptive levels of function aligned with a scale of 100 (health and independent functioning) to 0 (death). Interestingly, as the focus of the KPSS is the ability to live a normal life, when compared to those of normal health and of similar age, the scale is as often used as a quality of life scale (Holzemer & Wilson, 1995). The initial use of the scale was in populations undergoing treatment for cancer. More recently, the KPSS has been used as a quality of life measure in the HIV/AIDS population. The interrater reliability and validity of the scale has been established in both of these populations (Karnofsky & Burchenal, 1949; Fischl, et al., 1987; Rabkin, et al., 1993).

As a scale for functional status, the KPSS has potential for inclusion in an outcomes infrastructure given testing across settings of care and in the pediatric populations. As a measure of quality of life however, the single index of a complex concept would provide minimal direction to the multiple providers of care as to the specific area of impact of their interventions.

The Katz Index of Activities of Daily Living (ADLs) measures levels of independence using six graded categories within each of six activities: bathing, dressing, toileting, transferring, continence and feeding (Katz, Ford, Moskowitz, Jackson & Jaffe, 1963). In the original study, the results of 2,000 evaluations of 1,001 individuals supported the use of the instrument as an objective guide to the course of chronic illness, a tool to study the aging process and as a method for defining the effectiveness of rehabilitation teaching. The individuals studied had one or more chronic diseases in addition to one of the following primary clinical diagnoses: hip fracture, cerebral infarction, multiple sclerosis, arthritis, malignancy, cardiovascular disease and amputation, paraplegia, or quadriplegia. Healthcare providers trained in the completion of the scales demonstrated interrater reliability of at least .95. The Katz Index of ADLs scale demonstrated sensitivity to change over time in 100 patients with disabling illness. Predictive validity was supported by the definition of three stages of recovery through which the patients routinely progressed. Independence in feeding and continence came early followed by the ability to transfer and to go to the toilet. The recovery of complete independence in bathing and dressing was last and often occurred post discharge.

The Katz Index of ADL continues to be used today. For example, in a quasi-experimental study that examined the effectiveness of nursing interventions targeted to reduce the incidence and severity of acute confusion or delirium states in the hospitalized elderly, the Katz Index of ADL was used to quantify the anticipated outcome of improved functional status (Wanich, Sullivan-Marx, Gottlieb, & Johnson, 1992). Subjects who received the intervention were more likely to demonstrate an improvement in functional status from admission to discharge than those not receiving the intervention.

The Katz Index of ADL has potential for being a generic measure of functional status within an outcomes infrastructure given additional testing across settings of care and in the pediatric populations. The ADL elements were well described which would support sustained reliability. The data needed to complete the form should be easily collected during the routine course of nursing care. Of potential concern however, is that only a single indicator (transferring) directly reflects ambulation and mobility.

The Quality Audit Marker (QAM) (Holzemer, Henry, Stewart & Janson-Bjerklie,

1993) has strong potential for development into an instrument which could be used as part of an outcomes infrastructure. The QAM has demonstrated validity (content, construct, concurrent and predictive) and reliability in the HIV/AIDS (Holzemer, et al., 1993), hip and knee replacement (Ireson, 1993) and gerontological (Brown, 1992) populations. It has not been tested in children, to date. Three factors were assessed with ten items quantified with four- or five-point fixed choice ordinal scales: self-care (six items); ambulation (two items) and psychosocial well-being (two items). Taking fewer than five minutes to complete, it could be easily incorporated into the routine course of care. To meet the criteria for use within an outcomes infrastructure however, factors addressing knowledge and family/caregiver coping would require development and testing would be required in the pediatric population and across settings of care.

The documented use of the QAM has been in relatively controlled settings, i.e., during research involving identified populations, with specific education and training of those collecting the data and with close monitoring of reliability. Reliability is enhanced when assessment methods are supported with clear, concise descriptions and discrete categories and when rater training and competency is monitored and maintained (Padilla, 1989; Hays, Norris, Martin & Androwich, 1994). In an outcomes infrastructure model, part of the strength of an instrument is wording which leaves little ambiguity as to its strength or direction of meaning. The self-care and ambulation factors in the QAM are defined with four or five fixed choice options which are discrete enough to minimize the threat to reliability across providers and across settings.

The Health Status Outcomes Dimensions (HSOD) is a 17 item instrument developed to evaluate patient health outcomes sensitive to independent nursing intervention (Lush, Jones, & Outcomes Taskforce, 1995; Crawford, Taylor, Seipert, & Lush, 1996). The HSOD refined and expanded on the QAM (Holzemer, Henry, Stewart & Janson-Bjerklie, 1993) by adding items for knowledge, engagement in care, and the psychosocial well-being of the caregiver and family. Versions of the HSOD have been developed for four age groups including the infant, toddler, child and adult. The focus for instrument development was inclusion in an outcomes infrastructure through which patient outcomes could be monitored over time and across settings of care. The functional status domain of the HSOD includes measures of activities of daily living (n = 4 items), physical performance and ambulation. The instrument has demonstrated ease of use, validity, and reliability in the congestive heart failure, total joint replacement, and pediatric oncology populations.

The strength of the HSOD lies in its potential as a generic instrument to monitor for changes in diverse populations over time. A key weakness is its limited number of items in each domain reducing its value in specific populations. For instance, important measures of function in the total joint replacement population would include amount of pain, ability to do housework, and the ability and type of assistance required to ambulate prescribed distances (Johanson, Charlson, Szatrowski, & Ranawat, 1992). The HSOD measures of general physical performance and ambulation might not offer enough insight into the primary sources of variation in the outcomes of the total joint replacement population.

Knowledge

Knowledge is receiving greater attention in the literature as the increasing acuity of the patients coupled with reduced lengths of stay, require patients to assume additional and more complex levels of self-care at home (Lang & Marek, 1992). Despite its increasing importance, generic measures for assessing the knowledge in the patient, caregiver and/or family were not found in the nursing literature.

Rather than generic measures, the norm in the literature was studies where disease specific knowledge scales were used as predictors of behavioral outcomes or as tools for assessment of knowledge deficit. For example, Lacroix and associates modified a generic measure of symptom schemata to demonstrate that adult patients with chronic respiratory disease who were well-informed about their symptoms, functioned at a higher level physically, psychologically and socially than those less informed (Lacroix, Martin, Avendano & Goldstein, 1991). Chambers and Boggs (1993) developed a valid and reliable instrument to measure knowledge in adults with reduced kidney function (Chambers Kidney Knowledge Test (CKKT)). The CKKT was designed to assist healthcare providers in identifying learning needs and individualizing instructional efforts for their clients.

The Knowledge, Attitude, and Self-Efficacy Asthma Questionnaire (KASE-AQ) was designed to determine the pre and post intervention status of knowledge, attitude and perceived self-care abilities relating to asthma (Wigal, et al., 1993). The KASE-AQ has demonstrated reliability and internal consistency, with factor analysis supporting the presence of three subscales: knowledge, attitude and self-efficacy. The instrument is being used to evaluate both short term and long term outcomes of asthma education and self-management education.

Similar examples of condition-specific knowledge measures include: instruments with demonstrated reliability (test-retest and equivalence) and validity (content and construct) for assessing patient knowledge of cardiac catheterization (Blohon & Tyrala, 1993); a test of knowledge of surgical options for breast cancer with a reliable (modest internal consistency) and valid (content, construct) 18-item test (Ward & Griffin, 1990); and an instrument to determine the level of perceived knowledge and perceived learning needs in clients undergoing radiation therapy (Campbell-Forsyth, 1990). While each of the instruments in these studies has a narrow, population specific application, together they serve to demonstrate the increasing need of providers to establish the effectiveness of their interventions on outcomes achieved through the enhancement of patient knowledge.

An extensive review of the literature found no single measure with which knowledge in multiple domains could be assessed. The major nursing classification systems came closest to providing a measure for use across populations and disease states. The Home Health Care Classification (HHCC) of nursing diagnoses and nursing interventions is a research-based system which provides a model for measuring and evaluating home care and supports the documentation of care and resource requirements (Saba, 1992). Interventions are segregated into four groups one of which is teaching. Expected outcomes are documented as improved, stabilized or deteriorated.

Ozbolt (1992) noted that where outcomes were defined in terms of resolution of outcomes, the validity of the outcome was linked to the validity of the diagnoses. If the

HHCC (Saba, 1992) was the foundation for ongoing knowledge assessment in an outcomes infrastructure, the major assumption would have to be that the absence of knowledge deficit as an identified problem specifically implied the presence of at least an adequate degree of knowledge on the part of the client. What is difficult, if not impossible to assess, are the relative relationships between absence of a problem (and therefore adequate knowledge) and the states of deteriorated, stabilized and improved. While the ease of use of the HHCC method is clear and its sensitivity to change over the short term evident (for the individual patient), the lack of anchors to the outcome definitions is not compatible with the purpose and philosophy behind an outcomes infrastructure. For example, across patients in the HHCC, a deteriorated level of knowledge for one patient may equate with the same degree of knowledge for the patient with the outcome of improved. To monitor the degree of knowledge over time while retaining the ability to aggregate knowledge status and change at the population level, a set of more discrete descriptions of knowledge status is needed. This set of descriptions would need to include the extremes of the knowledge continuum so a valid statement of relative status can be made for all clients.

The Omaha System is another research based model designed to describe the characteristics of clients in diverse community settings, the services provided by nursing and the outcomes of those services (Martin & Scheet, 1992; Martin, Scheet & Stegman, 1993; Martin, 1994). The system includes a Problem Classification Scheme which places nursing diagnoses within four domains called Environmental, Psychological, Physiological and Health Related Behaviors. Periodic assessments of the client's knowledge, behavior and status are made for all identified problems using five point Likert-type scales, thus providing a routine assessment of knowledge in all domains of provided care. Given the ease of use of the measure and the demonstrated validity and reliability of the system in diverse settings and in multiple states and nations, the Omaha methodology provides a strong model for incorporating knowledge assessment within an outcomes infrastructure. The same limitation as the HHCC method exists in the Omaha System: unless a problem is identified, it is not clear whether assessment for knowledge was negative or did not occur at all. The Omaha System has a significant strength over the HHCC method in that the use Likert-type scales allows the placement of the patient's knowledge status along a continuum inclusive of the extremes of poor to excellent and with sensitivity to short term and long term change.

The HSOD instrument includes a measure of knowledge (Lush, Jones, & Outcomes Taskforce, 1995; Crawford, Taylor, Seipert, & Lush, 1996). Knowledge of the patient and of the caregiver are each assessed with a single item, 4-point scale. The use of a single item, generic measure of knowledge limits its applicability to surveillance for general trends within a patient population or nursing service, or for use to assess for change in knowledge for an individual during a specific healthcare event.

Engagement

The literature on measures of engagement in healthcare focuses on the engagement of the provider with the patient, rather than the engagement of the patient, caregiver or family with their own care. Nason (1990) discussed the changes in healthcare impacting the practice of the social worker in that engagement, assessment and intervention often needed to occur within the same session. For clients receiving social services, such as those with mental disabilities, engagement often referred to the degree in which the client participated in planned or community activities (Lowe, Beyer, Kilsby & Felce, 1992).

Engagement in care is similar to the concept of readiness in the domain of education. Nursing education literature has recognized for some time the importance of assessing the learner's readiness and willingness to engage in the educational process (Pichert & Stetson, 1994). Educators routinely assess the client's readiness to learn when planning their interventions as lack of readiness negatively impacts client outcomes. While readiness to learn is part of the evaluation process, the lack of readiness is not reflected in discrete diagnoses in the major nursing classification systems.

The willingness of the individual or caregiver to actively participate in their health maintenance and promotion is an important client variable (matrix cell 1) impacting the relationship between provider interventions (cell 5) and client outcomes (cell 3). This is because the degree of engagement will impact the processes, or self-care activities (cell 2) the client will or will not use to support their move towards positive health outcomes. As engagement is potentially an important covariate within the OMHCR matrix, it will be important to develop and test a generic measure of client engagement for inclusion within an outcomes infrastructure evaluating the effectiveness of nursing care. Monitoring and evaluating the impact of engagement on health outcomes over time will support the research needed to understand the relationship between engagement and health.

The HSOD instrument includes a measure of engagement (Lush, Jones, & Outcomes Taskforce, 1995; Crawford, Taylor, Seipert, & Lush, 1996). The single item measure

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measure is a four point scale designed to capture patient involvement in healthcare in terms of their level of participation and participation with providers in making decisions related to health promotion, disease prevention and treatment. In the HSOD, engagement in care is measured for both the patient and the caregiver. The instrument is completed by the nurse following his/her assessment of the client.

Psychosocial Well-Being

There is an increasing focus on trying to include the psychosocial well-being as an outcomes measure of nursing care. However, there are many aspects to psychological well-being which can be measured including affect or mood, cognitive ability, stress, anxiety, worries, contentment with life, enthusiasm with life, control over life, achievement of life goals, and adjustment to illness (Strickland, 1992). In contrast, Strickland identified social well-being in terms of limitation in social roles/role fulfillment, interpersonal relationships, ability to communicate, usefulness to others and recreational participation. Psychosocial well-being is frequently considered an essential measure within the construct quality of life (Murdaugh, 1992). Many of the available measures of psychosocial well-being were components of larger health status or quality of life scales. The length and complexity of these measures would make it difficult to integrate them into the normal practice of patient assessment, in multiple settings, and over time.

In a study of psychosocial resources of patients with chronic obstructive pulmonary disease, Leidy (1990) used the Modified Erikson Psychosocial Stage Inventory (MEPSI) (Darling-Fisher & Leidy, 1988) to measure the aggregate strength of personal characteristics and attitudes based on the eight stages of Eriksonian development. In addition, the Life Experiences Survey (Sarason, Johnson, & Siegel, 1978) was used to assess perceived stress. Both of these scales would be problematic for use in an outcomes infrastructure in an acute care setting. The MEPSI is composed of 80 items completed by the adult patient using 5-point Likert scales. The length of this scale is definitely problematic particularly as many acute care patients would not have the capacity or endurance to complete the scale. Patients completing the Life Experiences Survey are asked to indicate on a 7-point scale, the degree to which events experienced during the past year affected their lives. The reference to events of the last year makes it lack sensitivity to changes during the course of acute care and recovery.

The Medical Outcomes Study (MOS) SF-20 (Stewart, Hays & Ware, Jr., 1988) and the MOS SF-30 (Stewart, Hays & Ware, Jr., 1988) are strong, norm reference scales which captured aspects of psychosocial well-being. The scales are nationally recognized and drive many of the clinical trials in the country (Kelly, Huber, Johnson, McCloskey & Maas, 1994). The MOS scales could be both self-administered and administered by trained surveyors face-to-face or over the telephone. However, these two instruments are not appropriate measures for evaluating care within an acute care setting as the instruments focus on longer periods of time than experienced during normal hospitalizations. For example, many questions on the scales include as part of the stem "...during the past 4 weeks..." or "...during the past month..." (Stewart & Ware, Jr., 1992, p. 402-403). Likewise, in the absence of possible rescaling and retesting, the Health Assessment Questionnaire (Lubeck & Fries, 1993) would not be an appropriate measure as some of the concepts are measured with the MOS SF-20 or MOS SF-30 scales

(Stewart & Ware, Jr., 1992). The Short Form scales were developed for both self-administration and for face-to-face administration by different providers and different modes. There are no published studies documenting the comparability between the different modes/providers however.

An acute care version of the SF-36 has recently been published (Ware, Jr., 1993). Those questions which had been phrased in terms of a "4-week" recall are rephrased as a "1-week" recall period (p. 3:18). The acute version is recommended for use when administrations of the SF-36 are weekly or biweekly. While the Acute SF-36 is published and available, Ware Jr. (1993) noted that differences in effects between the Standard and Acute versions and the sensitivity of the two forms to acute changes in health were still under study.

The HIV Overview of Problems-Evaluation System (HOPES) (Schag, Ganz, Kahn, & Petersen, 1992; Ganz, Schag, Kahn, Peterson & Hirji, 1993) also covers psychosocial well-being and significant other/partner support. The 165 item HOPES required an average of 15.4 minutes (SD = 9.4, range 5-61) to be completed by patients. The HOPES has not been tested in other adult patient populations, nor in the pediatric population. The length of the HOPES and the time required for its completion would make its completion during the routine course of care and its subsequent translation into a database problematic. In addition, the HOPES includes concepts beyond that expected in a generic outcomes infrastructure for nursing within an acute care setting, i.e., sexual status and medical interaction. The medical interaction questions are designed to elicit patient satisfaction with medical care (Ganz, et al., 1993) by addressing problems of obtaining information, communicating with and control of the medical team (as opposed to the healthcare team). It would be inappropriate to remove subscales (sexual status, medical interaction) from the HOPES without reestablishing the psychometric properties of the remaining factors.

The Sickness Impact Profile (SIP) predates the development of the MOS scales. The SIP is a frequently used measure which includes 12 elements of health of interest to nursing, two of which are psychosocial and emotional behavior (Gilson, Gilson, Bergner, Bobbitt, & Pollard, 1975; Bergner, Babbitt, & Pollard, 1976). With validity and reliability established in multiple populations, the SIP is considered by some to be a benchmark measure, particularly for the elderly (Lohr, 1988). Its design however, is not conducive for use within an outcomes infrastructure. The 136 item survey takes approximately 40 minutes to complete, making it untenable in the acute care situation. The length of the instrument also makes its repeated use between short intervals a potential burden for the patient thereby increasing the potential for missing data. Missing data can threaten the validity of study results as can the strong potential for test-retest bias from repeated measurements in the continuum of care environment.

The Quality Audit Marker (QAM) (Holzemer, Henry, Stewart & Janson-Bjerklie, 1993) is a ten-item scale addressing functional status, ambulation, and includes measures of fear and anxiety. The reliability and validity of the QAM were discussed in the section on functional status. The QAM includes measures of fear and anxiety. Each is a four-point scale labeled "none - mild - moderate - severe." In the absence of discrete descriptions or definitions for each of the four levels, there is a significant potential for reduced reliability across clinical specialties and settings of care, particularly when the patient status is not at either extreme of the scale. For the QAM to be included in an outcomes infrastructure, discrete, descriptive wording will need to be developed to enhance the potential reliability of the instrument and to provide more confidence in any change over time observed through its repeated administration.

The 17-item HSOD includes measures of psychosocial well-being (Lush, Jones, & Outcomes Taskforce, 1995). The measures of psychosocial well-being include items for fear, anxiety, coping and altered role performance of the patient, role strain in the caregiver, in addition to measures of strain and coping in the family. The measures for patient's fear and patient's anxiety were modified from the original QAM (Holzemer, Henry, Stewart & Janson-Bjerklie, 1993) through the addition of descriptions for the mild, moderate and severe ratings. These changes were made to enhance interrater reliability across settings and specialties of care. However, the mild and moderate descriptions for patient's fear still lack specificity. The ease of use, validity and internal consistency reliability of the HSOD were demonstrated in the TJR, CHF and pediatric oncology populations (Henry, 1996; Lush, Henry, Foote, Jones, & Outcomes Taskforce, 1997). Issues relating to use of a generic instrument in the area of functional status also applies to the psychosocial domains.

Caregiver/Family Health Status

The impact of the patient's illness on the caregiver and the family is receiving increasing attention in the literature. This is particularly true in the presence of chronic disease and our aging population. Despite the great differences between caregiver characteristics and the nature of the caregiving relationship, the literature suggests that all caregivers are subject to adverse emotional, social, financial and physical health consequences (Naylor, Munro, & Brooten, 1991). Research in England linked chronic stress in caregivers to negative psychological and immunological changes in carers (Kennedy, Kiecolt-Glaser, & Glaser, 1988). Braithwaite (1990) characterized the physical, emotional, and social problems associated with caregiving as caregiver burden. This burden generates from the conflict between the requirements of the patient and the needs of the carer. Variables having significant impact on caregiver burden for those caring for patients with HIV includes living arrangements, the patient's emotional and spiritual concerns, and the patient's health status (Pakenham, Dadds, & Terry, 1995).

The home health nurse typically focuses on the organization of family resources to provide patient care (England, 1996). The lay caregiver attempts to integrate nursing care of the patient with other kinds of family care. This family care is perceived as different from nursing care. Support of the caregiver in the decision-making and planning processes is seen as essential to the timely management of clinical pathways and the achievement of patient and caregiver goals. England also cited the foundational work of Miller (1960) which recognized that caregiver decisions were driven by their beliefs of how things ought to be, ideas about their future, and how that future was to be secured. The importance of supporting caregiver decisions that do not conflict with his or her morals, values and beliefs is important to both goal achievement and to reducing stress and conflict for the caregiver.

Sensitivity to and management of caregiver burden and caregiver decision-making support must begin with valid reliable measures of knowledge, engagement and psychosocial well-being. As noted in earlier, generic, multi-population, multi-site measures are not readily available in these domains. One measure in the process of development is the HSOD (Lush, Jones, & Outcomes Taskforce, 1995). The infant, toddler, child, and adult versions of the instrument include single item measures of caregiver knowledge, caregiver engagement, caregiver role strain, family strain, and family coping. The strength of the HSOD lies in its ease of incorporation into the routine assessment process of the nurse. The single item measures are able to alert the nurse to issues requiring further data gathering and analysis. Holzemer and Henry (1991) examined the standardized nursing care plans for patients with HIV/AIDS. None of the plans included diagnoses or problem statements relating to caregiver or family needs. As the impact of caregiving on the caregiver and the family is emerging in the literature as an important domain for nursing, easy to use generic measures could be essential to bring this research domain into practice.

The limitation of the HSOD is its inability to point to specific areas within an element requiring support. For instance, the instrument provides a single measurement for caregiver role strain. However, the instrument does not provide other questions which might determine the source of that strain. Instruments that could provide this detail are significantly longer and less easily integrated into an outcomes infrastructure.

In their research on caregiver burden, Pakenham and colleagues (1995) used several measures to assess caregiver status. The Carer's Problem Checklist was used in addition to the Brief Symptom Inventory (BSI), the Psychosocial Adjustment to Illness

Scale -- Self Report (PAIS-SR), and the Coping Strategies Device. The Carer's Problem Checklist is a 28-item checklist which focused on sexual difficulties, grief, isolation, transport difficulties, and religious difficulties. Each question was answered 'yes' or 'no' within a time frame of the past month. The Cronbach's reliability analysis yielded an alpha of 0.75. When the Carer's Problem Checklist was administered to 34 caregivers of HIV patients, the most frequently checked items included distressing emotions, relationship difficulties, somatic symptoms, grief, concerns regarding confidentiality, the need for respite from caring, anxiety, isolation, issues with the healthcare system, depression, and acceptance of the patient's diagnosis of HIV (Pakenham, Dadds, & Terry, 1995).

The BSI (Derogatis & Spencer, 1982) is a 53-item symptom scale that measures nine primary symptom dimensions including somatization, obsessive-compulsive, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation and psychoticism. The PAIS-SR is a 45-item scale that consists of seven subscales designed to measure the impact of physical illness on behavior (Derogatis & Lopez, 1983). The scale has been validated and used extensively in chronic disease population to assess life adaptation (Pakenham, Dadds, & Terry, 1995). The original scale was rephrased for use with caregivers. The Coping Strategies Device (Viney & Westbrook, 1982) presents six groups of coping strategies on a card and asks the caregiver to rank each from the most likely to the least likely to use. The six groups of strategies included action, escape, control, fatalism, optimism, and interpersonal coping. The reliability coefficient of the instrument varied from 0.70 (over a month) to 0.90 (over a period of a day) (Viney & Westbrook, 1982).

Planning the Course of Care

The focus of this research project, is determine whether the nurse uses admission health status data to plan the patient's care in the hospital setting. Assessment, diagnosis, and outcome identification are steps in the nursing process which precede the writing of the plan of care (ANA, 1991). Evidence of assessment activities should appear in the patient record on the hospital admission assessment form and forms supporting patient care documents. The results of the nursing assessment of the patient's health status should be reflected in the nursing diagnoses, outcomes, and interventions written for the patient.

For an outcomes infrastructure to be of value in evaluating the quality of nursing care on achieving patient outcomes, there must be a clearly documented linkage between assessment and the care planned for the patient. However, the completion of patient care plans by nursing and/or the multidisciplinary team has been problematic in practice. Nurses often consider them a chore, rather than a tool for the provision of quality care. While considered supportive tools for new staff, experienced nurses tend to find care plans restrictive (Holzemer & Henry, 1991).

Contributing to the lack of similarity in written plans of care, could be the ambivalence of nursing towards the use of nursing diagnoses. The use of nursing diagnoses has been inconsistent and problematic for nursing. Agency preparation for accreditation surveys frequently sparks a concerted effort to monitor that nursing diagnoses are in fact being written and care plans individualized for the patient. Nurses have demonstrated frustration in selecting appropriate nursing diagnoses for the patient

(Carpenito, 1991). Gordon (1987) observed that nurses frequently focused on the selection of diagnoses from a list rather than on the process of collecting and interpreting that data needed to make an appropriate selection. This general frustration exists despite the fact that the writing of nursing diagnoses is a part of the nursing process as defined in the standards of practice of the ANA (1991).

There are five areas in which nurses may experience problems in making nursing diagnoses (Price, 1980). These include: a) defining a health problem based on insufficient data, b) overlooking an important cue requiring further assessment to determine whether a health problem exists, c) collecting and interpreting data based on preconceived notions of what client responses should be, d) identifying a symptom or cue as the nursing diagnosis, and e) linking diagnostic statements in an incorrect order (p. 668). Dobrzyn (1995) noted these same issues and concerns may or may not exist today. The literature is not encouraging.

Holzemer and Henry (1991) studied standardized care plans developed for persons with AIDS (PWAs). The care plans were developed at four agencies including a public and a private medical center, a public health nursing department, and a public hospital. Each of the four agencies studied had extensive experience caring for this population with complex care needs. The four facilities were located in the San Francisco area where there was extensive sharing of information between organizations and between providers relating to the care of PWAs. Despite this, there was little inter-agency similarity between the problems listed and the conceptualization of the problems on the care plans. The only areas on commonality across the four agency care plans were related to psychosocial and

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nutritional problems. The authors noted that these two areas also varied in levels of conceptualization.

In another recent report, the problem lists generated by physicians, nurses and PWAs were compared for content and overlap (Henry & Holzemer, 1995). Problem lists were reviewed from three institutions which utilized three different modes of nursing care planning systems: computer-based; standardized, paper-based; and handwritten. The most frequently occurring problems on lists generated by nursing were related to: respiratory function; body temperature; knowledge deficit; psychosocial concerns; nutrition; level of activity; and alterations in elimination (Henry & Holzemer, 1995). Nursing's unique contribution to the care of PWAs was demonstrated by the problems found exclusively on the nursing generated lists including those related to knowledge deficit and potential for injury. Of concern however, are the data which demonstrated that 34% of patients had identified a psychosocial problem on their problem list which was not identified on either a nursing or physician developed problem list. Given nursing's focus on human responses to actual or potential illness (ANA, 1980) and the complex needs of PWAs, it is disappointing that so many psychosocial problems were not acknowledged on the nursing generated problem list. Either the psychosocial problems were not identified, or they were determined by the nurses to be of relatively low priority for the inpatient stay.

If the lack of consistency and comprehensiveness of care plans for PWAs is typical for other patient populations, then there are serious implications for nursing's move to define the value of nursing in terms of nursing's impact on patient outcomes. The care plan should reflect the independent assessment and intervention of the nurse on behalf of the patient. The lack of consistency in care plans within a specific patient population suggests a lack of consistency in the care nursing provides. Holzemer and Henry noted that there is meager research available linking the use of standardized plans of care with patient outcomes (1991). As experienced staff nurses do not consider care plans of value, research is needed to determine whether the care actually provided to PWAs is more consistent in practice than the documentation on the care plan would suggest.

Dobrzyn (1995) used retrospective chart audit to examine whether nurses in an acute care setting correctly selected nursing diagnoses and constructed nursing diagnostic statements. The Ziegler Criteria for Evaluating the Quality of the Nursing Process (Ziegler, 1984) were used to evaluate 150 diagnostic statements written for 36 patients by nurses in a 237-bed acute care hospital (Table 3). The patient populations included in the sample were diverse and included inpatient units caring for surgical, medical, trauma, and neonatal patients. An average of four nursing diagnoses were selected for each patient (range 2 to 9). A total of 150 diagnostic statements were evaluated with only 4 (2.7%) meeting all quality criteria. When the 12 criteria were grouped into three larger component groupings (general, response, etiology), only 54 (36%) met the four criteria for the general grouping, while five failed all four of the general criteria. The etiology criteria were failed most frequently, with 68.6% of all statements meeting only one or none of the four etiology criteria. These results occurred despite each nurse participating in an intensive eight hour class on the components and writing of nursing diagnoses.

In contrast to the above studies, is the research examining the linkage of nursing diagnoses with etiologic factors and prescribed interventions (Coenen, Ryan, Sutton,

Table 3

Ziegler's Criteria Defining a Quality Nursing Diagnostic Statement

Component	Criteria
General	1. The response and etiology components are both present. 2. A 'related to' phrase is used to join components of the statement. 3. The response component is always first and immediately followed by the etiology component. 4. The diagnostic statement is asymmetrical, not circular.
Response	5. The response component specifies a clearly unhealthy state or a potentially unhealthy state. 6. Only one response is identified per diagnostic statement. 7. The response can potentially be modified. 8. The response is concrete allowing for the writing of specific client goals.
Etiology	9. Each diagnostic statement identifies only one etiology. 10. The etiology is potentially changeable. 11. The activity requiring modification is within the realm of the independent practice of nursing; the nursing being capable and is legally and ethically expected to treat. 12. The etiology is specific enough to allow the writing of specific nursing interventions.

Ziegler, Vaughan-Wrobel, & Erlan (1986).

Devine, Werley, & Kelber, 1995). The research work by Coenen and colleagues suggested that nurses will, in fact, individualize the interventions selected for the patient based on assessment data. Their research examined the interventions chosen by the nurse in response to selected nursing diagnoses and identified related factors. Data were derived from individualized standardized plans of care documented in a nursing information system. The setting was a public hospital with shared services for six other facilities. Data were reviewed from 13,135 patients admitted to the hospital during 1991. The authors reported the demographics of the sample but did not include a description the population in terms of medical diagnosis. This makes it difficult to interpret the appropriateness of the 'related to' factors.

The nursing information system at the study facility provided on-line care planning in which the nurse was able to select aspects of standardized plans of care. Patient records were selected which had at least one of the following nursing diagnoses on their plan of care: pain; potential for injury; anxiety; decreased cardiac output; potential for infection and knowledge deficit. These diagnoses were selected as previous study had identified them as the six most frequently occurring nursing diagnoses selected by nurses in the hospital. Interventions were coded to one of sixteen categories and linked to the diagnoses and the related factors. The intervention classification scheme was derived from the work of the Task Force of the Nursing Minimum Data Set Conference (Werley & Lang, 1988).

Study results showed that nurses used three to four related factors to describe the origin of each diagnosis. For instance, the four most common related factors selected for 'potential for injury' accounted for 84% of the related factors selected (Coenen, et al., 1995). These included inability to maintain own safety (50.4%), high risk for falls (18.5%), sensory and motor deficits (9%) and safety needs of hospitalized pediatric client (6.1%).

The interventions selected by the nurses varied in percentage across the six diagnoses. The most frequent intervention was teaching which was selected 34% of the time (Coenen, et al., 1995). Teaching was most frequently linked with knowledge deficit (75%) and least frequently with decreased cardiac output (22%). In contrast, monitoring and surveillance was most frequently linked to decreased cardiac output (49.3%) and least frequently with anxiety (2.9%). Interventions selected also varied in percentage across the related factors. The three most commonly used related factors for the diagnosis potential for infection included: lack of knowledge of wound care; central line placement; and potential for urinary tract infection (Coenen, et al., 1995). Teaching was selected as an intervention 83.7% of the time for the diagnosis lack of knowledge of wound care, and 48.7% of the time for the diagnosis of urinary tract infection. For the related factor central line placement, teaching was never selected in this study. Instead, the most frequent intervention for central line placement fell into the category of monitoring and surveillance (59.6%).

The above study data were collected across multiple and diverse patient populations in an acute care setting. While the specific populations were not reported, data were included from 13,135 admissions meeting study criteria during 1991. There was a definite relationship between the diagnoses selected, the related factors identified and the interventions prescribed for the patients. However, the above research was conducted in a hospital where there has been a long standing philosophy supporting the development, implementation and evaluation of a nursing minimum data set. The nursing information system used by nurses supported the identification, selection and linkage of diagnoses, related factors and interventions. This important work needs to be replicated in other hospital settings. If the same relationships can be demonstrated, nursing will have a good foundation for moving forward in defining quality care to our public in terms of our independent practice.

Nursing Interventions

The use of interventions to define nursing practice is problematic. It is generally acknowledged that no single intervention, except possibly when defined at the highest level of the concept, can possibly be wholly responsible for the outcome of a healthcare event. Outcome variations linked to a provider's intervention can be the result of differences in the resources used to provide or support the provision of care by provider and setting; differences in the history and health of the client; or the diverse activities of the setting and client taking place parallel to or in direct support of the healthcare event (Holzemer & Reilly, 1995).

The International Council of Nurses (ICN) has called upon nursing leadership to respond to the now famous battle cry of Norma Lang who stated: "If we cannot name it, we cannot control it, finance it, teach it, research it or put it into public policy" (ICN, 1993). The naming, sorting and linking of phenomena describing nursing practice will enable nurses to:

- "describe what nursing is and does;
- explain how nurses respond to particular human situations in ways that enable people as individuals, families and communities -- to achieve and maintain good health; and
- predict what nurses could do in response to particular human situations that would produce desired outcomes." (ICN, 1993, p. 5)

As healthcare organizations struggle to compete and survive on the basis of cost, the need to establish the most cost effective process through which quality outcomes can be achieved has reached a critical threshold. To meet these needs, a comprehensive understanding of the impact of nursing interventions of patient outcomes must be achieved. This knowledge will include: a) definitions of interventions or nurse behavior (McCloskey & Bulechek, 1992a); b) an understanding of interclinician variability among nurses (NCNR, 1992); c) the identification of contextual influences on nursing practice (Holzemer & Reilly, 1995); d) the recognition and understanding of parallel activities of the client, setting and other providers on the care process (Holzemer & Reilly, 1995); and 5) the differentiation between short term outcomes versus long term outcomes occurring over time and encounters (Hegyvary, 1991). Before outcome research can occur across sites of care however, there must be a method of defining or linking practice to a common definition of intervention such that comparative analysis can occur.

The paucity of multiple site research into the impact of nursing interventions on patient health outcomes may be partially related to the absence of a consistent definition or interpretation for the concept of intervention within nursing. There is no single, agreed upon definition of the term. An intervention can be described both in the terms of the very discreet and specific or in terms of the general and abstract. For instance, an intervention could be considered a task or procedure (i.e., change a dressing), a multidisciplinary care path for care of the patient undergoing total joint replacement, a group of tasks selected by the nurse in response to a patient problem, or a multidisciplinary methodology through which a substance abuse patient is induced to enter a treatment program.

Trying to define interventions becomes even more complex when overlaid with the questions of what actions or interventions represent professional nursing and which actions or interventions belong in a nursing intervention classification system or database. Workload measurement systems (a form of patient classification system) which document the tasks required for each patient on a daily basis are being down played as representing the nonprofessional aspects of nursing (V. Saba, personal communication, July 25, 1995).

Adding to this general confusion surrounding interventions are key measurement issues (Hegyvary, 1991). These include timing, or the definition of the period of time in which the outcomes are to be achieved; the level of analysis, indicators and approach as associated with the purpose of the study; and attribution, or determining whether the intervention actually caused the effect despite the delay between intervention and outcome measurement. All of these factors make it increasingly difficult to isolate the effect of the nursing intervention from the interventions of other caregivers and naturally occurring events with the patient's immediate and extended environment.

Nursing Minimum Data Set

Efforts to define interventions began with Werley and Lang's (1988) call for the implementation of a Nursing Minimum Data Set (NMDS). The NMDS was envisioned as the foundation for comparable data supporting the study of clinical populations, setting, practice and resources needed to define the contribution of nursing to healthcare. There are three primary components to the NMDS including nursing care, client demographics and service elements. Nursing interventions are included in the four nursing care elements along with nursing diagnosis, nursing outcomes and intensity of nursing care. The Nursing Intervention Task Force of the NMDS project agreed that a definition for nursing intervention should encompass "nursing actions, stemming from diagnoses and leading to desired outcomes" and that the definition should "...describe nursing actions as being autonomous, in the sense that nurses decide when, if and how to carry out the action or orders" (Werley and Lang, 1988, p. 388). The final approved NMDS definition reads: "A nursing intervention is an action expected to benefit the patient for which nurses are responsible" (Werley & Lang, 1988, p. 389).

Initially, interventions for the NMDS were conceptually linked with the independent use of the nursing process with the nurse managing and coordinating the plan of care (i.e., the nurse deciding "...when, if and how..."). In contrast, the final definition encompasses a broad range of nursing activities. Examples of nursing intervention data include: assessments, comfort care, treatments, teaching, self-care techniques, medications, provision of medically ordered treatments, patient preparation for treatments and procedures, coordination of care, emotional support, counseling, assisting the activities of daily living and diversional therapy (Werley & Lang, 1988, p. 311). These data represent the nursing process, tasks directed by physician and nursing orders in addition to activities reflecting the scope of nursing practice.

International Classification for Nursing Practice

The International Council of Nurses' (ICN) definition of intervention may be the most inclusive. The ICN (1993) sponsored a plan to develop an International Classification for Nursing Practice (ICNP) for use in all arenas of nursing practice (ICN, 1993). Rationale for the development of the ICNP included the description and organization of nursing data for the purposes of health related decision making, the development of knowledge and the support of research, teaching, and the delivery of effective nursing care.

For the purposes of the ICNP, interventions are "Actions undertaken by nurses as part of the activity of nursing in response to assessed nursing needs; the words action/intervention/prescription/treatment/ procedure are used interchangeably...to encompass the full range of nursing activity which includes health promotion, the prevention of illness, the restoration of health and the alleviation of suffering." (ICN, 1993, p. 13) Assessment is also subsumed under intervention for the initial phases of the ICNP project although the ICN noted assessment may be broken out separately in the future.

One of the initial steps in the process used to develop an exemplar of intervention labels, was to review the labels incorporated in 10 systems known in the nursing literature (ICN, 1993). Three major systems endorsed by the American Nurses' Association (McCormick, Lang, Zielstorff, Milholland, Saba, & Jacox, 1994) contributed the majority of the labels with the Nursing Interventions Classification (McCloskey & Bulechek, 1992b) providing 319, the Home Health Care Classification (Saba, 1992) contributing 168 and the Omaha System (Martin & Scheet, 1992) supplying 50. The remaining 166 were adopted from the seven remaining systems.

In a recent update on the activities of the ICNP project, Clark (1995) acknowledged the potential bias of the original listing of the ICNP due to its over-reliance on the English language sources. Nor was the original ICNP comprehensive, as evidenced by work of the United Kingdom (U.K.) Nursing Terms Project which has identified 20,000 diagnoses, intervention and outcome natural language terms used by U.K. nurses

(Clark, 1995). The U.K. alphabetic listing has not been structured as it is still growing via literature review (personal communication, M. Wake, October 27, 1995) and was rapidly approaching 40,000 terms. The U.K. project focused on a "bottom-up, clinically led approach" (Clark, 1995, p. 9) as opposed to a statistically focused, top-down, information technology approach. The ICN supports the bottom-up approach as being most likely to produce a language that would be seen by the ordinary nursing practitioner as meaningful in describing and structuring practice.

American Nurses' Association

Despite its interest in the development of standard nomenclatures for nursing (American Nurses' Association (ANA), 1989), the ANA has failed to provide a direct definition of intervention. Rather, intervention is integrated within the definition of the nursing process.

> "The nursing process encompasses all significant actions taken by nurses in providing care to all clients, and forms the foundation of clinical decision making. Additionally, nursing responsibilities for all clients (such as providing culturally and ethnically relevant care, maintaining a safe environment, educating clients about their illness treatment, health promotion or self-care activities, and planning for continuity of care) are subsumed within these standards" (ANA, 1991, p.4).

Given this definition and the circular nature of the care process, it is difficult to determine whether the nursing process is the intervention or whether interventions are a single step in the process. Are the decisions to assess, plan, monitor or evaluate interventions or actions taken on behalf of the patient?

The ANA Cabinet of Nursing Practice established the Steering Committee to Support Clinical Nursing Practice (SCSCNP) (McCormick, Lang, Zielstorff, Milholland, Saba, & Jacox, 1994). Rather than developing its own nomenclature or classification system, the SCSCNP developed criteria for reviewing and recommending existing or developing systems for use by nursing. ANA rationale for supporting the development of nursing nomenclatures included the development of a national database documenting what nurses do in a standardized, systematic manner in the support of research and policy making. To obtain the recommendation status by the SCSCNP, nomenclatures must reflect ANA Nursing Process Standards, include elements of the NMDS (Werley & Lang, 1988) and must:

- "Be clinically useful for making diagnostic, intervention, and outcome decisions.
- Be stated in clear and unambiguous terms, with terms defined precisely.
- Demonstrate evidence of testing for reliability.
- Have been validated as useful for clinical purposes.
- Be accompanied by documentation of a systematic methodology for development.
- Be accompanied by evidence of process for periodic review and provision for adding, revising, or deleting terms.
- Provide a unique identifier or code for each term." (McCormick, et al., 1994, p. 422).

The Omaha System (Martin & Scheet, 1992), the Home Health Care Classification (Saba, 1992) and the Nursing Intervention Classification (McCloskey & Bulechek, 1992b) have each been approved by the SCSCNP for use in describing the interventions making up nursing practice (McCormick, et al., 1994).

The Omaha System

The Omaha System (Martin & Scheet, 1992) is considered the oldest of the classification systems (Moorhead, McCloskey & Bulechek, 1993). The System, developed as both a documentation and data gathering system, describes the characteristics of clients in diverse community settings, the services provided by nursing and the outcomes of those services (Martin & Scheet, 1992). The system has received extensive testing for reliability, efficiency and utility in multiple community settings nationally and internationally (Martin, 1994).

The Omaha System consists of three major components within the conceptual framework of the nursing process: problems, interventions and outcomes. Within the Omaha System, the conceptual definition of intervention links it with planning: "Intervention describes activity that follows a thought process or written exercise usually referred to as planning. Intervention is often used simultaneously with terms such as 'approach,' 'order/prescription,' 'care/service,' 'strategy,' and 'treatment'" (Martin & Scheet, 1992, p. 37). In contrast the Omaha operational definition of intervention is: "An action or activity implemented to address a specific client problem and to improve, maintain, or restore health or prevent illness. The intervention always includes a category and target(s); it usually includes client-specific information" (Martin & Scheet, 1992, p. 84).

Within the Omaha System, interventions are designed to be used with nursing diagnoses and are divided into four categories: health teaching, guidance and counseling; treatments and procedures; case management; and surveillance. These four categories are considered mutually exclusive and are purported to represent the essence of community health nursing in terms of both priority and time. Within the four categories are 62 interventions or targets (i.e., cast care, exercise, bonding) that are considered the objects of nursing activities (Martin & Scheet, 1992). The alphabetical list of targets is not considered exhaustive and so "other" is available as the 63rd target. The third and last level of the intervention scheme includes client specific information. Client specific data are those discrete tasks, procedures, or activities required to address a specific patient problem or nursing diagnosis. They are individualized for the patient but not drawn from a standardized, coded list.

Home Health Care Classification

The Home Health Care Classification (HHCC) (Saba, 1992), also known as the Georgetown Intervention Classification, was designed to measure, evaluate and cost out home care. The HHCC also provides a dictionary of information encompassing home health nursing, documentation and research. The HHCC consists of nursing diagnoses and nursing interventions derived from the analysis of 8,961 discharged cases seen at 646 home health agencies across the nation (Saba, 1992). The HHCC is research-based, provides a model for measuring and evaluating home care, maintains a data dictionary for information systems encompassing home care nursing and offers an approach for documenting care and resource requirements.

For the HHCC, "A nursing intervention is defined as a nursing service, significant treatment, intervention or activity identified to carry out the medical and nursing order" (Saba, 1992, p. 52). Interventions are segregated into four groups: assessment; direct care. teaching.

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care; teaching; and management of nursing services. These are very similar to the four major groupings within the Omaha system. As with the Omaha System, three levels are used in the intervention schema. At the first level are 20 categories or groups of interventions called components. Subsequent analysis sorted 80,283 interventions into 60 major categories (i.e., counseling service, emotional support, terminal care) and 100 subcategories (coping support, stress control). Each third level intervention term is then classified by one of four actions: assess, care, teach and manage. The lowest level of each of the intervention definitions (subcategory) would still require detailing on the care plan or via protocols of care, those specific activities or tasks necessary to implement or complete the intervention. One of the benefits of the HHCC is that it is both a classification and a coding scheme, thus making data retrieval for the purposes of research and analysis of practice much easier.

The Nursing Interventions Classification

The Nursing Interventions Classification (NIC), was developed to document the nursing care provided patients and to develop nursing knowledge by examining the impact of nursing practice on patient outcomes. Secondary purposes of the language include the costing of nursing services, the support of research and policy making. The NIC, which purports to reflect all areas of nursing practice, defines interventions as nursing actions or behaviors, or those things nurses do to support the patient in moving towards the desired outcome (McCloskey, Bulechek & Cohen, 1990; McCloskey & Bulechek, 1992b). The terms interventions and treatments are used interchangeably. Interventions, are defined at the conceptual level, requires a series of actions or activities to carry them out, and can be initiated by physician order or nursing order (McCloskey & Bulechek, 1992b). More recently, McCloskey and colleagues have expanded the definition of intervention by observing that nursing is both a thinking and an action discipline and as such, interventions will focus on both the procedural or concrete, and the conceptual and the abstract (McCloskey, Bulechek, & Iowa Intervention Project Group, 1994).

The NIC classifies 402 interventions (Iowa Intervention Project, 1995) within six major conceptual groupings (physiologic basic, physiologic complex, behavioral, family, health system, safety). These six groups represent significantly different approaches to categorizing interventions when compared to each of the four major groupings of the Omaha System (Martin & Scheet, 1992) and the HHCC (Saba, 1992). Within the description of each intervention, are lists of activities which in combination, define the intervention. Despite the emphasis on the conceptual and the concrete in the expanded definition of intervention, tasks and procedures are still not classified as interventions. Healthcare institutions can in fact select different sets of activities from those listed to define the intervention for their specific environment (G. M. Bulechek, personal communication, July 25, 1995). This reinforces that discrete activities of care are not considered interventions, but rather components of an intervention.

Summarizing Similarities and Differences

While nursing leaders may agree that standardizing nomenclature is foundational to the development of clinical and management information systems, there is an absence of consensus surrounding which system to use and for what purpose. There are remarkable similarities in definition and purpose across the systems. Despite these similarities, the differences in the content of the systems is remarkable. The distinction between the discrete versus the abstract, the straight forward and the complex, seems to be the foundation for these differences. Are interventions those terms for discrete assignments made to ancillary personnel, those sets of tasks needed to address a specific patient problem or that collection of protocols and standards planned to move the patient through a healthcare event? Are interventions being used to define the productivity of each skill level on a particular unit, to determine the relative effectiveness of cardiac monitoring in two different institutions, or to determine those functions of nursing which contribute to the positive health outcomes of the client? Three very different levels of abstractness are reflected in these questions. The way in which these questions are answered may well force the selection of the intervention nomenclature through which nursing will be defined at the institution.

Intervention, as a concept, can be evaluated along a "abstract/concrete dimension" (Meleis, 1991, p. 220). The level of abstract/concrete is related to the degree of generality (Meleis, 1991; Jacox, 1992). The higher the level of abstraction, the more general is a concept, and the more it transcends time and location (Meleis, 1991). Abstractness "...is evaluated by length of reduction and deduction between its propositions. A highly abstract theory requires more steps to reduce the chain 'connecting the theoretical terms with the observable ones' (Kaplan, 1964, p. 301)." (Meleis, 1991, p. 229). "As one moves up the level of abstraction in order to develop systematic explanations of general phenomena, one is faced with the problem of relating back from the symbolic concepts to concrete phenomena." (Hardy, 1991, p. 375).

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The differences in levels of the discrete versus the abstract, are magnified when the rationale behind incorporating intervention data into effectiveness research is considered. Nursing is described as both a thinking and an action discipline and, as such, interventions will focus on both the procedural or concrete, and the conceptual and the abstract (Ozbolt, Fruchtnicht, & Hayden, 1994a). It is considered important by some for an interventions systems to capture both (Ozbolt, Fruchtnicht, & Hayden, 1994a; ICN, 1993). Others suggest that the inclusion of discrete tasks and activities confuses the analysis of nursing's impact on care by focusing on the nonprofessional aspects of that care (Virginia Saba, personal communication, July 25, 1995). [Note: in this case, Saba's definition of nonprofessional is referring to the technical aspects of care, or those not represented by the knowledge and professional assessment, planning and management of the nurse.]

No current American nursing nomenclature system links the discrete elements of practice with abstract labels of that practice. For this reason, nursing executives find themselves in a position of having to create their own standardized language to meet their particular needs. The University of Virginia, Thomas Jefferson University Hospital (UVTJH) found themselves in this exact situation (Ozbolt, Fruchtnicht, & Hayden, 1994a).

University of Virginia, Thomas Jefferson University Hospital Experience

The nursing leaders at UVTJH had the goal of establishing a comparative database through which the effectiveness of nursing practice could be studied. They wanted to be able to answer questions such as:

- By patient population, which activities do different clinicians use to resolve the problem? Which patient care activities offer the best combination of greater effectiveness and lower cost?
- Given sets of activities with similar outcomes, are some more likely to increase customer satisfaction with the care provided?

Having decided on the type of effectiveness research the institution wished to conduct, UVTJH reviewed the literature for available intervention nomenclatures. Ozbolt and colleagues were concerned that the available classification systems were designed under the assumption that minimal variation exists in the activities subsumed under the intervention label. Given this assumption, variations in practice research at the level of an abstract intervention (i.e., a protocol) might not be appropriate. Two units may implement interventions of the same labels for their cardiac patients, but incorporate very different activities and procedures within the interventions. Practice would appear to be exactly the same and a more detailed examination of the components of that practice would be required. So, unless and until nursing practice is standardized within a prescriptive label, comparative research at that level cannot be done. As the UVTJH team was unable to find a single system meet their identified operational and database needs, the decision was made to adapt the Saba HHCC (Saba, 1992) classification and coding methodology (Ozbolt, Fruchtnicht, & Hayden, 1994a).

Implications

The ANA has endorsed three classification systems for the purposes of labeling nursing interventions (McCormick, Lang, Zielstorff, Milholland, Saba, & Jacox, 1994).

That the ANA agreed to recognize more than a single language implied that the needs of the profession could not yet be met through any single, currently available research based nomenclature. The work of the ICN (1993) clearly supports the premise that there is still no single classification system available which meets everyone's needs.

Nursing is a relative neophyte in effectiveness research. This is evidenced by the lack of health related criteria by which the Institute of Medicine and the ANA could have defined the quality of nursing care in the acute care setting. Because best practices have yet to be defined, the activities which constitute best practice are unknown. Use of a classification system and a database which are useful and provide clinical discreetness is essential to this research (Ozbolt, Fruchtnicht, & Hayden, 1994b). Conversely, a critical goal of the nursing profession is to be able to define and communicate to the public and payers of care, what nurses do and the contribution of nursing to outcomes of care. To do this, a database at the level of abstractness of the NIC is also of value as it facilitates communication and brings the essence of the functions of nursing to the forefront.

There is a general acceptance that nursing must be able to define its value and contribution to achieving patient health related outcomes. There is currently no single intervention nomenclature which meets the diverse needs of nursing. Each recommended system was developed to meet the particular needs of its users and provides at some level, information about the practice of nursing. However, as none of the systems link the discrete aspects of practice with their intervention labels, nursing executives must either develop their own method of linking practice to the abstract definitions of one of the 'recommended' systems, or develop and test their own nomenclature system.

Other Sources of Variation in the Proposed Study Relationships

The OMHCR (Holzemer, 1992, 1994; Holzemer & Reilly, 1995) suggests there are several sources of variation which could impact the relationship between client admission status and the care planned by the nurse. For instance, Leidy (1995) discusses the importance of distinguishing the capacity to function (i.e., is able to be very active and could participate in sports) from the actual level of performance of the individual (patient chooses sedentary activities and not to exercise). A patient may be capable of ambulation without assistance. However, orders could be written for bedrest in the presence of an acute myocardial infarction. In contrast, another patient with an acute myocardial infarction could have the capacity to ambulate only with the assistance of a walker and another person. This same patient could also be placed on bedrest. In this example, the patients who had very different admission assessments based on capacity, could have the same admitting activity orders as a result of process variables (i.e., care paths, standards of care). Correlation studies would suggest that there is little relationship between admission status (based on capacity) and plans of care. The intervening process variables could be standards of care, critical paths or standardized care plans requiring bedrest during the first 24 hours post myocardial infarction.

Mediating variables which could impact the care planned for the patient require identification and measurement if the variation reflected in the results of a study is to be correctly interpreted. Examples of variables which could mediate the relationship between the admission health status assessment and the writing of the plan of care are shown in Table 4. The linkage of the variable to the Outcomes Model for Health Care Research

(Holzemer, 1992, 1994; Holzemer & Reilly, 1995) is also included in the Table 4.

Table 4

Sources of Variation Impacting Relationship Between Client Input Variables and the Process of Planning Care

OMHCR[1,2] Cell	Cell Description	Variables
1	Input/Client	Medical Diagnosis Demographic Information Age, Gender, Race
4	Input/Provider	Experience of Nurse Creating Plan Education of Nurse Creating Plan
7	Input/Setting	Skill Mix Staffing Ratios
2	Process/Client	Self-Care Activities Care Activities of Caregiver and Family
5[1]	Process/Provider	Multidisciplinary Care Paths Standardized Care Plans Standards of Care
8	Process/Setting	Physician Provider Orders Ancillary Departments Providing Care

[1] OMHCR: Outcomes Model for Health Care Research
[2] Holzemer, 1992, 1994; Holzemer & Reilly, 1995.

This study was designed to record or measure potential sources of variation from setting, provider, and client variables which could impact the process of care planning. Where there was variability within a variable (e.g., different diagnoses, different providers), the variable was treated as independent during data analysis. Controlling for the impact of these variables on the dependent variable allows the relationship between measures of client health status variables and the care planned by the nurse to be analyzed with the least amount of 'noise.' Where there was no variation in the variables (i.e., a single model of care), data were collected for descriptive purposes only.

Input/Client

Medical Diagnosis

A patient's principal diagnosis is a key predictor of clinical events and consumption of resources (Iezzoni, 1994). Inguinal hernia, myocardial infarction, stroke, and multiple trauma are all vastly different in their short term and long term consequences in terms of health and cost. As patients age, multiple acute and chronic illnesses could overlap. In combination, these 'co-morbidities' add to the complexity of care, and increase the risk to the patient of poor outcomes. Patients with comorbidities frequently need additional diagnostic exams and require increased surveillance. These patients will also have a higher risk of death, increased risk of complications, lower reserves, and decreased recuperative powers (Iezzoni, 1994).

Age

In most comparable clinical situations, age is an important source of variation in observed outcomes (Iezzoni, 1994). In general, older individuals tend to have poorer outcomes than younger persons. In addition, costs of care are higher for the elderly due to prolonged periods of recovery and greater potential for complications. In a study of the impact of clinical variables on in-hospital mortality and length of stay, outcomes were compared for 16,622 patients and 17,440 intensive care admissions in 42 intensive care units throughout the United States (Knaus, Wagner, Zimmerman, & Draper, 1993). Data analysis demonstrated that 90% of the variation in mortality rates and 78% of the variation in lengths of stay were attributable to the patient's status on admission. Age accounted for 7.3% of the variance in mortality rates, and 3.4% of the variation in length of stay.

Age is considered to have an independent effect on outcomes, regardless of other patient attributes (Iezzoni, 1994). While age may not always be statistically significant as a variable, its ease of capture and face validity as a risk adjustment factor, makes it an important variable to capture particularly when designing a risk adjustment strategy. For this reason, major severity indexes and programs for risk adjustment include age as a factor. Examples include the Acute Physiology and Chronic Health Evaluation (APACHE III) (Knaus, et al., 1991), the Pediatric Risk of Mortality (PRISM) (Pollack, Ruttimann, & Getson, 1988) and the risk adjustment methodology used by the California Hospital Outcomes Project in evaluating the quality of hospital care (Office Statewide Health Planning and Development (OSHPD), 1993).

Gender

Gender, in general, is another easily gathered variable which can be important in assessing patient risk (Iezzoni, 1994). While the genesis of the differences are not always understood, men and women differ in life expectancy, rates of cancer, cerebrovascular disease, myocardial infarction, diabetes and accidents (Iezzoni, 1994). There are also gender differences in resource utilization. In a study of health service utilization by 1,031 patients with HIV (10% female), women were more likely to use the emergency room and have an inpatient admission while reporting fewer outpatient visits (Mor, Fleishman, Dresser, & Piette, 1991). Gender is also a risk factor in the California project evaluating hospital quality based on discharge databases (OSHPD, 1993).

As with age, gender may have an independent effect on outcomes, regardless of other patient attributes (Iezzoni, 1994). Iezzoni review the research which suggests that women have higher mortality rates than men post coronary artery bypass graft, even after adjusting for age, ejection fraction, angina class, number of vessels involved, comorbidities, and whether the procedures were performed under emergency conditions.

Race

Racial attributes could have a critical effect on both short term and long term patient outcomes (Iezzoni, 1994). Race, culture and ethnicity could impact outcomes by impacting compliance with therapy, diet, engagement in care and attitudes to medical care. Patients bring culturally defined beliefs and practices to the experience of illness that influence their encounters with the healthcare system and their responses to care (Gerteis, Edgeman-Levitan, Daley, & Delbanco, 1993). Culture drives not only what patients and clinicians believe about health and illness but also how they act and expect others to act in a given clinical situation.

While age and gender are considered to have independent effects on outcomes, Iezzoni warns against looking at race in isolation of education and socioeconomic class (Iezzoni, 1994). Otten and colleagues differentiated the causes of higher mortality rates in African American adults when compared to whites (Otten, Teutsch, Williamson, & Marks, 1990). About 31% of the variance in the results could be explained by risk factors including: smoking; systolic blood pressure; cholesterol level; body-mass index, alcohol intake, and diabetes. Income accounted for an additional 38%. This left 31% of the higher mortality rates in blacks unexplained (Otten, et al., 1990).

Input/Provider

Demographic Data

The individual skills of the provider, be they interpersonal or technical competence, could impact the achievement of patient outcomes (Holzemer & Reilly, 1995). The ANA (1987) places the activities of assessing human responses to health and illness, the formulation of nursing diagnoses, and the writing of nursing interventions, in the role of the professional nurse (minimum baccalaureate nursing preparation). The technical nurse (associate or diploma degree) implements the plan of care as written by the professional nurse. While this distinction is made by the ANA, the practice in the setting where this study was conducted, is to require both the technical and professional nurse to perform the ANA standards defining the nursing process (ANA, 1991). Based on the ANA standards however, a significant difference would be expected in the number and types of problems identified by the professional nurse when compared to the technical nurse.

Effective implementation of the nursing process by the nurse has an impact on the quality of patient care (Smeltzer & Juhasz, 1990). However, in their review of the limited research available on the performance of graduates of differing nursing programs, Smeltzer and Juhasz noted that results were inconclusive. Where performance differences did exist, they tended to decrease as years of experience increased. Smeltzer and Juhasz designed a study to examine the relationship of staff nurse education and experience to the quality of nursing care. The dependent variables included completion of a plan of care, the meeting of the physical and non physical needs of the patient, and evaluation of nursing care objectives for completion. Results demonstrated no significant relationship between educational preparation or experience of nursing staff units and the behavior of completing plans of care. Mean level of experience did predict the degree to which nurses attended to patient physical and nonphysical needs. Finally, unit type rather than education and experience predicted the evaluation of the nursing process. The results of the study continues to suggest a lack of clarity regarding the linkage of education and experience to the planning of the nursing care for the patient. In this study, the unit of analysis was the mean years of experience and education of the nurses on the patient care unit, and not the individual nurse. The unit of analysis being the unit significantly reduces the power to discern smaller effect sizes.

The lack of clarity on the importance of provider input was reinforced in a study by Hogan. Hogan (1992) studied the relationship between demographic variables of the nurse and the types of problems and types of nursing care activities identified for patients with AIDS and hospitalized with Pneumocystis carinii pneumonia (PCP). A convenience sample of 67 nurses from a community and a university medical center was studied. Demographic data included level of nursing education, gender, age, work site, highest academic degree and length of time worked at the medical center. Years of nursing experience was not one of the data elements. The study used retrospective data from a larger study examining the quality of nursing care for hospitalized patients with AIDS (Holzemer, 1988).

The study used two methods to collect the problems and interventions identified by the nurse for the patient: an interview with a research assistant; and the taping of an intershift report. The two elemental questions of the interview were "'What do you identify as this patient's three or four major problems at this time?' and 'What are you doing about meeting these problems at this time?'" (p. 64-65). The interview questions and the shift report addressed the same patient. It is assumed, but not stated, that the interview and taping of the shift report occurred on the same shift and day. The nurse's assessments of the patient's physical status and the patient's social support were recorded on a Likert-type scale. The scale ranged from 1 (very poor) to 10 (excellent). The problems and interventions described during the interview were compared with those described during the shift report. Problems were interpreted as being of greater importance when they appeared in both the interview and shift reports.

With one exception, the results demonstrated no significant differences between the nursing demographic variables, and the types of problems identified or the types of nursing care activities cited (Hogan, 1992). Professional nurses (BSN or MSN) identified more <u>independent</u> nursing activities during the study interview than did technical nurses (.019 significance level). Of interest, was the result that significantly more nursing activities were reported for those who were identified as being <u>less</u> ill than those described as being more ill. Hogan noted that the activities ordered for those more ill tended to be dependent and interdependent in nature, suggesting a 'cure' focus. The number of independent activities increased as patients became less ill, suggesting the ability to shift nursing care priorities from those supporting life and basic physiological needs to those focusing on the human responses to that illness. This result would certainly be in line with Maslow's hierarchy of needs (Maslow, 1968).

Clinical Judgement/Problem Solving

Clinical decision making is at the heart of nursing practice (Thiele, 1993) and is foundational to the quality of nursing care (Fonteyn & Fisher, 1995). Clinical reasoning involves evaluating sometimes contradictory information, making judgements, drawing a conclusion, and forming and testing hypotheses. The outcome of the process is a plan for nursing action and implementation of that plan in support of the patient (American Association of Colleges of Nursing, 1986). This is a learned process which improves with experience (White, Nativio, Kobert, & Engberg, 1992). Expertise in problem solving is domain specific (Fonteyn & Fisher) and one can be an expert in one domain and a novice in another (Benner, 1984).

Eddy (1990) noted that the quality of healthcare was driven by two factors: the quality of the decisions made and the quality with which those decisions are implemented. As the decisions the nurse makes can impact the quality and outcomes of patient care and because expert decision making is a learned process, there has been a great deal of focus on the development of computer-based clinical decision support systems (Thiele, 1993). Decision support systems use computer technology to help nurses carry out the decision-making process in a better manner than the same process unaided (Brennan, 1988). However, just as there is an art and science to nursing, there is an art and a science to decision making. Decision making is influenced by nursing theory, differences in philosophy and conceptual models of care, legislation, ethical standards, regulatory and/or accreditation standards and the requirements of professional bodies (Hovenga, et al., 1988). Despite (or given) the presence of decision support systems, the nurse still retains the ultimate legal, ethical and professional responsibility for the decisions made (Brennan, 1988).

Diagnostic reasoning by physicians and medical students has been studied extensively. The model includes a) attending to available clues such as signs and symptoms, b) initiating hypotheses to explain the initial clues presented, c) gathering data to rule in or out hypotheses, and d) evaluating hypotheses and recalculating probability of each in light of each new cut until a diagnosis is accepted (Elstein, Shulman & Sprafka, 1978).

Research has demonstrated that the diagnostic reasoning process used by nurses and nursing students can be described by the same general model used to describe the process in physicians and medical students (Tanner, Padrick, Westfall, & Putzier, 1988; Crow, Chase, & Lamond, 1995). Increased knowledge and experience of the nurse were associated with more systematic data acquisition and greater accuracy in diagnosis. Recent research suggests that while nurses and physicians use similar problem solving processes, the aim of that problem solving differs (Crow, Chase, & Lamond, 1995). Physicians problem solve to establish an explanation for the patient's presenting problem. In contrast, the aim for nursing is to accurately reflect the patient's current condition or situation. As such, medical diagnoses remain relatively stable over time, while nurses must continually update and revise their clinical judgements as the patient's condition changes (Crow, Chase, & Lamond, 1995).

The individual perspective of the provider could also have a strong impact on the quality of the decision made. Research at a Toronto hospital examined the decision making process of nine nurse and nine physician providers in the light of a clinical-ethical decision making model (Grundstein-Amado, 1993). Through in-depth interview techniques, it was determined that self-reported behavior differed significantly from their abstract thought process. The study found, in general, that decisions were made in a narrow, habitual manner. The most significant and demanding aspects or elements of the decision making process were ignored. The entire decision making process was influenced by the ethical approach of the individual provider.

While the Grundstein-Amado (1993) research studied a limited number of providers in light of a specific ethical model, it still brings to light the potential impact of the individual provider in any decision making process. Be it their individual belief system, their baseline knowledge, or their years of experience, each provider brings a unique framework to the decision making process. The impact of between-provider variation remains an important variable for study when studying the outcomes of nursing care.

Input/Setting

There are several setting variables which could influence the relationship between the nursing assessment and the plan of care (Holzemer & Reilly, 1995). These include model of care, skill mix, nursing ratio, retention, and degree of self-management. In the setting for this study however, two facilities were selected which were very similar in these areas. As there was no variation in the these variables, they were not collected for the purposes of statistical analyses.

Process/Client

Self-care activities, personal habits, and compliance with plans of care have significant effects on the health of individuals and on the outcomes of care (Holzemer & Reilly, 1995). These client variables could also impact short term and long term outcomes and the costs of care. Likewise, the presence and level of support from the primary caregiver and the client's family could impact the outcomes and costs of care. While these variables could influence the outcomes of care, they should not influence the care planning process. Based on the presence or absence of client process variables, the plan of care could differ. However, the process of assessing and writing the plan of care based on that assessment should remain the same.

Process/Provider

Standards of Care and Care Paths

Standards of care and standardized care paths were developed to define the care a patient should expect to receive from the healthcare institution. Standards of care define the care to be provided to patients at an agency, unit, population or individual level. For instance standards of care for patients in a critical care unit would refer to addressing psychosocial needs, frequency of vital signs and assessments, safety requirements, etc. Care paths are normally multidisciplinary, defining the normal care to be provided a particular patient population. The timing of key interventions by each of the patient care team members are specified along with benchmark outcomes the patient must demonstrate to move to the next step of the path.

It might not be possible to observe a statistically significant relationship between the patient's assessed status on admission and the initial interventions in the patient's plan of care. Standards of care and standardized care plans are to be individualized for the patient. However, there are certain circumstances when the prescribed plan or care should supersede the patient's potential in a particular area. The care path might require a standard level of activity at particular points in time (i.e., bedrest for 24 hours after surgery). This activity level could be greater than, equal to or less than the normal level of activity for the patient. In this situation, it could be the prescribed outcomes for the patient where the relationship is found, rather than in the initial interventions.

Again, the study sites were testing a new model of care. The administration, the standards of care, and care processes were the same at both facilities. For this reason, facility was not predicted to be a variable which would provide evidence of being a source of variation in the dependent study variables.

Types of Care Planning Systems

There have not been clear linkages between type of care planning system and patient outcomes. One study examined the relationship between the type of care planning system and patient outcomes in hospitalized AIDS patients (Henry, Holzemer, & Reilly, 1993). Study units utilized either manually-generated, computer-supported, or standardized care planning systems. Data analysis revealed no statistically significant differences in patient outcomes as measured by the HIV-QAM (Holzemer, Henry, Stewart, Janson-Bjerklie, 1993), by patient self-rating of physical condition and length of stay. Of concern was the fact that 22% of the patients had no care plan at all. In this study, the care planning system was the same at both facilities.

Setting/Process

Setting/process variables such as quality improvement programs and communication patterns between nurses and physicians have the potential to impact patient outcomes (Holzemer & Reilly, 1995). Ancillary departments providing care could also impact the care planned by the nurse. In some facilities, case managers might also be responsible for assessing for the discharge needs of the patient. Social services could also be assigned primary responsibility for assessing the psychosocial status of the patient and their family. In this study however, the units on which the care was delivered were similar settings with like processes. For this reason, setting/process variables were not collected for inclusion in data analysis.

Summary of Literature Review

None of the instruments available for the measurement of functional status, knowledge, engagement in care, and psychosocial well-being, met all of the criteria established for use in an outcomes infrastructure. Concerns included limited testing in diverse populations, length of time to complete, either too narrow or too broad a focus, and limitations to particular settings of care. The Health Status Outcome Dimensions (Lush, Jones, & Outcomes Taskforce, 1995) instrument was selected for use in this study due to its demonstrated ease of use, ease of integration into daily practice, and its inclusion of items assessing the desired domains of nursing care.

There is little research examining the relationship between the admission status of the patient and the care planned by the nurse. Most of the available research focused on the nursing diagnoses selected or the quality of the written diagnoses. If health related outcomes are to be used to define the quality and value of nursing care, there must be a relationship established between patient, the patient's status and the care prescribed by the nurse. If this relationship cannot not be empirically delineated, then the use of health outcomes to quantify nursing quality had to be seriously questioned. The goal of this study was to evaluate the relationship between the patient's admission health status as defined by the HSOD, and the problems identified and the interventions ordered for the patient by the nurse.

The Outcomes Model for Health Care Research (Holzemer, 1992, 1994; Holzemer & Reilly, 1995) identifies potential sources of variation which need to be accounted for in the study design. In some cases, these variables were be collected for descriptive purposes (i.e., setting, model of care). Other variables were measured and included in data analysis to determine whether they significantly contributed to the variation in the relationship between admission health status and the care planned for the patient (i.e., severity of illness, experience and education of the nurse).

There is an urgent need for nursing to participate in patient outcomes research. Nursing must define its value to its recipients, payers, and purchasers of care in terms of health related outcomes. If health related outcomes are to be used to define the quality and value of nursing care, then there must be a relationship between patient health outcomes and the care prescribed by the nurse. The goal of this study was to demonstrate that nurses respond to admission health status data by identifying related patient problems and ordering related interventions.

Study Questions

The following questions needed to be answered in order to determine whether nurses responded to admission health status data by identifying relevant patient problems and ordering related interventions.

- After controlling for patient, setting, and nurse provider characteristics, do the admission HSOD scores of functional status, engagement in care, and psychosocial well-being, predict the type and number of problems identified for the patient, caregiver and family?
- After controlling for patient, setting and nurse characteristics, do the admission HSOD scores of functional status, engagement in care, and psychosocial well-being, predict the time required to implement the interventions selected by the nurse for the patient, caregiver, and family?
- After controlling for patient and setting characteristics, do the educational background and years of experience of the nurse predict the patient problems identified and the types of interventions ordered by the nursing in response to admission health status assessments?

Categories of Variables

Patient Demographics

Patient demographics were defined as the patient's age, gender, race, severity of illness, and clinical population group.

HSOD Factor Scores

HSOD factor scores were summed into five groups: individual functional status; individual engagement in care; individual psychosocial well-being; caregiver engagement and well-being; and family well-being.

Care Planned for the Patient

The care planned for the patient included the problems identified and the nursing interventions ordered for the patient.

Provider Characteristics

Provider characteristics included highest nursing degree earned and years of experience in nursing.

Definition of Terms

Patient Characteristics

1. Age in years.
2. Gender as male or female.
3. Race as self-identified by patient as Asian, Black, Hispanic, Native American, White, or Other, as recorded in the admitting/discharge/transfer (ADT) database.
4. Severity of Illness was determined by health information management personnel using the software program Refined DRGs (Iezzoni, Ash, Schwartz, Daley, Hughes, & Mackiernan, 1995).
5. Clinical Population Group was the primary reason for admission: a) pulmonary; b) cerebrovascular; c) cardiac; d) gastrointestinal or e) infection.

HSOD Factor Scores

Prior to factor analyses, it was predicted that the HSOD scores would factor into one of five groups: individual functional status; individual engagement in care; individual psychosocial well-being; caregiver engagement and psychosocial well-being, and family psychosocial well-being.

Individual Functional Status

Functional status was the combined scores of the elements bathing, grooming, dressing, toileting, physical performance and ambulation from the HSOD scale.

Individual Engagement. Engagement was the sum of the scores for patient healthcare management and knowledge on the HSOD scale.

Individual Psychosocial Well-Being

Sum of the elements of patient fear, anxiety, coping and role performance on the HSOD scale.

Caregiver Engagement in Care and Psychosocial Well-Being

This variable was the sum of elements of caregiver knowledge, caregiver engagement in care, and caregiver role strain on the HSOD scale.

Family Psychosocial Well-Being

Is the sum of the elements family strain and family coping on the HSOD scale.

Care Planned for the Patient

Identified Patient Problems

Identified patient problems were those selected by the nurse from predefined choices on the patient care documentation forms found in the study settings, and those written specifically by the nurse. Identified patient problems from KPNCR documentation which would relate to HSOD domains included: knowledge; mobility, coping, family process, self-care deficit, and other. The problem statements did not match the language of nursing diagnoses as defined by the North American Nurses Diagnosis Association (NANDA) (Carpenito, 1985; Carpenito, 1995). However, patient problems do align with

Table 5

Definition of Study Variables

Variable	T[1]	Definition
Functional Status	I[2]	HSOD[3] functional status scale score
Individual Engagement	I	HSOD knowledge and involvement scale score
Individual Psychosocial Well-Being	I	HSOD role, coping, fear, anxiety scale score
Caregiver Engagement/Psychosocial Well-Being	I	HSOD knowledge and involvement scale score
Family Psychosocial Well-Being	I	HSOD role, coping scale score
Age	I	Years 18+
Gender	D[4]	Male, Female
Race	N[5]	Asian, Black, Hispanic, Native American, White, Other
Severity of Illness	O[6]	Refined DRG[7] (four digit #) or 0, 1, 2, 3
Patient Problems	D	From KPNCR[8] documentation. Grouped as knowledge, mobility, psychosocial well-being, other. Scaled as present/not present
Sum of Patient Problems	I	Sum of problems into three groups: 1) health status, 2) other, 3) total.
Time to Complete Nursing Orders/Interventions	I	GRASP[9] - time in hours to complete in three groups: teaching and emotional support, activities of daily living, and other direct nursing care
Clinical Population	N	Pulmonary (1) Cerebrovascular(2) Cardiac (3) Gastrointestinal (4) Infection (5)
Nurse Experience	I	Years 0-50
Nurse Education	D	AA/Diploma (1), BSN/Masters (2)

T[1] Type of Variable; I[2] Interval; HSOD[3] Health Status Outcome Dimensions (Lush, Jones, Outcomes Taskforce, 1995); D[4] Dichotomous; N[5] Nominal; O[6] Ordinal; Refined DRG[7] (Iezzoni, et al., 1995); KPNCR[8] Kaiser Permanente, Northern California Region, GRASP[9] (Meyer, 1978).

the ANA (1991) definition of diagnoses: "A clinical judgment about the client's response to actual or potential health conditions or needs. Diagnoses provide the basis for

determination of a plan of care to achieve expected outcomes (p. 7)."

Nursing Orders/Interventions

Interventions were orders written or confirmed by the nurse and recorded on the computer-based GRASP (Meyer, 1978) instrument. The definitions for the interventions had been standardized throughout the 16 medical centers of the HMO. The major groupings which potentially related to HSOD measures included: a) teaching and emotional support, b) nutrition; c) elimination; d) hygiene; e) mobility; f) other direct nursing.

Provider Characteristics

Nurse Education. The highest nursing degree earned by the nurse.

Nursing Experience. Years of nursing experience.

Variable definitions are summarized in Table 5.

CHAPTER III

METHODOLOGY

Research Design

This was a passive-observational, cross-sectional study (Cook & Campbell, 1979) using retrospective chart audit as the primary method of data collection. This design was used as it supported the use of informatics to capture and observe processes and sequences as they occurred naturally in the environment. This design does not manipulate any naturally occurring variables that could rule out sources of variation. The assignment of independent and dependent variables is made based on the order or sequence of their occurrence (Cook & Campbell, 1979). This was compatible with the conceptual framework for the study shown in Table 2 (page 12). In outcomes research, the independent variable is process and the dependent variable is outcome. Input variables are considered covariates of that relationship. This study moved the linear relationship back to the left. It sought to predict the care planned by nurse (dependent variable) from the input of the patient's health status scores (independent variables).

Setting

Two acute care hospitals in a large health maintenance organization (HMO) in the Northern California area were the settings for this study. Two medical/surgical units in the Vallejo facility and one medical/surgical unit in the Walnut Creek facility were selected because the elements of the HSOD instrument (Lush, Jones, & Outcomes Taskforce, 1995) had been incorporated into the standardized admission documentation for patient care. Major medical populations found on the units included disease states related to the respiratory, cerebrovascular disease, cardiovascular, and gastrointestinal systems. A fifth major population included those admitted for management of an acute infection (i.e., cellulitis, peritonitis, sepsis). Two facilities were selected in order to maximize the possibility of obtaining an adequate sample size. The facilities and the study units were similar in that they had implemented the same care delivery model, were under the leadership of the same nurse executive, held the same standards of patient care, and used the same forms for documentation. The registered nurses providing care on the units completed the admission assessment and wrote the initial care plan.

Study Sample/Criteria for Selection

The convenience, consecutive sample meeting primary inclusion criteria consisted of 442 adult patients admitted to the study units during a three month period (September through November, 1996). Inclusion criteria included: age greater than or equal to 18 years; a length of stay of greater than 24 hours; and an admitting clinical diagnosis which fell into one of the following groups: acute pulmonary, acute cardiac, acute cerebrovascular, acute gastrointestinal or acute infection. A total of 134 charts met study criteria but were excluded for one of the following reasons: readmission during the study period (n = 17); the wrong form was used for documentation (n = 18); health status documentation on the correct form was absent or incomplete (n = 30); or the chart could not be located in medical records (n = 69). The 134 subjects withdrawn from the original sample fell into the following diagnostic groups: pulmonary (n = 27); cerebrovascular (n = 17); cardiac (n = 35); gastrointestinal (n = 27); and infection (n = 28).

Required Sample Size

Minimum sample size was determined using a statistical software program based on sample size methodologies developed by Cohen (1988). Conservative estimates of effect size (percent of explained variance) were used in the analysis. In the logistic regression and multiple regression techniques, there were fourteen groups defined as covariates: diagnosis group (4); age (1); gender (1); race (5); severity of illness (1); nurse experience (1); and highest nursing degree (1). In addition, there were four primary independent variables (up to four of the five HSOD factor scores). There was one subsequent independent variable - the fifth HSOD factor score entered last into the analysis. Sample size analysis was based on a desired power of 0.80. As there were six patient problem groups, and six intervention groups, sample size analysis was based on an alpha of 0.01 per group in order to control for the threat of galloping alpha. The percent of explained variance anticipated was conservatively estimated at 13% for patient characteristics, 2% for nurse characteristics, and 5% for HSOD factor score. Prior research by Hogan (1992) was used to determine that the effect size for nurse characteristics would be small, if present. In the absence of prior research examining the relationship of HSOD factor scores on care planning, a small effect size is hypothesized. The effect size of 5% was selected under the assumption that effects of less than 5% while statistically significant, would not be considered clinically significant. Given these criteria, the minimum sample size for the study was calculated to be 245 subjects.

Human Subject Assurance

Application for institutional review board (IRB) approval was first made to the local chiefs of research at the two proposed study sites, and then to the regional IRB for the HMO. Request was made for access to patient information from medical records and from the HMO mainframe, and to obtain nurse characteristic data via survey without a requirement for obtaining consent.

Following IRB approval, application was then made to the Committee on Human Research (CHR) of the University of California, San Francisco (UCSF) (Appendix A). The study methodology met the UCSF criteria for an expedited review. Despite the fact that the study was being done in support of the administrative needs of the facilities, the CHR would not approve the collection of nurse demographic data without the equivalent of informed consent. CHR approval (H2483-13179-01; October 1, 1996) was received following the development of an information letter for the nurse stressing that participation in the study would be voluntary.

During the second month of data collection, it became apparent that few nurses (12 of 86 who had completed a care plan) were completing the demographic survey. After discussing the situation with the unit managers, application was made to the CHR to alter the initial procedure. Approval was received to offer three $75.00 gift certificates as an encouragement to the nurses to return the survey (H2483-13179-01A; December 4, 1996). A total of seven additional nurses returned surveys for a total of 19.

Data Collection Methods

Survey

A survey was used to collect descriptive data for the registered nurses completing care plans for the patient sample. Data collected included: name; highest nursing degree;

years of nursing experience; facility; unit; and shift (Appendix B).

Chart Audit

Retrospective chart review was used to collect the primary study data including: admitting clinical population; age; gender; race; case number; unit; admission HSOD scores; patient problems identified on admission; and the nurse writing the initial plan of care.

Download from Mainframe

A program was written to retrieve patient data from the organization's mainframe databases. Mainframe data retrieved were: severity of illness level; and GRASP (Grace Reynolds Application and Study of PETO (Poland, English, Thornton, and Owens); Meyer, 1978) interventions ordered during the first 24 hours of stay.

Instruments

HSOD

The Health Status Outcome Dimensions (HSOD) instrument was designed to capture patient status in the domains of functional status, engagement in care, and psychosocial well-being (Appendix C). The HSOD was based on the Quality Audit Marker (QAM) for HIV/AIDS (Holzemer, Henry, Stewart & Janson-Bjerklie, 1993). The QAM has demonstrated validity and reliability in the HIV/AIDS population (Holzemer, et al., 1993), the hip and knee replacement (Ireson, 1993) and gerontological (Brown, 1992) populations. The HSOD received further testing in the HMO of the study sites, as additional health related measures had been added and because it would be used to evaluate outcomes across all patient populations and in multiple settings (hospital, home health, medical offices). Two pilot studies were conducted to collect evidence for the validity and the reliability of the instrument.

Study 1

Evidence for the content validity of the HSOD was obtained through a study in which a computer generated random sample of 1900 nurses was asked to respond to the stem question "How much does independent nursing assessment and intervention impact patient outcomes in this area of care?" The 538 nurses who returned the survey completed five point Likert type scales anchored on one end with "1 - none at all" and on the opposite end with "5-strongly" (Lush, Jones, & Outcomes Taskforce, 1995).

The respondents were mainly staff nurses (85%) and represented a wide selection of both inpatient and outpatient clinical specialties. The majority of the sample held a bachelors of science or higher degree in nursing. The mean years of experience in nursing was 16.8 with an average of 9.2 years of experience in the study HMO. Fourteen care elements were evaluated within the three domains of functional status, engagement in health status, and psychosocial well-being.

The mean scores for elements within functional status ranged from 3.2 to 3.8. In contrast, engagement in care ranged from 4.5 to 4.7, and mental and social well-being from 4.1 to 4.5 (Table 6). The results indicated that the nurses perceived that the items on the HSOD were impacted by independent nursing assessment and intervention, thus providing evidence that the HSOD is appropriate for measuring the outcomes of nursing care. Additionally, each item on the HSOD was predominantly placed into the appropriate category (functional status, engagement in care, and psychological distress/mental and social well-being) based on the hypothesized factor structure for the HSOD.

Table 6

RN Rating of Independent Nursing Assessment and Intervention by Item by Domain

Domain/Item	Mean	SD
Functional Status		
Bathing	3.3	1.1
Grooming	3.2	1.1
Dressing	3.2	1.1
Toileting	3.6	1.1
Physical Performance	3.8	0.9
Ambulation	3.8	0.9
Engagement in Care		
Knowledge	4.7	0.6
Involvement in Care	4.5	0.7
Mental and Social Well-being		
Fear	4.5	0.7
Anxiety	4.5	0.7
Individual Coping	4.5	0.7
Altered Role Performance	4.1	0.9
Family/Caregiver Strain	4.2	0.9
Family Coping	4.4	0.8

SD - Standard Deviation

Study 2

A second study research provided additional support for the validity of the HSOD (Lush, Henry, Foote, Jones, & Outcomes Taskforce, 1997). Three different clinical populations were examined over time. Patients undergoing total joint replacement (TJR) and patients admitted to the hospital in acute congestive heart failure (CHF) were assessed with the HSOD on admission, on discharge from the hospital, and six weeks post hospital discharge. In addition, pediatric oncology patients receiving chemotherapy in the medical office (outpatient) setting were examined at three month intervals.

In the TJR and CHF samples, functional status diverged as expected with several related variables (Tables 7 and 8). Lower functional status was associated with higher resource utilization as evidenced by significant, negative correlations with total patient care hours and length of stay for the TJR population and with length of stay for the CHF sample. Increased age was associated with decreased functional status at discharge for TJR and CHF and with the third monthly functional status assessment for the pediatric oncology subsample. The only laboratory variables in the analysis that were significantly related to functional status were admission and discharge blood urea nitrogen (BUN) and admission carbon dioxide ($CO2$) for the CHF sample. Additional support for the validity of the functional status factor was the difference in functional status over time for three clinical populations consistent with their associated clinical trajectory; for TJR functional status decreased from admission to discharge, for CHF functional status increased from admission to discharge, and for pediatric oncology functional status remained fairly stable over a three month course of chemotherapy. Functional status also was significantly different among groups within a single population expected to differ. For pediatric oncology, there was a main effect of risk category on functional status with the lowest risk associated with the higher functional status score. CHF patients who required home oxygen therapy prior to hospital admission had significantly lower functional status scores.

Lower engagement in care at admission was associated with both admission and discharge BUN levels in the CHF sample. This is likely due to the decreased renal function indicated by the BUN along with the associated decrease in functional status. Increased $CO2$ levels as a measure of decreased respiratory function also were significantly related to engagement at discharge. Only two variables had significant correlations with engagement in the TJR sample. Patients requiring higher total patient care hours and who were older had decreased engagement at discharge.

The pattern for psychological status in TJR differed from that of engagement in that it was the lower psychological status at admission that was associated with increased length of stay. Not surprisingly given the impact of renal status on functional status and cognition, the correlations psychological status and BUN were similar to those of engagement in the CHF sample.

Table 7

Correlations Supporting Validity of the HSOD[1] in the Congestive Heart Failure Sample

Element of Care	Var[2]	r (p)
Functional Status Admit:	LOS	-.36 (.038)
Functional Status Discharge:	CO2[6]	-.43 (.030)
	Age	-.42 (.023)
Engagement Admit:	BUN[7,4]	-.46 (.017)
	BUN[5]	-.56 (.005)
Engagement Discharge:	LOS	-.50 (.006)
	CO2	-.38 (.049)
Psychosocial Well-Being Admit:	BUN[4]	-.49 (.009)
	BUN[5]	-.52 (.011)
Family Status Discharge:	BUN[4]	-.58 (.004)
	BUN[5]	-.51 (.025)

[1] Health Status Outcomes Dimensions (Lush, Jones, Outcomes Taskforce, 1995)
[2] Variables, [3] Length of Stay, [4] Admission Lab Value, [5] Lab Value Closest to Discharge,
[6] Carbon dioxide, [7] Blood Urea Nitrogen

The pediatric analyses that demonstrate improvement in caregiver and family status as well as patient engagement and psychological status over time (in the absence of improvement in functional status) are consistent with the family focus of independent nursing intervention in the pediatric oncology clinics.

Table 8

Correlations Supporting Validity of the HSOD[1] in the Total Joint Replacement Sample

Element of Care	Var[2]	r (p)
Functional Status Admit:	PCH[3]	-.39 (.016)
Functional Status Discharge:	PCH	-.43 (.006)
	Age	-.29 (.040)
Engagement at Discharge:	PCH	-.55 (.001)
	Age	-.32 (.022)
Psychosocial Status Admit:	PCH	-.41 (.011)
Psychosocial Status Discharge:	Hgb[4]	-.28 (.047)
Family Status Discharge:	Age	-.39 (.017)

[1] Health Status Outcomes Dimensions (Lush, Jones, & Outcomes Taskforce, 1995), [2] Variables, [3] Patient Care Hours/Hospital Stay, [4] Hemoglobin on admission

A principal components factor analysis with Varimax rotation was performed using the patient-related items (n = 12) in a sample of 93 HSODs (adult version) completed at study admission. Six items loaded on factor 1 (functional status) explaining 4.0% of the variance. Three items (role performance, knowledge, and involvement in care) loaded most highly on factor 2 (engagement in care). Coping loaded only slightly higher on the third factor (psychosocial well-being) than on engagement in care. However, the theoretical model supported including coping with the other psychosocial well-being items, fear and anxiety.

Separate factor analyses of the caregiver-related items (n = 3 items, 38 HSODs) and family-related items (n = 2 items, 73 HSODs) resulted in single factor solutions. The factor analysis supported the underlying theoretical constructs for the instrument.

One of the reasons the three clinical populations were chosen was their difference in expected clinical trajectories that would be reflected by items on the HSOD. For example, it was hypothesized that patients with CHF would have increased levels of functional status at discharge as compared to hospital admission while the TJR sample would have a decreased level of functional status due to their surgical procedure. Additionally, it was hypothesized that since the pediatric oncology group represented a nonacute, stable outpatient sample that the changes seen over time would be predominantly in the non functional status areas on the HSOD.

A series of ANOVAs were conducted to assess changes over time and the interaction between time and clinical population (Lush, et al., 1997). To control for the potential of a galloping alpha, the alpha level for significance was set at .017 for the three patient-related comparisons between TJR and CHF. A 2 X 3 (population X time) ANOVA for TJR and CHF demonstrated a significant main effect of time ($F = 8.0$, $p = .0006$) and a significant interaction effect between time and population ($F = 14.4$, $p < .0001$) for functional status. TJR patients had lowest ($M = 16.8$) functional status scores at discharge while CHF patients had lowest ($M = 20.0$) functional status scores at hospital admission. There were no significant main or interaction effects for psychosocial well-being. For healthcare involvement, there was a significant interaction effect. The lowest involvement score for CHF were at the outpatient visit, while the lowest scores for TJR were at hospital discharge. There were no significant main or interaction effects of time or population (TJR vs. CHF) for family or caregiver variables. There was adequate power to detect differences in the family analysis, but not in the caregiver analysis.

In the pediatric oncology subsample (HSOD child version, $n = 16$), the highest scores for all HSOD factors with the exception of functional status were at Time 3 (Lush, et al., 1997). Using a conservative alpha of .017 for the three patient-related analyses there was a significant main effect of time on engagement in care. There was also a significant main effect of time on the caregiver factor (p = .0001) and the family factor (p = .04). In the toddler sample (n = 9), the only significant main effect of time was in the caregiver factor (F = 6.8, p = .009) with the highest score occurring at Time 3.

The four versions of the HSOD were successfully administered to three clinical populations with varying age ranges. HSOD factor scores were sensitive to changes over time and successfully discriminated between clinical populations with different clinical trajectories (Lush, et al., 1997).

Reliability. The internal consistency reliability as measured by a standardized alpha was adequate for all subscales (factors): functional status = .91; healthcare engagement = .69; psychosocial well-being = .77; caregiver status = .67; and family status = .83 (Henry, 1996). These values fall within those recommended by Helmstadter (1964) and Nunnally (1978) for use in group comparisons.

While the internal consistency reliability of the instrument was demonstrated for all of the HSOD scales, evidence for the test-retest and interrater reliability of the instrument was equivocal (Henry, 1996). Three strategies were used to evaluate reliability for the HSOD scales. The strategies of two measurements within 24 hours of each other either in two different settings (hospital and home care) or using two different methods (in person and telephone ratings) showed low agreement as measured by Cohen's kappa. There was greater agreement between the in person and telephone rating than between the hospital and home care ratings. It is difficult to assess whether the difference is due to a change in patient condition, difference in perspective of the individual nurse or physical therapist completing the rating, or a problem with the HSOD items.

In addition, reliability was assessed related to the correct HSOD ratings on the videotape vignette scenes. These vignettes were made to stabilize patient situations allowing for interrater and test-retest studies. The percent of correct responses for each HSOD item varied significantly across the vignettes. For instance, for the item bathing in the adult vignette, 100% of responses were correct in scene 1, 91% in scene 2, and only 45% in scene 3. Certain items on the HSOD had low numbers of correct responses across vignettes. These tended to be in difficult conceptual areas such as coping, role strain, and healthcare involvement. For the HSOD item role strain, correct responses were made in 64% of scene 1, 36% in scene 2 , and 27% of the scene 3 answers. It is unclear whether this was related to training, whether individual items needed to be revised, or if the poor performance related to the items was an artifact of inadequate information to make the assessment in the vignette. Nurses did complain of the inability to ask questions of the videotaped subjects to clarify certain assessments.

Defining reliability in health status measures is inherently difficult (Ware, Jr., 1993). Reliability refers to stability, consistency and the degree to which a score can be considered free from random error. Health is not necessarily stable or constant. Rather, health is a concept which constantly moves along the continuum between wellness and illness. This ongoing change has implications for selecting appropriate methods for defining the reliability of the instrument. For instance, the appropriate time interval for test-retest evaluation would necessarily vary based on whether the health status was captured during genuine change, and whether this change was associated with an acute or chronic phase of illness (Ware, Jr., 1993).

While test-retest is still considered the appropriate indicator for reliability for single item measures and multi-item (but not multitrait measures), internal consistency is being defined as the appropriate measure of reliability in multi-item, multitrait scales (Stewart, Hays & Ware, Jr., 1992; Ware, Jr., 1993). The internal consistency approach considers true (reliable) variance to be that shared by all items in the scale in contrast to a specific item variance which is considered to be error. The reliability coefficient, as measured by coefficient alpha (Cronbach, 1951), increases as items co-vary together and as the number of scale items increase.

Increasing the number of items on a scale however, can decrease the utility of that scale in practice (Ware, Jr. 1993). Stewart and colleagues (1992) suggest that the burden of additional items needed to obtain a reliability of 0.80 may exceed the value of the increased reliability. The MOS authors propose that while coefficients of 0.90 or greater are considered adequate for individual comparisons, reliability of 0.50 or above are considered acceptable for group comparisons (Stewart, Hays, Ware, Jr., 1992; Helmstadter, 1964; Nunnally, 1978). The MOS developers also propose that in the absence of reliability estimates, an inference of reliability can be made based on studies of correlations between the measure and other variables (Stewart, Hays & Ware, Jr., 1992). Prior research has provided support for the construct validity of the HSOD through significant correlations with other conceptually linked variables (Table 7 and Table 8).

As the HSOD was a new scale, principal components factor analysis with varimax rotation was conducted on the data from the dissertation study and is reported in the results section. This was done to verify that the scale was performing in the current study as it had in prior research.

GRASP

GRASP (Grace Reynolds Application and Study of PETO (Poland, English, Thornton and Owens)) is a workload management system (Meyer, 1978). It is designed to quantify the workload of the nurse in terms of tasks required to complete physician and nursing orders. The tasks normally performed during patient care are assigned times. Each time unit is 0.1 hour, or six minutes. When a GRASP instrument is completed for a patient, it provides an estimate of the hours of care the patient will require during the next 24 hour period. These patient care hours (PCHs) are then distributed between the shifts based on workload distribution. Line item descriptions of nursing tasks are standardized between the two facilities and are divided into eight groups. Six groups have pertinence to the HSOD factor scores including: teaching and emotional support; nutrition; elimination; hygiene; mobility; and other direct nursing. Nutrition, elimination, hygiene, and mobility were combined into a single group to reflect activities for daily living. Each hospital unit maintains GRASP standards which require that monthly interrater reliability studies be maintained at a minimum of .90 and that the instrument be tested annually for clinical and fiscal alignment (validity).

In this study, GRASP data were derived from mainframe tables. The interventions selected by the nurses during the first three shifts were also pulled from the mainframe.

The frequencies and standardized times associated with the interventions were also obtained and summed. These data were summarized into the total time in hours, to implement selected interventions following into three groups: teaching and emotional support; activities of daily living; and other direct care.

Procedure

Following IRB approvals, four major phases were implemented. These were: a) introduction of project to the staff nurses and the collection via survey of staff demographic data; b) collection of chart data; c) retrieval of mainframe data; and d) the analysis and reporting of results.

Staff Education/Survey

It was originally planned to provide a one hour class for the staff nurses for the purpose of introducing the project. Following the class, the nurses would be asked to complete the demographic survey. Unfortunately, the window of opportunity to present the class passed before the human subject approvals process could be completed. The unit managers determined that direct access to the staff was not possible as staff and management were overwhelmed with the transition to a new care delivery model. Instead, the managers requested that packets of information be prepared for the staff. The managers distributed the packets and then used staff meetings to discuss and promote staff participation in the study. The content of the packets included an information letter for the staff which summarized the goals and objectives of the project, their roles, and how their demographic information would be used. Completion of the survey by the nurse was considered their consent to participate.

During the second month of data collection, it became apparent that few nurses (12 of 86 who had completed a care plan) had completed and returned the demographic survey. After discussing the situation with the unit managers, application was made to the CHR to alter the initial procedure. Approval was received to offer three $75.00 gift certificates to a well-known, high-end department store as an encouragement to the nurses to return the survey (H2483-13179-01A; December 4, 1996). This incentive also had minimal impact: seven additional surveys were returned. The managers described the working environment as incredibly stressful. The facilities had undergone a reduction in force, were implementing new care delivery models, and were in the midst of contract negotiations. No further attempts were made to increase the final number of completed surveys. A total of 19 surveys were returned.

Data Collection from Chart

A mainframe based program was written which identified potential subjects. Admissions to the study units which met study criteria were listed. These admissions were transcribed to a form and delivered to the health information management department on a weekly basis. The following week, the charts would be pulled for review. All chart reviews were completed by the principal investigator. Data were entered directly into a laptop computer. For all variables, "." was used to indicate that the value was missing. In addition, health status care elements marked "not applicable" were recorded as "!", and "?'s" were entered when "unable to assess" was checked for the element of care.

Demographics

The patient's age, gender, race, and clinical diagnosis were collected from the front sheet of the patient's record. The front sheet was completed by admitting personnel at the time of hospital admission.

Health Status Scores

The health status data (excluding ambulation) were collected from the admission record. Of the 17 elements of care, 16 had been integrated into the facility documentation in such a way that the scoring integrity of the HSOD instrument was easily maintained (Appendix D). Unit standards required that the admission assessments be completed within four hours of the patient's admission.

The patient's ambulatory status score was derived from the first 24 hour flow sheet in the chart. A score of 5 was assigned when "WNL/Patient Baseline" was marked. WNL/Patient Baseline was defined on the documentation as "Gait steady, balance intact, activity at baseline level, ambulates safely (with/without devices), moves all extremities with full range of motion or patient's baseline." A score of four was given if "walker/cane/crutches" was checked by the nurse. When the patient required assistance to ambulate, a score of three was given. The patient was considered chair bound (score of two) if "chairfast" was circled, or if "bed to chair" was marked. Finally, a score of one was applied when "bed" was circled, and when the maximum activity indicated was "bed to commode."

Problems Identified by the Nurse

Patient problems were collected from the first 24 hour flow sheet completed for the patient. Unit standards required that the plan of care portion of the flow sheet be completed within eight hours of the patient's admission. Nurses had the option of checking one of 19 problems and/or writing in a different problem for the patient. The flowsheet includes nine domains of care: pain/comfort; psychosocial; mobility; GU/GYN; neuro; respiratory; cardiovascular; GI/nutrition; and skin/wound/hygiene. The problem knowledge was available to be marked in each of the domain areas, so the nurse could check as many as nine times. All other problems were only listed once. Any problems written on the form were categorized as being related to psychosocial well-being, mobility, knowledge, or other.

Table 9 shows how the problems were aggregated for purpose of analysis. Problems were first assigned to one of the three domains represented in the HSOD. Functional status issues were listed as mobility as mobility was the name of the problem the nurses most commonly marked to indicate a problem in that area. All problems were classified as other which did not clearly fall within the domains of functional status, psychosocial well-being or engagement in care.

The initial four groupings were made into three. All HSOD problems were combined into a single group, the "other" problems remained as a separate group, and the total number of problems identified was the sum of these two groups (Table 9).

Mainframe Data Download

A programmer expert in mainframe DB2 and SAS languages wrote the program needed to retrieve the mainframe data. Mainframe data (severity of illness, GRASP interventions, GRASP intervention times) were pulled 60 days following the latest discharge date of the sample. This delay was required in order to provide sufficient time for the coding of medical records and the subsequent assignment of severity of illness

levels.

Table 9

Grouping of Identified Problems for Analysis

Problem Label on Flowsheet	Problem Type	Sum of Problems	
Breathing Ventilation GU Elimination Altered Comfort Sensory Impairment Communication Cardiac Output Fluid Volume Tissue Perfusion GI Elimination Nutrition Skin Integrity	Other	Total Number Other Problems Identified	Total Number Problems Identified
Coping Family Process _____________ write-in	Psychosocial	Total Number HSOD Related Problems	
Readiness to Learn Knowledge (nine chances to select) _____________ write-in	Engagement in Care		
Mobility Self-Care Deficit _____________ write-in	Mobility		

To obtain the mainframe data for the study, a disk was provided to the programmer that contained the sequential patient identification number assigned by the investigator in the statistical software program and the patient's associated medical record number. The medical record number assured that the correct patient data were retrieved from the mainframe. The patient identification number was used to merge the mainframe data with files derived from data collected in the medical record.

Grouping of GRASP Intervention Data

Each unit's GRASP instrument is made up of 40 to 50 line items which were selected from a standardized list of 458 patient care activities used throughout the HMO. Once selected by the nurse, the individual line items are automatically grouped into 11 categories (Table 10). The times associated with each group were summed into three final groups for the purposes of data analysis. In contrast to the types of problems identified where knowledge was seperate from psychosocial well-being, the times associated with the interventions for these two problem times were combined. This was done because the GRASP system used at the study facilities combined interventions for teaching and emotional support into single line items.

Table 10

GRASP Intervention Groups

GRASP Intervention Group	Study Group
Teaching and Emotional Support	Teaching and Emotional Support
Elimination Hygiene Nutrition Mobility	Activities of Daily Living
Respiratory/Suction Vital Sign Monitoring Medications/IV Care Evaluation Assessment Planning	Other Direct Care

Data Analysis

While the study was 'non-experimental' by traditional definitions (no control/manipulation of the independent variable), the goal remained to determine whether certain variables covaried with others. Correlational methods are the primary mode of analysis in this type of study (Cook & Campbell, 1979). In addition, as the *t* test (difference between means), the *F* test (analysis of variance) and multiple regression techniques are part of the same linear statistical model, they were all appropriate methods of analyzing the data from a study of passive-observational design (Cook & Campbell, 1979).

Preliminary Data Analysis

The statistical program used to collect the data was programmed to provide alerts for data which exceeded defined parameters. This was done to minimize errors in data collection. In addition, during and following data entry into the laptop, data were visually reviewed for errors in data entry. Frequencies were run on medical record numbers to verify that a single subject was only represented once in the study sample. Factor analyses and internal consistency a reliability were calculated for the HSOD instrument to determine if scale factors were operating as they had in prior research. Demographic variables were compared for significant differences between facilities. All reports were written in terms of the aggregate data. Any data linking to specific patients or nurses remains locked in the research files of the principal investigator.

Descriptive/Correlational Statistics

Descriptive statistics were used to describe the patient and nurse samples, the

admission health status of the sample by HSOD factor score, the patient problems selected, and the interventions ordered for the patient. Correlational statistics were used to look for relationships among the major study variables. Correlation data were also reviewed to identify variables which should be controlled in the regression analyses. The correlation matrix was also examined for any correlations between the independent variables greater than 0.80 to determine whether there is a possible problem of multicollinearity. No correlations of that magnitude were found.

Study Questions and Hypotheses

Question 1

After controlling for patient and setting characteristics, do the admission HSOD health status factor scores of functional status, engagement in care, and psychosocial well-being, predict the type of problems identified by the nurse at the time of hospital admission of the patient? The hypotheses for this question were tested using hierarchical and stepwise logistic regression techniques. Hierarchical techniques were used to first enter patient and setting demographic factors (age, sex, race, clinical population, severity of illness and facility). The HSOD factors were entered last as a group. Those not contributing to the equation at a level of significance of .01 were removed from the equation in the next step.

The assessment for the overall fit of the model was tested with the log likelihood statistic and the chi-square goodness of fit statistic. Confidence intervals were established around the adjusted odds ratios (Norusis, 1993). The overall alpha level of dependent variable type of problem identified was .05. As there were four major groups within the

dependent variable, the alpha level of significance was set at .01 for each group.

Null Hypothesis 1. After controlling for patient and setting characteristics, the admission HSOD factor scores will not explain a significant amount of the variance in the identification of knowledge as a problem by the nurse.

Null Hypothesis 2. After controlling for patient and setting characteristics, the admission HSOD factor scores will not explain a significant amount of the variance in the identification of mobility as a problem by the nurse.

Null Hypothesis 3. After controlling for patient and setting characteristics, the admission HSOD factor scores will not explain a significant amount of the variance in the identification of a psychosocial well-being problem by the nurse.

Null Hypothesis 4. After controlling for patient and setting characteristics, the admission HSOD factor scores will not explain a significant amount of the variance in the identification of an other problem by the nurse.

Question 2

After controlling for patient and setting characteristics, do the HSOD factor status scores predict the number of problems identified by the nurse for the patient? The hypotheses for this question were tested using hierarchical and stepwise regression techniques. Multiple regression analyses were used to examine the impact of setting, patient, and health status data on the total time required to implement interventions selected by the nurse. Hierarchical techniques were used to first enter patient demographic factors (age, sex, race, clinical population, and severity of illness). Health status scores and facility were then allowed to enter via stepwise progression, with .01

being the criteria for entering the equation.

F statistics were used to test the adequacy of the overall fit (R^2) and the squared semi-partial correlations (sr^2) used to determine which variables had significant, unique contributions to the variation in the dependent variable (Cohen & Cohen, 1983). While the overall alpha level of significance for the dependent variable was 0.05, the alpha level of significance was set at 0.015 for each of the three groups within the dependent variable

Null Hypothesis 5. After controlling for patient and setting characteristics, the admission HSOD factor scores will not explain a significant amount of the variance in the number of health status related problems identified by the nurse.

Null Hypothesis 6. After controlling for patient and setting characteristics, the admission HSOD factor scores will not explain a significant amount of the variance in the number of non-health status related problems identified by the nurse.

Null Hypothesis 7. After controlling for patient and setting characteristics, the admission HSOD factor scores will not explain a significant amount of the variance in the total number of problems identified by the nurse.

Question 3

After controlling for patient and setting characteristics, do the HSOD factor scores predict the time required to implement the interventions selected by the nurse for the patient? The same analyses were used for Question 3 as were used for Question 2. As in question 2, the overall alpha is 0.05 and the alpha level of significance will be 0.015 for each of the three major groups within the dependent variable of total problems identified.

Null Hypothesis 9. After controlling for patient and setting characteristics, the

admission HSOD factor scores will not explain a significant amount of the variance in the time required to implement teaching and emotional support interventions selected by the nurse.

Null Hypothesis 8. After controlling for patient and setting characteristics, the admission HSOD factor scores will not explain a significant amount of the variance in the time required to implement activity of living interventions selected by the nurse.

Null Hypothesis 10. After controlling for patient and setting characteristics, the admission HSOD factor scores will not explain a significant amount of the variance in the time required to implement other direct care interventions selected by the nurse.

Assumptions

1. The care actually delivered by the nurse was reflected on the written plan of care and/or care path, in patient problems identified, and interventions selected by the nurse.

2. That the care plan and care path had been individualized for the patient. This would mean that a prewritten care plan and care path without changes, but that had been initialed by the nurse, had been determined to be appropriate for the individual patient.

CHAPTER IV

RESULTS

Preliminary Analysis

Missing Data

Missing Health Status Data

A total of 442 cases met the inclusion criteria for the study. Of these, 134 were excluded for secondary reasons, leaving a final sample size of 308 (Table 11). Cohen (1983) provides an extensive discussion on types and patterns of missing data, and the implications for analysis. Although the new documentation had been implemented in both facilities 30 days prior to the start date for the study, 18 records reviewed had the old documentation forms. The old forms did not include the health status scale (primary independent variable) nor the problem identification format (primary dependent variable) that were present in the new documentation. These cases were of necessity excluded.

In 30 cases, the correct form was present, but incomplete. There was a specific pattern to the missing data. The physical performance and patient involvement in care variables were listed consecutively and at the bottom of the first page of the admission assessment form. The two variables were probably missed due to a form design issue, as all other questions on the front and on the back were usually answered. A decision was made to exclude these cases from the final study sample. In the case of involvement in care, it was one of only three elements in the engagement in care factor, making it inappropriate to use mean substitution as a fill mechanism. As physical performance was one of six elements in the factor functional status, it would have been conceptually

Table 11

Data on Subjects Meeting Original Inclusion Criteria (n = 442) but Excluded from Study (n = 134)

Variable	Original Sample Distribution n (%)	Excluded From Original Sample n (%)	Final Sample Distribution n (%)
Facility			
Facility 1	94 (21.3)	29 (21.7)	65 (21.1)
Facility 2	348 (78.7)	105 (78.4)	243 (78.9)
Total	442(100.0)	134 (100.1)	308(100.0)
Chi-square test for difference in facility represented in dropped vs. retained cases: $\chi^2 = 0.016$ (df 1) $p < .899$			
Clinical Population			
Pulmonary	101 (22.8)	27 (20.1)	74 (24.0)
Cerebrovascular	64 (14.5)	17 (12.7)	47 (15.3)
Cardiac	90 (20.4)	35 (26.1)	55 (17.9)
Gastrointestinal	80 (18.1)	27 (20.1)	53 (17.2)
Infection	107 (24.2)	28 (20.9)	79 (25.6)
	442 (100.0)	134 (99.9)	308 (100.0)
Chi-square test for difference in clinical population in dropped vs. retained cases: $\chi^2 = 0.014$ (df 1) $p < .840$			
Reason for Exclusion			
Readmission		17 (12.7)	
Wrong Form		18 (13.4)	
Form not Complete		30 (22.4)	
Chart not Available		69 (51.5)	
		134 (100.0)	

possible to use mean substitution for the element. However, while physical performance was grouped with functional status through factor analysis, it was the one element in the factor which demonstrated marked sensitivity to clinical population. The physical performance factor scores varied between .587 (pulmonary) to .797 (cardiac), with a mean factor score of .651 across the clinical samples. In the cerebrovascular sample, physical performance had a factor score of .709 and fell into group two (engagement in care),

rather than functional status. Use of mean substitution for physical performance would have had the effect of removing a primary source of variability in the factor, thus reducing its potential to explain variation in the dependent variable.

For the above reasons, it was decided to over sample for the study so that cases missing physical performance or patient involvement data could be excluded from the final sample. The originating facility and medical diagnosis for the cases excluded from the study were compared with those of the 308 in the final study sample. There were no significant differences in the sample excluded and the final study sample in terms of facility and clinical population (Table 11).

Missing Caregiver and Family Variables

The HSOD captures health status data for the patient, the caregiver, and the family. As the patient does not always have a caregiver or a family, it was anticipated that caregiver and family data would be missing. What was not anticipated was the extent to which the variables were missing. The HSOD scores by factor by clinical population are displayed in Table 12. The total sample sizes for the health status factors varied between 279 and 303 for patient related factors, 168 and 173 for caregiver factors, and was 147 for the family factor. The sample with caregiver and family data was smaller (n = 129) than the sample without caregiver/family data (n = 179). As 245 was the minimum sample size needed to support the desired power in the planned analyses, the missing data in the caregiver and family factors were problematic. Tests of significance were conducted to determine whether the sample with caregiver/family data differed from the sample without caregiver/family data. As demonstrated in Table 13, there were no

significant differences in the patient variables, including the patient health status factor scores. As sample size in these variables was insufficient for the planned statistics, the caregiver and family variables were eliminated from the study.

Table 12

Mean, Standard Deviation, Minimum/Median/Maximum of Health Status Factor Scores by Clinical Population

	Pulmonary	Cerebro-vascular	Cardiac	Gastro-Intestinal	Infection	All Subjects
	Mean S.D. M/M/M[1]	Mean S.D. M/M/M	Mean S.D. M/M/M	Mean S.D. M/M/M	Mean S.D. M/M/M	Mean S.D. M/M/M
Individual Functional Status	15.49 (5.96) 6/13/25 n = 74	12.71 (5.66) 6/12/25 n = 45	17.84 (6.07) 6/15/25 n = 55	17.42 (6.39) 6/15.5/25 n = 52	17.40 (6.73) 6/18.5/25 n = 78	16.33 (6.42) 6/14/25 n = 303
Individual Engagement in Care	8.81 (1.58) 5/9/12 n = 68	7.72 (2.40) 3/8/12 n = 39	9.47 (1.44) 6/9/12 n = 53	9.04 (2.04) 3/10/12 n = 51	9.29 (1.61) 5/9/12 n = 68	8.94 (1.86) 3/9/12 n = 279
Individual Psychosocial Well-being	9.33 (1.79) 3/9/12 n = 70	8.74 (2.31) 3/9/12 n = 39	10.07 (1.94) 3/10/12 n = 54	9.65 (1.99) 3/10/12 n = 51	10.07 (1.37) 7/10/12 n = 71	9.63 (1.89) 3/10/12 n = 285
Caregiver Engagement in Care	6.22 (1.40) 5/6/8 n = 38	6.41 (0.85) 5/6/8 n = 22	6.79 (0.92) 6/6/8 n = 19	6.44 (0.97) 4/6/8 n = 27	6.47 (1.03) 4/6/8 n = 36	6.50 (0.93) 2/6/8 n = 168
Caregiver Role Strain	2.94 (0.80) 1/3/4 n = 39	3.00 (0.82) 1/3/4 n = 22	3.29 (0.69) 2/3/4 n = 17	3.07 (0.62) 2/3/4 n = 27	3.18 (0.76) 1/3/4 n = 34	3.08 (0.74) 1/3/4 n = 173
Family Psychosocial Well-being	6.47 (0.88) 2/6/8 n = 37	6.18 (1.47) 3/6/8 n = 19	6.96 (1.55) 3/8/8 n = 19	6.52 (1.18) 4/6/8 n = 29	6.59 (1.35) 3/6.5/8 n = 44	6.47 (1.39) 4/6/8 n = 147

[1] Minimum/Median/Maximum

Table 13

Tests of Significance Between Age, Severity of Illness, Gender, Clinical Population, Facility, and Health Status Individual Subscales and the Sample With Caregiver and Family Scores (n = 129) and the Sample Without Caregiver and Family Scores (n = 179)

Variable				Test Statistic	p
Functional Status		M	SD		
With CG/F[1]		16.51	6.48	$t = .563$	<.574
Without CG/F		16.09	6.36		
Patient Engagement in Care					
With CG/F		9.02	1.79	$t = .763$	<.446
Without CG/F		8.85	1.93		
Patient Psychosocial Well-being					
With CG/F		9.75	1.89	$t = 1.12$	<.232
Without CG/F		9.48	1.88		
Age					
With CG/F		65.64	16.16	$t = -0.01$	<.994
Without CG/F		65.65	15.63		
Severity of Illness					
With CG/F		0.758	0.655	$Z^c = 0.420$	<.266
Without CG/F		0.667	0.612		
Gender		f	%	$\chi^2 = 0.285$ (df 1)	<.593
With CG/F	Male	66	47.1		
	Female	78	46.4		
Without CG/F	Male	74	52.9		
	Female	90	53.6		
Facility				$\chi^2 = 0.120$ (df 1)	<.729
With CG/F	Male	28	20.0		
	Female	37	80.0		
Without CG/F	Male	112	22.0		
	Female	131	78.0		
Clinical Population				$\chi^2 = 0.016$ (df 1)	<.899
With CG/F	Pulmonary	36	25.7		
	Cerebrovascular	22	15.7		
	Cardiac	19	13.6		
	Gastrointestinal	27	19.3		
	Infection	36	25.7		
Without CG/F	Pulmonary	38	22.6		
	Cerebrovascular	25	14.9		
	Cardiac	36	21.4		
	Gastrointestinal	26	15.5		
	Infection	43	25.6		

[1] Caregiver/Family

Sample Demographics

Nurse Sample

Only 19 of a possible 117 nurses completed surveys. The years of experience and educational background of the 19 nurses are summarized in Table 14. A total of 70 (22.7%) of the 308 charts represented in the final study sample, could be linked to one of the 19 nurses completing a study survey. Cohen (1983) recommended that variables be simply dropped when a substantial portion of the cases lack data. The small number of cases with the variable data could not contribute materially to the dependent variable variation. Table 15 includes the tests for significance between the sample represented by nurses completing the survey and the sample which could not be linked to a specific nurse. There were no significant differences in the sample demographics. The independent variables, years of nursing experience and highest nursing education degree were dropped from the analyses in order to maintain sufficient power for the regression techniques required to address the study hypotheses.

Table 14

Provider Demographics (n = 19)

	AA & Diploma	BSN & MS
Highest Degree n (%)	13 (68.4)	6 (31.6)
Years Experience mean/SD	17.77 (5.63)	19.17 (5.64)
Sample Charts Linked to Nurses w/Survey	41	29

Table 15

Tests of Significance Between Sample Represented By Nurses Completing Surveys (n = 70) and the Sample Represented by Nurses who did not Complete Surveys (n =238)

Variable			Test Statistic	p
Age	M	SD		
W/Surveys[a]	67.53	15.49	$t = 1.15$	<.252
No Surveys[b]	65.07	16.05		
Severity of Illness				
W/Surveys	2.89	1.60	Z[c] = 0.42	<.677
No Surveys				
Gender	f	%	$\chi^2 = 0.130$ (df 1)	<.719
W/Surveys				
Male	35	48.6		
Female	37	51.4		
No Surveys				
Male	109	46.2		
Female	127	53.8		
Clinical Population			$\chi^2 = 1.030$ (df 1)	<.310
W/Surveys				
Pulmonary	22	30.6		
Cerebrovascular	11	15.3		
Cardiac	10	13.9		
Gastrointestinal	11	15.3		
Infection	18	25.0		
No Surveys				
Pulmonary	52	22.0		
Cerebrovascular	36	15.3		
Cardiac	45	19.1		
Gastrointestinal	42	17.8		
Infection	61	25.8		

[a] Sample linked to nurse completing surveys; [b] Sample linked to nurses not completing survey; [c] Standardized U of MannWhitney

Patient Sample

Table 16 summarizes the demographics of the 308 cases representing the final

patient sample. The sample was predominantly white (77.6%), female (53.3%), with a mean age of 65.6 years. The overall severity of illness was relatively low (mean .71; minimum 0, maximum 3) for the sample which is in line with the average length of stay of 4.38 days. The sample sizes of the five clinical populations varied between 47 (cerebrovascular) and 79 (infection). There were significant differences in the sample sizes of the clinical populations when sorted by facility. Facility one provided 21.1% of the final study sample compared to 78.9% for facility two. There were no significant differences in the distribution between the facilities of the pulmonary, cerebrovascular and infection samples, when compared to the overall distribution. In contrast, 98.2% of the cardiac sample was found in facility two as was 62.3% of the gastrointestinal sample. Of concern was the possibility that facility would falsely appear to explain a significant amount of variation in the dependent variable. A process was needed to determine whether facility should be eliminated as a variable due to sampling error, versus being retained as a possible covariate reflecting variation inherent to the structure and process of the individual facilities.

Facility

Early analyses suggested that facility was an important, predictive source of variation for the dependent variables. In some analyses, facility was found to be a more significant variable than the clinical population and even the health status of the patient. In Table 17, are the results of chi-square tests for significant differences between facilities in terms of the identification of the problems of knowledge and well-being by the nurse. While facility two had a much larger sample size, it was at facility one that nurses more

Table 16

Sample Demographics (n = 308)

	CLINICAL POPULATION					
Variable	Pulmonary (n = 74)	Cerebro-vascular (n = 47)	Cardiac (n = 55)	Gastro-intestinal (n = 53)	Infection (n = 79)	Total (n = 308)
Facility n (%)						
Facility 1	14 (21.5)	9 (13.8)	1 (01.5)	20 (30.8)	21 (32.3)	65 (99.9)
Facility 2	60 (24.7)	38 (15.6)	54 (22.2)	33 (13.6)	58 (23.9)	243 (100.0)
Gender n (%)						
Male	36 (25.0)	21 (14.6)	19 (13.2)	25 (17.4)	43 (29.9)	144 (46.8)
Female	38 (23.2)	26 (15.8)	36 (22.0)	28 (17.1)	36 (22.0)	164 (53.3)
Race n (%)						
Asian	1 (50.0)	0	1 (50.0)	0	0	2 (0.7)
Black	5 (29.4)	1 (5.9)	3 (17.6)	4 (23.5)	4 (23.5)	17 (5.5)
Hispanic	6 (23.1)	7 (26.9)	5 (19.2)	3 (11.5)	5 (19.2)	26 (8.4)
Nat/American	3 (13.6)	4 (18.2)	1 (4.5)	4 (18.2)	10 (45.5)	22 (7.1)
White	57 (23.8)	35 (14.6)	45 (18.8)	42 (17.6)	60 (25.1)	239 (77.6)
Other	2 (100.0)	0	0	0	0	2 (0.7)
Age m sd	66.5 (15.1)	67.6 (17.7)	70.6 (11.4)	62.6 (17.1)	62.2 (16.7)	65.6(15.9)
LOS[2] m sd	4.46 (2.58)	4.35 (3.08)	3.38 (2.31)	4.67 (3.72)	4.83 (3.54)	4.38(3.12)
SOI[1] m sd	.80 (.61)	.44 (.55)	.61 (.57)	.91 (.64)	.74 (.69)	.71 (.63)
n	66	45	51	44	65	271

[1]Severity of Illness; [2]Length of Stay

frequently identified the problem of knowledge (Table 18). Neither clinical population nor the severity of illness of the patient contributed significantly to explaining the phenomenon (Table 19). In a stepwise regression analysis examining the impact of health status scores on the number of problems identified for the patient, facility entered the equation prior to well-being and functional status, and to the exclusion of engagement in care, severity of illness, age, gender, race, and clinical population (Table 20). The importance of facility as

a source of variation was not seen in the selection of problems relating to mobility and to 'other' problems for the patient.

The following approach was developed to determine whether facility should be retained as a study variable. Data were analyzed to determine whether facility was a primary source of variation in the health status factor scores. If health status factor scores (the primary independent variable) varied as a result of facility in the same way that the dependent variable of problems identified by the nurse did, than facility would be removed as a possible covariate. If facility and health status covaried, eliminating facility as a study variable could minimize the potential for multicollinearity (due to redundant variables) and allow the analyses to support the conceptual foundation for this study. Problems identified by the nurse should primarily be a result of the health status of the patient, rather than the facility in which the patient is provided cared. Conversely, if there were no significant differences in health status between the two facilities, but facility continued to be a significant source of variation in the dependent variable "problem identified by the nurse," then facility would be retained as a possible covariate. ANOVAs were used to test whether facility, health status factor scores and clinical population were explaining different sources of variation in the dependent variables.

A 5 x 2 x 3 ANOVA was designed to examine the contribution of clinical population (5) and facility (2) to the variance in health status factor scores (3). In contrast to clinical population, facility did not contribute significantly to the variance in the scores of the three health status factor scores: functional status, engagement in care, and psychosocial well-being (Table 21).

Table 17

Chi-Square Tests for Significant Relationships Between Gender, Race, Facility, and Clinical Population with Type of Problem Identified by the Nurse

	Knowledge χ^2 (df) p n = 308	Mobility χ^2 (df) p n = 308	Well-being χ^2 (df) p n = 308	Other χ^2 (df) p n = 303
Gender	0.68 (1) .411	0.00 (1) .993	5.64 (1) .018	0.02 (1) .883
Race	8.10 (5) .151	4.10 (5) .535	5.93 (5) .313	2.72 (5) .742
Facility	48.32 (1) .000[1]	0.08 (1) .771	19.67 (1) .000[1]	0.53 (1) .468
Clinical Population	11.57 (4) .021	11.08 (4) .021	8.62 (4) .071	0.65 (4) .958

[1] $p \leq .0125$ required to achieve significance

Table 18

Chi-Square Tests of Differences in Proportion of Subjects with Knowledge and Psychosocial Well-being Identified as a Problem by Facility

		Knowledge	Psychosocial Well-being
Facility			
Facility 1	Yes	17 (26.2)	36 (55.4)
	No	48 (73.8)	29 (44.6)
Facility 2	Yes	4 (1.6)	64 (26.3)
	No	239 (98.4)	179 (73.7)
Chi-Square		48.5 (1) .000[1]	19.73 (1) .000[1]

[1] $p < .01$ to achieve statistical significance

Table 19

Chi-Square Tests of Significance Between Clinical Population, Severity of Illness, and Facility and Type of Problem Selected by the Nurse

Variable	χ^2	df	p	% Yes	% No
Knowledge					
Clinical Population	11.57	4	.021		
Severity of Illness	1.54	3	.673		
Facility	48.32	1	.000[1]		
Facility 1				26.2	73.8
Facility 2				1.6	98.4
Mobility					
Clinical Population	11.53	4	.021		
Severity of Illness	6.27	3	.099		
Facility	0.08	1	.771		
Well-being					
Clinical Population	8.62	4	.071		
Severity of Illness	1.39	3	.708		
Facility	19.67	1	.000[1]		
Facility 1				55.4	44.6
Facility 2				26.3	73.7
Other Problems					
Clinical Population	0.65	4	.958		
Severity of Illness	0.78	3	.855		
Facility	0.53	1	.468		

[1] $p < .01$ = level of significance

In contrast, a 5 x 2 x 3 ANOVA demonstrated a different relationship between clinical population and facility, and the dependent variable number of health status problems identified by the nurse (Table 22). Both facility and clinical population contributed significantly to explaining the variance in the number of problems identified. There were two homogeneous subsets created with one subset including the cardiac, infection, pulmonary and gastrointestinal samples, and the second subset including the infection, pulmonary, gastrointestinal and cerebrovascular samples. Despite the large overlap between the clinical populations, facility one had twice the mean number of health problems identified (m = 1.46) as did facility two (m = .69). The interaction variable (facility x clinical population) was not statistically significant.

The interaction variable was significant in the one ANOVA where the two statistically significant different clinical samples were cardiac and gastrointestinal: the two populations found primarily in facility two (Table 23). The mean time for teaching and emotional support interventions was almost five times more in facility one (m = 2.03 hours) than facility two (m = 0.46 hours). The ANOVA with activities of daily living interventions as the dependent variable had significant clinical population and facility effects, but no interaction effect. The cardiac sample required less time for activities of daily living interventions than the cerebrovascular sample.

Table 24 summarizes the results of the ANOVAs and chi-square analyses addressing the possible covariation of facility and health status scores (Tables 19, 21, 22, 23). There were no significant effects of facility on the independent variable HSOD health status scores. There were statistically significant effects of clinical population on all of the HSOD health status scores. Facility was a variable of significance only in relation to the dependent variables, and then not consistently.

Factor Analysis of HSOD

As the HSOD was a new scale and as reliability is a function of the sample in each particular study, the internal consistency reliability was re-evaluated in this study. Principal components factor analysis with varimax rotation was used to determine the groupings or subscales of the HSOD. As in prior research (Henry, 1996), the patient variables fell into three subscales: functional status; engagement in care; and psychosocial well-being (Table

25). The family variables also grouped together. One difference from the prior study was that care giver role strain element separated from the caregiver engagement and knowledge elements of care. Initial factor analysis retained the three together, but with extreme differences in the contribution to variance explanation. When the three caregiver elements were left together, internal consistency reliability as measured by a standardized alpha was not acceptable (.475). When factor analysis was set-up to force two factors, the reliability of the caregiver engagement/knowledge factor increased to .80 (Table 26).

Table 20

Stepwise Regression Summary Table: Test of the Effects of Health Status Scores on Number of Health Status Problems Selected by Nurse Without Prior Control of Patient and Setting Variables (n = 239)

Step Entered/ Variable(s)		Step Change				Total Equation			
	df	sr^2	F	p	Beta	R^2	R^2Adj.	F	p
1. Facility	1, 237				-.359	.145	.141	40.06	.000
2. Psychosocial Well-being	2, 236	.079	23.89	.000	-.228	.223	.217	33.91	.000
3. Functional Status	3, 235	.038	9.24	.003	-.180	.253	.243	26.48	.000

Not Entered: Engagement in Care (p = .258), Severity of Illness, Age, Gender, Clinical Population, Race.

Maximum P-to-enter: .01.

Table 21

Analysis of Variance of Clinical Population and Facility and their effects on Health Status Subscale Scores of the Patient (n = 303)

Health Status Subscale	Source	Degrees Freedom	Sum Squares	Mean Squares	F	p
Functional Status	Between Subjects	302	12446.7			
	Clinical Population	4	1013.1	253.3	6.65	.000
	Facility	1	79.4	79.4	2.09	.150
	Interaction	4	359.0	89.8	2.36	.054
	Error 1	293	11159.6	38.1		

Bonferroni's Test for Homogeneous Subsets of Clinical Population (p < .001)
Subset 1: Cerebrovascular, Pulmonary
Subset 2: Pulmonary, Infection, Gastrointestinal, Cardiac

Health Status Subscale	Source	Degrees Freedom	Sum Squares	Mean Squares	F	p
Engagement in Care	Between Subjects	278	957.1			
	Clinical Population	4	48.7	12.2	3.81	.005
	Facility	1	0.3	0.3	0.09	.767
	Interaction	4	9.3	2.3	0.73	.575
	Error 1	269	859.9	3.2		

Bonferroni's Test for Homogeneous Subsets of Clinical Population (p < .001)
Subset 1: Cerebrovascular
Subset 2: Pulmonary, Infection, Gastrointestinal, Cardiac

Health Status Subscale	Source	Degrees Freedom	Sum Squares	Mean Squares	F	p
Psychosocial Well-Being	Between Subjects	284	1014.3			
	Clinical Population	4	53.1	13.3	3.91	.004
	Facility	1	4.7	4.7	1.38	.241
	Interaction	4	14.8	3.7	1.09	.362
	Error 1	275	935.6	3.4		

Bonferroni's Test for Homogeneous Subsets of Clinical Population (< .001)
Subset 1: Cerebrovascular, Pulmonary, Gastrointestinal
Subset 2: Pulmonary, Gastrointestinal, Infection, Cardiac

Table 22

Analysis of Variance of Clinical Population and Facility and their Effects on Number of Problems Selected by the Nurse by Type (n = 308)

Sum of Problems	Source	Degrees Freedom	Sum Squares	Mean Squares	F	p
Problems Related to Health Status	Between Subjects	307	309.1			
	Clinical Population	4	14.8	3.70	4.25	.002
	Facility	1	16.9	16.92	19.41	.000
	Interaction	4	6.9	1.75	2.01	.094
	Error 1	298	259.7	0.87		

Bonferroni's Test for Homogeneous Subsets of Clinical Population ($p < .01$)

Subset 1: Cardiac, Infection, Pulmonary, Gastrointestinal

Subset 2: Infection, Pulmonary, Gastrointestinal, Cerebrovascular

Facility	n	m
Facility 1	65	1.462
Facility 2	243	0.687

Sum of Problems	Source	Degrees Freedom	Sum Squares	Mean Squares	F	p
Other Problems	Between Subjects	307	412.90			
	Clinical Population	4	2.30	0.58	0.43	.790
	Facility	1	0.01	0.01	0.01	.917
	Interaction	4	7.70	1.91	1.42	.227
	Error 1	298	402.00	3.2		

Bonferroni's Test for Homogeneous Subsets of Clinical Population

No significant differences between groups at $p < .01$

Facility	n	m
Facility 1	65	2.077
Facility 2	243	1.905

Sum of Problems	Source	Degrees Freedom	Sum Squares	Mean Squares	F	p
Total All Problems	Between Subjects	307	934.7			
	Clinical Population	4	20.9	5.2	1.83	.124
	Facility	1	17.9	17.9	6.25	.013
	Interaction	4	23.5	5.9	2.05	.088
	Error 1	298	854.4	2.9		

Bonferroni's Test for Homogeneous Subsets of Clinical Population

No significant differences between groups at $p < .01$

Facility	n	m
Facility 1	65	3.538
Facility 2	243	2.593

Table 23

Analysis of Variance of Clinical Population and Facility and their Effects on Total Time to Implement Selected Interventions by Group (n = 308)

Group of Interventions	Source	Degrees Freedom	Sum Squares	Mean Squares	F	p
Teaching and Emotional Support	Between Subjects	306	230.6			
	Clinical Population	4	4.3	1.08	3.26	.010
	Facility	1	45.2	135.99	135.99	.000
	Interaction	4	5.5	1.34	4.11	.003
	Error 1	297	98.8	0.33		
	Bonferroni's Test for Homogeneous Subsets of Clinical Population (p < .01)					
	Subset 1: Cardiac, Pulmonary, Infection, Cerebrovascular					
	Subset 2: Pulmonary, Infection, Cerebrovascular, Gastrointestinal					
	Facility	n	m			
	Facility 1	64	2.030			
	Facility 2	243	0.459			
Activities Daily Living Interventions	Between Subjects	306	401.0			
	Clinical Population	4	18.5	4.62	3.90	.004
	Facility	1	14.4	14.43	12.20	.001
	Interaction	4	4.5	1.13	0.96	.432
	Error 1	298	351.3	1.18		
	Bonferroni's Test for Homogeneous Subsets of Clinical Population (p < .01)					
	Subset 1: Cardiac, Gastrointestinal, Infection, Pulmonary					
	Subset 2: Gastrointestinal, Infection, Pulmonary, Cerebrovascular					
	Facility	n	m			
	Facility 1	64	2.768			
	Facility 2	243	2.095			
Other Direct Care	Between Subjects	306	320.8			
	Clinical Population	4	8.7	2.2	2.14	.076
	Facility	1	0.5	0.5	0.48	.489
	Interaction	4	3.7	0.9	2.05	.454
	Error 1	298	303.1	1.0		
	Bonferroni's Test for Homogeneous Subsets of Clinical Population					
	No significant differences between groups (p < .01)					
	Facility	n	m			
	Facility 1	65	3.538			
	Facility 2	243	2.593			

Table 24

Summary of the Presence of Statistically Significant ($p < .01$) Relationships Between Facility, Clinical Population and the Variables HSOD Health Status Scores, Number of Health Problems Identified and the Time Required to Implement Interventions Related to Health Status Scores (n = 308)

Variable	Facility Effect Significant	Clinical Population Effect Significant	Interaction Significant
HSOD Scores: Independent Variable			
Functional Status	no	yes	no
Engagement in Care	no	yes	no
Psychosocial Well-Being	no	yes	no
Number Problems Identified: Dependent Variable			
Health Status Problems	yes	yes	no
Other Problems	no	no	no
All Problems	yes	no	no
Time Implement Interventions: Dependent Variable			
Teaching & Emotional Support	yes	yes	yes
Activities of Daily Living	yes	yes	no
Other Direct Care	no	no	no
Type of Problem Identified: Dependent Variable			
Knowledge	yes	no	n/a
Mobility	no	no	n/a
Well-Being	yes	no	n/a
Other	no	no	n/a

The internal consistency reliability as measured by a standardized alpha was adequate for all subscales (factors): functional status = .95, engagement in care = .80, psychosocial well-being = .79, caregiver engagement in care = .80, and family well-being = .83. These values fall well within those recommended by Helmstadter (1964) and Nunnally 1978) for use in group comparisons.

Descriptive Statistics: The Dependent Variables

The problems identified by the nurse for the patient were initially grouped into four

groups: knowledge, mobility, well-being, and other. The problems of knowledge, mobility and well-being are related to health status factors from the HSOD. All other problems identified by the nurse were grouped under other. The percentage of patients for whom the admitting nurse identified problems within each group is shown in Table 27. Across the clinical populations, the percentage of patients with other problems identified varied from 96.3% to 98.0% with an average of 97.0%. The percentage of problems identified which were conceptually linked to the HSOD questionnaire varied greatly. Knowledge was the problem least frequently identified, being found in only 6.8% of the sample overall, and in none of the cardiac sample. Mobility was the health status problem most frequently identified (35.4% overall) ranging from 28.4% in the pulmonary sample and 55.3% in the cerebrovascular sample. The identification of well-being as a problem also varied greatly with a mean of 32.5% and a range of 21.8% in the cardiac and 42.6% in the cerebrovascular sample.

The four problem groups were collapsed into two groups. Problems related to HSOD scores (mobility, knowledge, well-being) were combined into a health status group, with all remaining problems grouped as other. In addition, other and health status problems were summed to create a third dependent variable, total problems identified. The frequency, mean, and standard deviations of problems identified within the three groups are presented in Table 28. The minimum, median and maximum values are also presented.

The times required to implement the interventions ordered for the patient by the nurse were grouped into one of three categories: a) teaching and emotional support; b)

activities of daily living, and c) other direct care (Table 29). The time devoted to teaching and emotional support during the first 24 hours of the hospital admission varied between 0.54 hours (acute cardiac) and 0.97 hours (acute gastrointestinal) with a mean of 0.79 hours for the entire sample. The hours required to support activities of daily living were greater varying between 1.83 for the cardiac sample and 2.70 for the cerebrovascular sample, with an average of 2.24 hours across all clinical groups. The hours required to provide other direct care interventions were least in the cerebrovascular sample (4.41 hours) and greatest in the gastrointestinal sample (4.81 hours).

Table 25

Principal components Factor Analysis with Varimax Rotation for the Health Status Outcomes Dimensions Instrument Individual Elements of Care (n = 274)

	FACTORS		
Variables	Functional Status	Engagement in Care	Psychosocial Well-being
Elimination	.95[1]	.16	.09
Grooming	.95[1]	.16	.11
Dressing	.94[1]	.17	.11
Bathing	.94[1]	.12	.11
Ambulation	.74[1]	.12	.10
Physical Performance	.65[1]	.21	.11
Role Strain	.35	.61[1]	.40
Engagement in Care	.17	.90[1]	.07
Knowledge	.16	.90[1]	.10
Coping	.16	.51	.66[1]
Anxiety	.12	.03	.87[1]
Fear	.08	.13	.86[1]
Eigenvalue	4.77	2.44	2.17
% of Variance	39.7	20.3	18.0
Alpha	.95	.80	.79

[1] Care element retained in factor.

Table 26

Principal components Factor Analysis with Varimax Rotation for the Health Status Outcomes Dimensions Instrument Caregiver Elements of Care (n = 135)[1]

	FACTORS	
Variables	Engagement Care	Psychosocial Well-being
Knowledge	.92[2]	-.01
Engagement in Care	.92[2]	.09
Role Strain	.04	1.00[2]
Eigenvalue	1.69	0.99
% of Variance	56.5	33.1
Alpha	.80	

Note: Alpha = .47 if three elements retained in single factor. [1] n = 135 as some patients did not have caregivers or caregivers not available at time of assessment. [2]Care elements retained in factor.

Table 27

Percent of Sample with Problem Group Selected by the Nurse, by Clinical Population

	Pulmonary	Cerebro-vascular	Cardiac	Gastro-Intestinal	Infection	All Subjects
Knowledge	9.5	10.6	0	13.2	2.53	6.8
Mobility	28.4	55.3	29.1	30.2	38.0	35.4
Well-being	36.5	42.6	21.8	39.6	25.3	32.5
Other	97.3	96.7	96.3	98.0	97.4	97.0

Relationships Between Variables

The Pearson product moment correlation coefficient statistic (Dawson-Saunders & Trapp, 1994) was used to investigate possible relationships between the interval independent and dependent variables. Given the sample size and the number of variables, a number of statistically significant relationships were expected. Of concern was the number of relationships which while technically statistically significant, are very small.

Colton (1974) provides four ranges of intensity for interpreting correlation coefficients (note that each range has a mirror group for correlations between -1 and 0). Correlations from 0 to .25 demonstrate little or no relationship while those from .25 to .50 indicate a fair relationship. Moderate to good relationships vary between .50 and .75 with correlations greater than .75 reflecting very good to excellent relationships.

The size of the relationship was of concern as the coefficient of determination (r^2) is a measure of the percent of variation in one variable which could be explained by its associated variable. For the minimal to no relationship group, a maximum of 6.2% of variation would be explained in comparison a range of 6.3% to 25% for the fair relationship group. Table 30 summarizes the number of statistically significant

Table 28

Mean, Standard Deviation, Minimum/Median/Maximum of the Total Number of Problems Identified by the Nurse, by Problem Group by Clinical Population

	Pulmonary	Cerebro-vascular	Cardiac	Gastro-Intestinal	Infection	All Subjects
	n = 74 mean (S.D.) m/m/m[1]	n = 47 mean (S.D.) m/m/m	n = 55 mean (S.D.) m/m/m	n = 53 mean (S.D.) m/m/m	n = 79 mean (S.D.) m/m/m	n = 308 mean (S.D.) m/m/m
Total Health Status Problems	0.82 (1.00) 0/1/5	1.28 (1.14) 0/1/5	0.56 (0.76) 0/0/3	0.94 (1.03) 0/1/5	0.76 (0.99) 0/1/6	0.85 (1.00) 0/1/6
Total Other Problems	1.97 (1.11) 0/2/6	1.87 (1.29) 0/1/6	1.78 (1.13) 0/1/5	2.00 (1.14) 0/2/5	2.03 (1.18) 0/2/6	1.94 (1.16) 0/2/6
Total Problems Identified	2.80 (1.70) 0/2.5/8	3.15 (2.07) 1/3/9	2.35 (1.53) 0/2/7	2.94 (1.68) 1/2/9	2.78 (1.75) 0/2/9	2.79 (1.74) 0/2/9

[1] Minimum/Median/Maximum

relationships found in this study, as they fell within the Colton groups. Of 54 possible relationships as measured by Pearson and Spearman correlation coefficients (Table 31 and Table 32), 25 were statistically significant ($p < .01$). Of these, 10 fell into the minimal group, 14 into the fair group and only one into the moderate to good relationship group. Plots of the data failed to provide evidence of possible non-linear relationships.

Table 29

Mean and (Standard Deviation) of Time in Hours to Implement Interventions Ordered by the Nurse During First 24 Hours of Hospital Admission, by Intervention Group, by Clinical Population (n = 307)

	Pulmonary	Cerebro-vascular	Cardiac	Gastro-Intestinal	Infection	All Subjects
Teaching and Emotional Support	0.74 (.79)	0.87 (1.15)	0.54 (.51)	0.97 (.95)	0.82 (.86)	0.79 (.87)
Activities of Daily Living	2.39 (1.27)	2.70 (1.32)	1.83 (.94)	2.04 (.86)	2.23 (1.09)	2.24 (1.15)
Other Direct Care Activities	4.76 (1.07)	4.41 (1.04)	4.43 (.84)	4.81 (1.24)	4.59 (.90)	4.62 (1.02)

All of the significant relationships associated with the health status scores were negative. So any significant correlation had the relationship of poorer health states being associated with increased problems identified and interventions ordered by the nurse for the patient. The other significant relations were positive and related to severity of illness and age. Increased Activities of daily living interventions were weakly associated with increased age and severity of illness, while increased other direct care interventions were weakly associated with increased severity of illness.

Table 30

Number of Statistically Significant Correlations Falling Within the Four Groups as Defined by Colton (1974)

Correlation Coefficient Group	Number of Significant Correlations in Study	Coefficient of Determination (r^2)
Little or No Relationship r = 0 to .249 (or 0 to -.249)	10	0 - .062
Fair Relationship r = .250 - .499 (or -.250 to -.499)	14	.063 - .249
Moderate to Good Relationship r = .500 to .749 (or -.500 to -.749)	1	.250 - .561
Very Good to Excellent Relationship r = .750 to 1.00 (or -.750 to -1.00)	0	.563 - 1.00

The Spearman rank correlation coefficient was used to evaluate the relationship between severity of illness data and the dependent variables (Table 33). Severity of illness was an ordinal variable ranging between zero and three. There was a small, statistically significant, negative relationship between severity of illness and the time to implement activity of daily living interventions (-.188, $p < .002$) and the time required to implement other direct care nursing activities (-.199, $p < .000$).

The Mann-Whitney and Kruskal-Wallis statistics were used to test whether the categorical independent variables provided a significant source of variation in the number of problems identified by the nurse for the patient, and the total time required to implement interventions ordered for the patient (Table 34 and Table 35). Facility was a significant source of variation in the number of health status problems identified and in the total number of problems identified for the patient. In both cases, Facility one had the

higher mean rank.

The t statistic was used to test for significant differences between pairwise comparisons of the clinical populations. At the .01 level of significance there were no differences between the cardiac, infection, pulmonary and gastrointestinal populations in terms of the total number of health status problems identified by the nurse for the patient. Similarly, the pulmonary, gastrointestinal and cerebrovascular samples were considered homogeneous at the .01 level of significance. The overlapping of the two subsets as shown in Table 34 demonstrates that the cardiac and pulmonary samples had the least number of health status problems identified, while the cerebrovascular sample had the largest number of health problems identified by the nurse. The cardiac sample was different from the cerebrovascular sample ($t = 3.78$; $p < .000$) as was the pulmonary sample ($t = .988$, $p < .003$).

Clinical population also provided a significant source of variation in the time required to implement interventions associated with activities of daily living. Test for homogeneous subsets (using t statistic) grouped the cardiac, gastrointestinal and infections samples together. A second subset consisted of the gastrointestinal, infection, and pulmonary and cerebrovascular samples. As demonstrated in Table 35, overlapping the two subsets distinguished the cardiac sample as being significantly different from the pulmonary ($t = 2.72$; $p < .007$) and cerebrovascular ($t = 3.77$; $p < .000$) samples. The cardiac sample had less time associated with activities of daily living intervention activities, and the pulmonary and cerebrovascular samples required the greatest amount of time for activities of daily living interventions.

Table 31

Pearson Pairwise Correlations of Age, Health Status Subscales, and Severity of Illness with Total Number of Patient Problems Identified by Problem Group

	Total Health Status Problems r (p)	Total Other Problems r (p)	Total All Problems r (p)
Age (n = 308)	-.006 (.922)	.057 (.317)	.035 (.543)
Functional Status (n = 303)	-.304 (.000)[1]	-.269 (.000)[1]	-.354 (.000)[1]
Engagement in Care (n = 279)	-.250 (.000)[1]	-.234 (.000)[1]	-.302 (.000)[1]
Psychosocial Well-being (n = 285)	-.291 (.000)[1]	-.107 (.070)	-.249 (.000)[1]
Caregiver Engagement in Care (n = 140)	-.093 (.276)	.027 (.748)	-.039 (.652)
Caregiver Role Strain (n = 135)	-.238 (.005)[1]	-.211 (.014)	-.275 (.001)[1]
Family Psychosocial Well-being (n = 161)	-.341 (.000)[1]	-.220 (.005)[1]	-.335 (.000)[1]
Severity of Illness (n = 271)	-.004 (.945)	.105 (.084)	.069 (.261)

[1] $p \leq .01$

Table 32

Pearson Pairwise Correlations of Age, Health Status Subscales, and Severity of Illness with Total Time Associated with Groups of Interventions

	Teaching and Emotional Support Interventions r (p)	Activities of Daily Living Interventions r (p)	Other Direct Care Interventions r (p)
Age (n = 307)	-.111 (.051)	.323 (.000)[1]	-.050 (.383)
Functional Status (n = 302)	-.190 (.001)[1]	-.570 (.000)[1]	-.115 (.045)
Engagement in Care (n = 278)	-.047 (.438)	-.476 (.000)[1]	-.062 (.304)
Psychosocial Well-being (n = 284)	-.153 (.010)[1]	-.314 (.000)[1]	-.014 (.809)
Caregiver Engagement in Care (n = 139)	.148 (.083)	.019 (.824)	-.162 (.057)
Caregiver Role Strain (n = 134)	-.163 (.060)	-.183 (.034)	-.002 (.981)
Family Psychosocial Well-being (n = 160)	-.288 (.000)[1]	-.297 (.000)[1]	-.058 (.471)
Severity of Illness (n = 271)	.117 (.054)	.191 (.002)[1]	.162 (.007)[1]

[1] $p \leq .01$

Table 33

Spearman Rank Pairwise Correlations of Severity of Illness with the Total Number of Problems Identified by the Nurse, and the Total Time to Implement Interventions Ordered by the Nurse During the First 24 Hours of the Hospital Admission (n = 271)

	Severity of Illness r (p)
Total Health Status Problems	-.016 (.790)
Total Other Problems	-.125 (.040)
Total All Problems	-.091 (.137)
Teaching and Emotional Support Interventions	.108 (.077)
Activities of Daily Living Interventions	-.188 (.002)[1]
All Other Direct Care Interventions	-.199 (.000)[1]

[1] $p \leq .01$

Table 34

Mann-Whitney and Kruskal-Wallis Tests for Significant Relationships Between Gender, Facility, and Clinical Population with the Number of Problems Identified by the Nurse

Group (n)	Total Number Health Related Problems Identified Rank/Mean/SD	Total Number Other Problems Identified Rank/Mean/SD	Total Number Problems Identified Rank/Mean/SD
Facility			
Facility 1 (65)	189.0 (3.54)2.07	165.9 (2.08) 1.18	189.0 (3.54) 2.07
Facility 2 (243)	142.9 (0.69).82	151.4 (1.91) 1.16	145.3 (2.59) 1.59
Standardized U (p)	22.76 (.000)[1]	1.49 (.223)	12.98 (.000)[1]
Gender			
Male (144)	145.5(0.76).99	163.3(2.08)1.24	154.8 (2.84)1.81
Gender (164)	162.4(0.93)1.01	146.8(1.82)1.07	154.2 (2.84)1.69
Standardized U (p)	3.21 (.073)	2.91 (.089)	.003 (.954)
Clinical Population			
Pulmonary (74)	152.0(.82)1.00	158.1(1.97)1.11	156.5(2.80)1.68
Cerebrovascular (47)	190.8(1.23)1.14	145.1(1.87)1.28	166.2(3.15)2.07
Cardiac (55)	129.9(.56).76	140.9(1.78)1.13	131.7(2.35)1.53
Gastrointestinal (53)	163.6(.94)1.03	161.1(2.00)1.14	164.4(2.94)1.68
Infection (79)	146.2(.76).99	161.7(2.03)1.78	154.9(2.76)1.75
Kruskal-Wallis H (p)	15.45 (.004)[1,2]	3.00 (.557)	5.37 (.252)

[2] Pairwise comparisons: groups in a common subset do not differ at the .01 level.
Subset 1: Cardiac, Infection, Pulmonary, Gastrointestinal
Subset 2: Pulmonary, Gastrointestinal, Cerebrovascular

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[1] $p \leq .01$ required to achieve significance

Table 35

Mann-Whitney and Kruskal-Wallis Tests for Significant Relationships Between Gender, Facility, and Clinical Population with Total Time Associated with Groups of Interventions

Group (n)	Teaching and Emotional Support Interventions Rank/Mean/S.D.	Activities of Daily Living Interventions Rank/Mean/S.D.	Other Direct Care Interventions Rank/Mean/S.D.
Facility			
Facility 1 (64)	267.3 (2.03).81	198.8 (2.77) 1.11	126.6 (4.40) 1.28
Facility 2 (243)	124.2 (0.46).52	142.2 (2.10) 1.12	161.2 (4.67) 0.94
Standardized U (p)	12.09 (.000)[1]	4.54 (.000)[1]	-2.77 (.006)[1]
Gender			
Male (143)	150.1(0.77).94	159.8(2.34)1.21	166.2 (4.77)1.12
Gender (164)	157.4(0.80).84	148.9(2.15)1.08	143.4 (4.48)0.91
Standardized U (p)	-0.77 (.444)	1.08 (.282)	2.24 (.025)
Clinical Population			
Pulmonary (74)	152.4(.74).79	163.9(2.39)1.27	165.9(4.76)1.07
Cerebrovascular (47)	156.1(.88)1.15	187.0(2.70)1.32	133.7(4.41)1.04
Cardiac (55)	140.3(.54).51	121.7(1.83)0.94	136.7(4.43)0.84
Gastrointestinal (53)	169.3(.97).95	143.9(2.04)0.86	172.4(4.81)1.24
Infection (78)	153.6(.82).86	154.3(2.23)1.09	154.6(4.59)0.90
Kruskal-Wallis H (p)	3.25 (.516)	15.38 (.004)[1,2]	8.15 (.086)

[2] Pairwise comparisons: groups ina common subset do not differ at the .01 level.
Subset 1: Cardiac, Gastrointestinal, Infection
Subset 2: Gastrointestinal, Infection, Pulmonary, Cerebrovascular

[1] $p \leq .01$ required to achieve significance

Hypothesis Testing

Analysis of Question #1

The first question sought to determine whether the health status of the patient, as measured by the HSOD on admission to the hospital, was predictive of the types of problems the nurse would identify for the patient. Logistic regression was used for the

analysis as the dependent variable, type of problem identified, was dichotomous: identified; not identified. Patient and setting characteristics including severity of illness, age, gender, clinical population, race, and facility were forced into the equation. In step two, the health status scores of functional status, engagement in care, and psychosocial well-being were then entered. The factors entered in step two were removed in step three if they did not contribute to the equation at the level of significance of .01. The assessment for the overall fit of the model, as well as the comparisons of the submodels derived from each step, were tested with the log likelihood statistic and the chi-square goodness of fit statistic.

Null hypothesis 1

After controlling for patient and setting characteristics, the admission HSOD factor scores will not explain a significant amount of the variance in the identification of knowledge as a problem by the nurse.

Table 36 provides a summary of the logistic regression model derived to test the hypothesis. Overall, the control variables were able to explain the variation in the identification of knowledge as a problem at a statistically significant level. However, the only control variable adding to the prediction equation at a level of significance of $p < .01$ was facility (odds ratio 0.02; 95% confidence interval = .00, .11; $p < .000$). Subjects at facility two were two hundredths as likely to have knowledge identified as a problem as subjects at facility one. In step two, none of the three health status scores added to the prediction at a level of .01. There were no significant differences in the predictive models with or without the health status scores. Null hypothesis 1 failed to be rejected.

Null Hypothesis 2

After controlling for patient and setting characteristics, the admission HSOD factor scores will not explain a significant amount of the variance in the identification of mobility as a problem by the nurse.

The logistic regressions used to test this hypothesis are summarized in Table 37. Patient characteristics alone did not create a model which would explain whether a nurse was more likely to identify mobility as a problem for the patient, at the .01 level of significance. Null hypothesis 2 was rejected however, as the final model demonstrated that the addition of the health status scores of functional status (odds ratio .90; 95% CI = ,85 - .96; $p < .002$) and engagement in care (odds ratio .62; 95% CI = .50, .78; $p < .000$) to the equation increased the chi-square (increased the likelihood) that equation would predict the selection of mobility as a problem ($\chi^2 = 67.24$; df = 14 ; $p < .000$). Facility and psychosocial well-being did not contribute to the final model.

Null Hypothesis 3

After controlling for patient and setting characteristics, the admission HSOD factor scores will not explain a significant amount of the variance in the identification of a psychosocial well-being problem by the nurse.

The logistic regressions which tested hypothesis 3 are summarized in Table 38. The health status scores did not contribute to the predictive value of the equation beyond the control variables. Of the control variables, only two contributed to the goodness of fit at a statistically significant level: age (odds ratio .97; 95% CI .95, .99; $p < .004$) and

facility (odds ratio .24; 95% CI = .10, .62; p < .003). Null hypothesis #3 failed to be rejected.

Null Hypothesis 4

After controlling for patient and setting characteristics, the admission HSOD factor scores will not explain a significant amount of the variance in the identification of an other problem by the nurse.

The logistic regressions testing this hypothesis are summarized in Table 39. Null hypothesis 4 failed to be rejected. Neither the control variable set, nor the addition of health status scores were able to generate an equation likely to explain the selection of other problems by the nurse at a level of significance of .01.

Table 36

Logistic Regression Table: Effects of Health Status Scores on the Identification of Knowledge as a Problem by the Nurse, after Controlling for Patient and Setting Characteristics

Step	Variables in Model	Log Likelihood	Chi-Square	df	p
1	Control Variables[1]	-25.459	50.92	12	.000
2	Control Variables, Psychosocial Well-Being, Functional Status, Engagement in Care	-25.701	51.40	15	.000
3	Control Variables	-25.459	50.92	12	.000

Comparisons of Models Where One Model is a Submodel of the Other

Step vs	Step	Variable(s) Tested	Log Likelihood	Chi-Square	df	p
1	2	Functional Status, Psychosocial Well-Being, Engagement in Care	-0.241	0.483	3	.923
2	3	Functional Status, Psychosocial Well-Being, Engagement in Care	-0.241	0.483	3	.923

[1] Control Variables: Severity of Illness; Age; Gender; Clinical Population; Race; Facility.

Table 37

Logistic Regression Table: Effects of Health Status Scores on Identification of Mobility as a Problem by the Nurse, after Controlling for Patient and Setting Characteristics

Step	Variables in Model	Log Likelihood	Chi-Square	DF	P
1	Control Variables[1]	-11.145	22.29	12	.034
2	Control Variables, Psychosocial Well-being, Functional Status, Engagement in Care	-34.011	68.02	15	.000
3	Control Variables, Functional Status, Engagement in Care	-33.617	67.24	14	.000

Comparisons of Models Where One Model is a Submodel of the Other

Step vs	Step	Variable(s) Tested	Log Likelihood	Chi-Square	DF	P
1	2	Functional Status, Psychosocial Well-being, Engagement in Care	-22.865	45.73	3	.000
1	3	Functional Status, Engagement in Care	-22.471	44.94	2	.000
2	3	Psychosocial Well-being	-0.393	0.79	1	.375

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[1] Control Variables: Severity of Illness; Age; Gender; Clinical Population; Race; Facility.

Analysis of Question 2

The purpose of Question 2 was to determine whether health status scores were predictive of the number of problems identified by the nurse of the patient, over and beyond that predicted by patient and setting characteristics.

Hierarchical and stepwise regression techniques were used to test the hypotheses for this question. Patient demographics (age, sex, race, clinical population, and severity of illness) and facility were forced into the model in step one. The health status scores were

then allowed to enter in a stepwise manner, with .015 being the criteria for entering the equation. *F* statistics were used to test the adequacy of the overall fit (R^2) and the squared semi-partial correlations (sr^2) used to determine which variables had significant, unique contributions to the variation in the dependent variable (Cohen & Cohen, 1983).

Table 38

Logistic Regression Table: Effects of Health Status Scores on the Identification of Well-Being as a Problem by the Nurse, after Controlling for Patient and Setting Characteristics

Step	Variables in Model	Log Likelihood	Chi-Square	df	p
1	Control Variables[1]	-15.368	30.74	12	.002
2	Control Variables, Psychosocial Well-being, Functional Status, Engagement in Care	-19.496	38.99	15	.001
3	Control Variables,	-15.368	30.74	12	.002

Comparisons of Models Where One Model is a Submodel of the Other

Step vs	Step	Variable(s) Tested	Log Likelihood	Chi-Square	df	p
1	2	Functional Status, Psychosocial Well-being, Engagement in Care	-4.128	8.26	3	.041
2	3	Functional Status, Psychosocial Well-being, Engagement in Care	-4.128	8.26	3	.041

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[1] Control Variables: Severity of Illness; Age; Gender; Clinical Population; Race; Facility.

Hypothesis 5

After controlling for patient and setting characteristics, the admission HSOD factor scores will not explain a significant amount of the variance in the number of health status related problems identified by the nurse.

After the control set had been entered into the equation, psychosocial well-being and functional status met the criteria for entering the equation in subsequent steps (Table 40). In the final equation, 28.5% of the variation in the number of health status problems identified was accounted for by the four elements: 19.1% by the control variables (11.1% from facility (p < .000)); 6.5% by psychosocial well-being scores (p < .000); and 2.9% by the functional status scores (p < .003). Null hypothesis 5 was rejected.

Table 39

Logistic Regression Table: Effects of Health Status Scores on the Identification of Other Problems by the Nurse, after Controlling for Patient and Setting Characteristics

Step	Variables in Model	Log Likelihood	Chi-Square	DF	P
1	Control Variables[1]	-5.227	10.45	12	.576
2	Control Variables, Psychosocial Well-being, Functional Status, Engagement in Care	-7.688	15.38	15	.425
3	Control Variables	-5.227	10.45	12	.576

Comparisons of Models Where One Model is a Submodel of the Other

Step vs	Step	Variable(s) Tested	Log Likelihood	Chi-Square	DF	P
1	2	Functional Status, Psychosocial Well-being, Engagement in Care	-2.461	4.92	3	.178
1	2	Functional Status, Psychosocial Well-being, Engagement in Care	-2.461	4.92	3	.178

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[1] Control Variables: Severity of Illness; Age; Gender; Clinical Population; Race; Facility.

Null Hypothesis 6

After controlling for patient and setting characteristics, the admission HSOD factor

scores will not explain a significant amount of the variance in the number of non-health status related problems identified by the nurse.

The control set provided minimal explanation of the number of other problems identified by the nurse ($R^2 = .054$; $p < .386$). Engagement in care met the criteria to be added to the equation ($p < .015$), and increased the explained variance to 9.8% ($sr^2 = .044$; $p = .001$). While functional status and psychosocial well-being met the criteria to enter the equation in step 1, they no longer met the criteria following step 2 (Table 40). Null hypothesis 6 was rejected.

Null Hypothesis 7

After controlling for patient and setting characteristics, the admission HSOD factor scores will not explain a significant amount of the variance in the total number of problems identified by the nurse.

The set of control variables explained 12.0% ($p = .003$) of the variance in the total number of problems identified by the nurse for the patient (Table 40). Facility contributed the most to the explanation of variance (6.0%, $p < .000$). All three health status scores met the criteria to enter step two. Engagement in care was entered and explained an additional 8.0% of the variance in the dependent variable ($p < .000$). Functional status entered at step three adding 2.9% to the understanding of the variance. Following step three, psychosocial well-being no longer met the criteria for entry. Null hypothesis 7 was rejected.

Table 40

Hierarchical Regression Summary Table: Test of the Effects of Health Status Scores on Number of Problems Selected by Nurse, After Controlling for Patient and Setting Characteristics

		Step Change				Total Equation			
Step Entered/ Variable(s)	df	sr²	F	p	Beta	R²	R²Adj.	F	p
Sum All Problems Linked to Health Status Scores									
1. Control Set[1]	12, 226					.191	.148	4.45	.000
2. Psychosocial Well-being	13, 225	.065	19.77	.000	-.220	.257	.214	5.97	.000
3. Functional Status	14, 224	.029	9.05	.003	-.195	.285	.241	6.39	.000
Not entered: Engagement in Care (p = .184)									
Sum All Problems Not Linked to Health Status Scores									
1. Control Set	12, 226					.054	.004	1.07	.385
2. Engagement/Care	13, 225	.044	11.08	.001	-.233	.098	.046	1.89	.033
Not entered: Functional Status (p = .055); Psychosocial Well-being (p = .216)									
Sum All Problems Selected									
1. Control Set	12, 226					.120	.073	2.56	.003
2. Engagement Care	13, 225	.080	22.62	.000	-.231	.200	.154	4.33	.000
3. Functional Status	14, 224	.029	8.42	.004	-.205	.229	.181	4.75	.000
Not entered: Psychosocial Well-being (p = .025)									

[1] Control Set Variables: Severity of Illness, Age, Gender, Clinical Population, Race, Facility. Maximum P-to-enter: .015.

Analysis of Question 3

Question 3 sought to determine whether health status scores were predictive of the time to implement groups of interventions ordered by the nurse for the patient. The sample analysis design was used for this question as was used for Question 2. Again, the overall alpha was 0.05 and individual criterion of significance was 0.015 for each of the three major groups within the dependent variable total time required to implement

interventions.

Null Hypothesis 8

After controlling for patient and setting characteristics, the admission HSOD factor scores will not explain a significant amount of the variance in the time required to implement teaching and emotional support interventions selected by the nurse.

The control set of patient and setting variables explained 45.2% ($p < .000$) of the variance in the time required to implement teaching and emotional support interventions (Table 41). Of this, facility accounted for an astonishing 41.0 % of the explanation (F to remove 168.3, $p < .000$). At the end of step one, only functional status met the criteria for entering the equation, adding an additional 2.9% to the explanation of the variance ($p < .001$). Null hypothesis 8 was rejected.

Hypothesis 9

After controlling for patient and setting characteristics, the admission HSOD factor scores will not explain a significant amount of the variance in the time required to implement activity of living interventions selected by the nurse.

The patient and facility characteristics were able to explain 25.1% ($p < .000$) of the variation in the time required to implement interventions supporting activities of daily living (Table 41). All three health status scores met the criteria for entering the equation at the end of step one. Engagement in care was entered first, explaining an additional 13.9% of the variance ($p < .001$) while functional status was entered in step three increasing the explanation of variance by 5.0% ($p < .000$). Following step three, psychosocial well-being no longer met the criteria to enter the regression equation. Null

hypothesis 9 was rejected.

Hypothesis 10

After controlling for patient and setting characteristics, the admission HSOD factor scores will not explain a significant amount of the variance in the time required to implement other direct care interventions selected by the nurse.

Table 41

Hierarchical Regression Summary Table: Test of the Effects of Health Status Scores on the Time Required to Implement Selected Interventions, by Group, After Controlling for Patient and Setting Characteristics

	Step Change					Total			
Equation Variable(s)	Step Entered/ df	sr^2	F	p	Beta	R^2	R^2Adj.	F	p
Teaching & Emotional Support Interventions									
1. Control Set[1]	12, 226					.452	.423	15.53	.000
2. Functional Status	13, 225	.029	12.5	.001	-.187	.481	.451	16.02	.000
Not entered: Psychosocial Well-being (p = .406); Engagement in Care (p = .112)									
Activities of Daily Living									
1. Control Set	12, 226					.251	.211	6.30	.000
2. Engagement/Care	13, 225	.139	51.36	.000	-.269	.390	.355	11.07	.000
3. Functional Status	14, 224	.050	19.93	.000	-.305	.440	.405	12.56	.000
Not entered: Psychosocial Well-being (p = .163)									
Other Direct Care Interventions									
1. Control Set	12, 226					.136	.091	2.97	.001
Not entered: Engagement in Care (p = .547); Functional Status (p = 375); Psychosocial Well-being (p = .851)									

[1] Control Set Variables: Severity of Illness, Age, Gender, Clinical Population, Race, Facility. Maximum P-to-enter: .01.

Table 42

Summary of Hypotheses, Whether Accepted or Rejected, and the Study Variables Contributing Significantly to the Explanation of Variance in the Dependent Variable

Hypothesis Number Dependent Variable	Control Variables Provide Sig χ^2 or sr^2?		Hypothesis Rejected?		Health Status Scores That Contributed Sig χ^2 or sr^2?
	All	Individual	Yes	No	
#1 Knowledge Problem Identified	Yes	Facility		No	None
#2 Mobility Problem Identified	No		Yes		Functional Status, Engagement in Care
#3 Psychosocial Well-Being Problem Identified	Yes	Facility Age		No	None
#4 Other Problem Identified	No			No	None
#5 Number of Health Status Problems Identified	Yes	Facility	Yes		Psychosocial Well-Being, Functional Status
#6 Number of Other Problems Identified	No		Yes		Engagement in Care
#7 Total Number of Problems Identified	Yes	Facility Age	Yes		Engagement in Care, Functional Status
#8 Time to Implement Teaching & Emotional Support Interventions	Yes	Facility	Yes		Functional Status
#9 Time to Implement Activities of Daily Living Interventions	Yes	Severity of Illness, Age, Facility	Yes		Engagement in Care, Functional Status
#10 Time to Implement Other Direct Care Interventions	Yes	Severity of Illness, Facility		No	None

The control variables accounted for 13.6% ($p < .001$) of the variation in the time required to implement interventions in the other direct care group (Table 41). Of the control variables, severity of illness accounted for 3.2% ($p < .004$) and facility accounted for 4.9% ($p < .004$) of the variation. None of the three health status scores met the criteria to enter the regression equation at the end of step one. Null hypothesis 10 failed to be rejected.

Summary of Hypothesis Testing

Table 42 is a summary table of the ten hypothesis tests. The table includes the hypothesis number and related dependent variable, whether control variables provided significant sources of variation, whether the null hypothesis was rejected or not, and health status factors that resulted in the rejection of the hypothesis.

Summary

In this study, analyses of the HSOD elements of care and of the study variables were completed prior to hypotheses testing. Missing data was problematic and resulted in cases being removed from the study, the elimination of nurse demographics as variables, the elimination of caregiver and family factor scores from regression and ANOVA analyses, and the elimination and/or modification of hypotheses requiring nurse variables. A decision was made to retain facility as a study variable even though its presence made the interpretation of some results less definitive. Six of the ten study hypotheses were rejected.

CHAPTER V

DISCUSSION

This study sought to determine whether the patient's health status on admission was reflected in the care planned for the patient by the nurse. This discussion will interpret the results of the hypotheses testing in relation to each group of dependent variables. The potential impact of the decisions made relating to missing nurse demographic data and to the retention of facility as a covariate in the study will be considered. The significance and limitations of the study will then be addressed and finally, the implications for nursing.

Hypotheses Testing

Question #1: Problems Identified by the Nurse

Four hypotheses were directed toward determining whether the patient's admission HSOD health status factor scores (HSFSs) were related to the types of problems identified by the nurse for the patient. Three of the null hypotheses (knowledge, psychosocial well-being, other) failed to be rejected because statistically significant, predictive relationships with HSFSs were not present. The logistic model for mobility achieved statistical significance with the addition of the functional status and engagement in care HSFSs.

Other

No variable, in isolation or in a group, was able to explain a significant amount of the variation in the selection of "other" problems. Other problems included those relating specifically to the admitting medical diagnoses and to nursing problems in areas other than

functional status, engagement in care, or psychosocial well-being. Examples include: dysuria, cardiac output, tissue perfusion, ventilation, gastrointestinal elimination, and chest pain. Altered skin integrity, symptom management, cognition, and altered comfort are typical of other problems managed by nursing but not related to the HSOD factors. All but 3% of the sample had at least one "other" problem identified on their plan of care.

This tendency to focus on other problems was evident in the literature. In the Henry and Holzemer study (1995), four of the seven groups of most frequently identified problems for persons with AIDS included respiratory function, body temperature, nutrition, and alterations in elimination. Similarly, Coenen and colleagues (1995) found four of the six most frequently identified problems in the study facility were pain, potential for injury, decreased cardiac output, and potential for infection. Given the short lengths of stay and the need to prioritize care, a focus on the physiological needs of the patient in line with Maslow's hierarchy of needs (1968) can be understood. It is more difficult to interpret why none of the independent variables or covariates contributed to a statistically significant predictive model. As the null hypothesis for the number of other problems identified was rejected, it could be that the dichotomous response (identified at least one other problem, or no other problem identified) for this hypothesis did not provide sufficient variability: particularly as 97% of the sample had at least one problem identified in this category.

Mobility

In the predictive model for mobility, the control variables alone did not create a statistically significant model. This suggests that the identification of mobility as a

problem was not driven by facility or by the clinical population, but rather the specific condition of the patient. The addition of functional status and engagement in care HSFSs resulted in a significant increase in the chi-square and goodness of fit of the model to the exclusion of psychosocial well-being. Functional status and mobility are directly linked conceptually. The contribution of engagement in care is of interest. Does one's role strain, involvement in their care and/or their level of knowledge regarding their particular disease process contribute to their ability to perform activities of daily living? Additional research is needed to understand the contribution of engagement in care.

Knowledge and Psychosocial Well-Being

The two problem types which were explained by the control set of variables and not further explained by HSFSs, were knowledge and psychosocial well-being. Of the control variables, only facility and age were able to contribute at a significant level to a predictive model for the two problem types. Age was a significant covariate in predicting the identification of psychosocial well-being as a problem whereas facility was a significant covariate for both knowledge and psychosocial well-being. The extent of the facility difference was remarkable. For only 1.6% of patients in facility one was knowledge identified as a problem as compared to 26.2% of patients at facility two. While 26.3% of patients in facility one were identified as having a problem in the area of psychosocial well-being, 55.4% of patients in facility two were similarly identified. Although significant differences in the distribution of two of the clinical populations between the facilities were present, chi-square analyses indicated that clinical population was not a significant source of variation in the identification of the two problem types. The importance of facility was

also present even though ANOVA demonstrated that facility was not a source of significant variation in the health status factor scores, the independent variable.

This last point is important as it prevents a major misinterpretation of the results of the study. It could be said that as the cardiac and gastrointestinal populations were located primarily at facility two, the reason knowledge and psychosocial well-being were not as frequently identified was because the two clinical populations were well-educated and had fewer psychosocial problems, making the overall results for facility two lower than for facility one. This premise cannot be supported however, as the ANOVA of clinical population and facility and their effects on HSOD factor scores (Table 21) demonstrated that four of the five clinical groups (excludes cerebrovascular) are homogeneous in their engagement in care scores ($p < .001$). The same four groups form a homogeneous subset in their psychosocial well-being scores as do the cerebrovascular, pulmonary and gastrointestinal groups ($p < .001$).

So, differences in HSOD factor scores which are sensitive to clinical population, are not a source of variation in the facility differences. Since the variation was not related to health status scores between the facilities, and could not be linked to clinical population or severity of illness (Table 19), then important sources of variation must exist within the provider in the setting, or in the setting itself. The literature was very mixed regarding the quality of care planning by the nurse. The extreme dichotomy between two seemingly like facilities certainly adds to the confusion. These results are not unlike those of Holzemer and Henry (1991) where little interagency similarity was found between the problems listed and the conceptualization of problems on the care plan, for persons living with

AIDS.

Absence of Provider Data

Due to the absence of sufficient nurse demographic data, it was not possible to determine whether the facility difference was related to nurse characteristics (education and/or years of experience) and/or due to other facility differences (i.e., management, philosophy of care, model of care, etc.). Prior research suggested that nurses throughout the HMO in the study, believed their independent practice had a strong impact on outcomes in the domains of knowledge and well-being (Lush, Crawford, Outcomes Taskforce, 1995). The results of the study did not vary significantly across facility or setting of care. The Henry and Holzemer (1995) study that compared problem lists written for persons living with AIDS, found that the problems uniquely contributed by nursing were those relating to knowledge and potential for injury. If knowledge is sensitive to nursing intervention, and related problems are uniquely identified by nursing, it must be of great concern to have knowledge identified as a problem in only 1.6% (n = 4) of a broad spectrum of clinical populations (n = 243). Particularly, as the increased acuity of the patient associated with shortened lengths of stay means the patient and/or caregiver is responsible for increasingly complex self-care at home (Lang & Marek, 1992).

In this study, the nurses identification of mobility as a problem was linked to their admission assessment of functional status and engagement in care. In contrast, problems of knowledge were linked to facility, and problems of psychosocial well-being were linked to facility and age of the patient. The linkage of well-being to age makes conceptual sense. The linkage of well-being and knowledge to facility does not make conceptual sense, particularly in the absence of like facility-based differences in clinical population, severity of illness and/or age. Further research is needed to differentiate possible provider sources from setting-based sources of variation.

Questions #2: Number of Problems Identified

The first four hypotheses were directed towards a dichotomous variable: the nurse did or did not identify at least one problem within a problem type or group. In practice, the nurse was able to identify more than one problem within different areas of care. As the three HSOD factors are important, and sometimes overlapping components of quality of life (Holzemer & Wilson, 1995), it was decided to sum together all problems which could be related to health factor scores into a group called "health status related problems." All other problems identified for the patient were grouped as "other." Health status problems and other problems were summed together as a final "all problems" group. Null hypotheses five, six, and seven, sought to examine whether patient, setting and/or health status variables were predictive of the total number of problems grouped as health status, other, and total. The increase in variation in the dependent variable would both allow the use of multiple regression techniques, and provide a better sense of the magnitude to the focus on health versus other problems in the plan of care.

All three null hypotheses were rejected: HSFSs were able to add significantly to the explanation of the variation in the number of problems identified, over and above the control variables. The total amount of variation (as described by the adjusted R squared) explained by the final regression models varied from 4.6% (number of other problems), to 18.1% (total number of problems), to 24.1% (health status problems). Adjusted R^2 was

used here for the conservative reporting of explained variance, as the adjusted R^2 adjusts for the number of variables involved (Glantz & Slinker, 1990).

The final regression equation testing null hypothesis six (number of other problems identified) had the smallest amount of explained variance of the models (adjusted $R^2 = .046$). As with the logistic equation with the dependent variable other problem, the control variables made essentially no contribution to the equation explaining the total number of other problems (adjusted $R^2 = .004$). The null hypothesis was rejected based on the contribution of the HSFS engagement in care ($sr^2 = .044$).

In the Hogan (1992) study, the focus on dependent and interdependent activities was related to the severity of illness of the patient, with the number of activities increasing as the degree of illness increased. This suggested a cure focus. The number of independent activities increased as patients became less ill, suggesting the shifting of nursing priorities from those supporting life and basic physiological needs to those focusing on the human responses to that illness. The results of this study provided slight support to Hogan's premise. While severity of illness did not make a significant contribution to the regression equation for number of other problems ($sr^2 = .007$; $p = .175$), it was the only variable in the equation with a positive beta coefficient (+0.153). In contrast however, Hogan suggested that attention to psychosocial, well-being, and engagement issues would increase as the patient became less ill. Given the relatively low severity of illness of the sample ($\underline{m} = 0.71$), an increased frequency of problem identification in the areas of knowledge and psychosocial well-being should have been present.

In the regression analyses testing the null hypothesis related to the number of health related problems identified, the control variables (setting and patient) accounted for 19.1% of the variation. Of the control variables, only facility made a significant, unique contribution ($sr^2 = .11$; $p < .000$). Examples of problems linked to the group of HSOD related problems included knowledge, self-care deficit, coping, family process, and mobility. It was facility one which most frequently identified at least one problem in the areas of knowledge and psychosocial well-being. Facility one also identified the greatest number of health status problems and number of problems over all. The expansion of the plan of care to reflect health related problems sensitive to independent nursing practice, may well be influenced by provider differences and/or setting differences hidden within the variable facility.

Of interest, are the HSOD HSFSs that contributed to the predictive equations for each of the "number of problems identified for the patient" groups. For each problem group (health status, other, total), all three of the HSOD factor scores were eligible to enter the regression equation ($p < .001$) at the end of step one. The psychosocial well-being (6.5%) and functional status (2.9%) HSOD factor scores were part of the final model for the number of health status problems selected. Engagement in care was the only HSOD factor in the predictive equation for the number of other problems identified, and contributed only 4.4% to the explanation of variance. The final model for the total numbers of problems identified included engagement in care (8%) and functional status (2.9%).

The inclusion of functional status in the predictive models for numbers of health

status problems and the total number of problems was anticipated. What is more difficult to interpret is that engagement in care was the only HSOD factor entering the final model for other problems identified, and the factor with the greatest contribution to the explanation of variance (8.0%) in the total number of problems identified model. It is important to not jump to "cause and effect" conclusions, particularly given the small contribution engagement in care to the explanation of variance. However, as managed care seeks ways to reduce the short and long term costs of care, models of care are being tested which focus on engaging the client as active partners in their care, and providing knowledge to support their self-care. As the coefficients of the HSOD HSFSs were all negative in the final regression models, these results would provide support for the development of approaches to care that enhance the knowledge and participation in care of the individual.

In interpreting the results of the regression analyses, it is helpful to keep in mind the relative frequencies of the original four problem types. There was little between subject variation in two groups: knowledge and other. Knowledge was identified as a problem in only 6.8% of the study sample as compared to mobility (35.4%), well-being (32.5%) and other (97.0%). At first sight, this is in marked contrast to studies which identify knowledge deficit as one of the top few diagnoses identified for the patient (Henry & Holzemer, 1995; Coenen, et al., 1995). When sorted by facility however, knowledge was identified as a problem in 26.2% of the sample at facility two. That only 4 of 239 (1.6%) of the sample from facility two had knowledge identified as a problem is remarkable. This is even more confusing given 98% of the cardiac sample was from facility two, and that many educational models exist for the cardiac population.

The number of health status problems identified for a patient ranged from 0 and 9 with a mean of .85. The distribution was obviously skewed to the right, as 43.2% of the sample had no problems, 38.6% had one, and 11.7% two problems identified. Again, 97.0% of the sample had at least one other problem identified (range of 0 to 6). Why the extreme differences?

Problems in the area of functional status are highly visible to the nurse as they are commonly reflected in physician orders and directly impact the activities and the hours of care required to support the patient during the hospital stay. Activity orders are posted at the patient bedside to assure that all concerned staff have access to the current orders. Identifying problems in the group other is also relatively straight forward, as they are linked to the reasons for patient admission and to physician orders.

In contrast, problems of knowledge and psychosocial well-being are not routinely addressed through physician orders. The identification of problems in these areas rely heavily on the nurse's independent assessment and follow-through. Nursing interventions in these areas are time consuming and can add significantly to the workload already ordered by the physician. As lengths of stay are reducing, there is increasing concern for the knowledge and ability/willingness of the patient and/or caregiver to provide care at home. While this would seem to make knowledge a priority, teaching is time consuming, and may drop in priority during the length of stay. A focus on knowledge and well-being may well be related to setting variables (i.e., philosophy of care, care paths, presence of clinical specialists), provider variables (i.e., years of experience, highest nursing degree)

and/or patient variables (samples with greater variation in engagement in care scores and severity of illness). Future work will be needed to predict and test the possible relationships.

Missing Caregiver and Family Variables

The statistically significant squared semi-partials (sr^2) for the HSFSs varied between .029 (functional status for both number of health problems and total number of problems identified) and .080 (engagement in care for total number of problems identified). These values reflect a relatively small effect size of HSFSs for each of the number of problems groups. The regression equations were run on a final sample size of 239 cases (those cases without missing data in any of the variables included in the specific analysis). The preferred sample size to detect small effects on the dependent variables, was 245. Caregiver and family factor scores were purposefully eliminated from the regression analyses based on the missing data severely reducing the number of observations with complete data.

To examine the appropriateness of this decision, three regressions involving the dependent variables for the numbers of problems identified were run with caregiver and family variables present. Of the study sample of 308 cases, only 112 (less than one-half of the desired sample size) had the complete data needed for the regression analyses. Of the three hypotheses, number five (health status problems) and six (other problems) could no longer be rejected. In the regression equation for null hypothesis seven, age, engagement in care and functional status no longer made significant contributions to the explanation of the variance in the total number of problems identified. The only health status score to

enter into any of the three equations was caregiver role strain. These results suggest that sample size, and the subsequent increase in power, were critical to the detection of the relatively small effect of health status on the number of problems identified for the patient. So, while the opportunity was missed to examine the impact of caregiver and family health status on the care planned by the nurse, by removing the variables from the analyses, sufficient power was available to identify the effects of the patient's health status on the care plan.

Question #3: Time Required to Implement Interventions

The time required to implement interventions was studied as it provided another avenue to understand to what extent the workload of the nurse was focused on health issues as compared to the medical status of the patient. The multiple regressions analyzed whether health status scores provided an increase in the explanation of the variation in the time to implement teaching and emotional support and activities of daily living interventions, were both rejected. The adjusted R^2 quantifying the percent of variance explained by the regression model was .405 for activities of daily living interventions and .451 for teaching and emotional support interventions. The alternative hypothesis for other direct care interventions was accepted (adjusted R^2 only .091).

In the workload measurement system used in the study facilities, other direct care interventions include assessment and planning activities, the monitoring of vital signs and other hemodynamic parameters, laboratory and clinical procedures, and medication administration. The statistically significant predictors of other direct care interventions were the patient's facility (sr^2 = .049), and severity of illness level (sr^2 = .032). The beta

coefficient for severity of illness was again positive (+0.280). This result is consistent with literature demonstrating the relationship between nursing severity and the consumption of nursing resources (Phillips, Castorr, Prescott, & Soeken, 1992). The patient's severity of illness is a logical driver of nursing resources - the more severely ill the patient the greater degree of monitoring, medication, procedures and hemodynamics support are likely to be needed.

Functional status contributed to the predictive models for both time to implement teaching and emotional support interventions, and the time to implement activities of daily living interventions. What is difficult to explain is that functional status was the only HSOD factor to enter the model for teaching and emotional support, to the exclusion of psychosocial well-being and engagement in care. Functional status was only able to contribute an additional 2.9%. A possible conceptual link which could be tested is that increased dependency is related to an increased need for rehabilitation training and/or an increased need for emotional support. Facility explained a large (40.2%) portion of the variation in the time for teaching and emotional support interventions. Facility, continues to be a confounding variable of great interest that requires further study.

In marked contrast, the strongest predictors of activities of daily living intervention time among the control variables were age (8.7%), severity of illness (5.7%), with facility contributing only 2.6% to the final model. Activities of daily living interventions in the facilities' workload management system support mobility, turning, nutrition, bathing, grooming and elimination. While all three HSOD factor scores ($p < .000$) were eligible to enter the model following step one, only two were included in the final model. Functional status provided an additional 5.0% to the understanding of the variation, and engagement in care an additional 6.4%.

The OMHCR (Holzemer, 1992; Holzemer, 1994; Holzemer & Reilly, 1995) and the work of Iezzoni (1994) stressed the importance of accounting for patient input variables when studying outcomes. Gender, race and age were considered three important variables in defining risk adjusted outcome standards (Iezzoni, 1994). In this study, gender and race did not make a significant contribution to the understanding of the variation in any of the dependent variables. Age was a significant factor for the identification of psychosocial well-being problems, the total number of problems identified, and the time required to implement activities of daily living interventions. Severity of illness was important in two equations: time to implement activities of daily living interventions and time to implement other direct care interventions.

Significance

The study results provided support for the conceptual framework for the study: specifically the Outcomes Model for Health Care Research (OMHCR) (Holzemer, 1992;1994; Holzemer & Reilly, 1995). The premise of the model was that a complete understanding of a nursing phenomenon was not possible unless the interactions and linkages between all nine cells are considered. By requiring that variables representing the other cells in the OMHCR matrix are not manipulated, but measured as potential covariates, hidden, unanticipated relationships could be discovered. Client variables (age and severity of illness) contributed to the understanding of variation in the process of using health status data to develop a plan of care. Facility was a variable of critical

importance in this study. That provider was probably an important source of variation in the dependent variables, could not be validated due to the absence of provider demographic data.

In this study, there were small, statistically significant relationships between HSOD HSFSs and the care planned by the nurse. These relationships existed above and beyond those explained by patient and setting variables. That patient and setting variables were entered into the equation first is of importance, as it strengthens the importance of a HSFS once it successfully enters the equation or model. Of the control variables with significant contributions to the regression models, facility had the greatest variability. In the regression models of the rejected null hypotheses, the explanation of variance provided by facility varied from a low of 2.5% for time for activities of daily living interventions to 40.2% for teaching and emotional support interventions. Provider variation was not able to be captured in this study due to missing data. Provider variation was most likely a confounding factor in the large variation in the significance of facility as a variable. The importance of facility as a covariate is further clouded by the fact that the study design selected two sites where a minimum of facility variability was anticipated.

Also significant, was that where HSOD factor scores were predictive of the care planned by the nurse, they were predictive primarily in areas of health problems and health related activities. Health status scores were not predictive of the identification of other problems, nor of the time required to implement other direct care interventions. This reinforces the potential of using data from a generic health measure, captured during the course of care, to evaluate the process and outcomes of care in terms of health.

The relatively small effect sizes seen of HSOD HSFSs on health related problems and care, reinforces the need for large sample sizes and the development of a computer-based outcomes infrastructure. Principles of nursing informatics are foundational to outcomes research in the area of health.

Finally, the study contributed to the research base of the HSOD by providing additional evidence for the construct validity of the instrument. In five broadly defined clinical populations, the HSOD factor scores were predictive of the number of problems identified and the time required to implement interventions in the domain of health, and were not predictive of other (nonHSOD-related) problems and interventions. The sensitivity of the HSOD to facility-based differences supports the future use of HSOD data to evaluate models of care. Additional support was obtained for both the internal consistency reliability and the construct validity of the HSOD in five broadly defined medical clinical populations.

Limitations

Limitations of this study are discussed from the perspective of the Outcomes Model for Health Care Research (Holzemer, 1992, 1994; Holzemer & Reilly, 1995).

Input/Provider

Insufficient data were obtained to describe the impact of the nurse's education and experience on the problems and interventions selected. In addition, the study was not designed to determine the relationship between the provider education and experience, and the comprehensive writing of care plans. Other provider input variables which could be covariates but which were not collected included their experience using nursing diagnoses,

their personal philosophy of care, and their belief in the use of data to define the value of nursing on patient outcomes.

Input/Setting and Process/Setting

As there were marked differences between the two facilities despite being in the same health maintenance organization, in the same customer service area, under the same area management, using the same model of care and the same documentation system, the results of the study should not be generalized to other health care organizations, or to other facilities within the current organization. There were no aspects of practice controlled in the study. Rather, as the eventual goal was to use the results of the study to support the development of an outcomes infrastructure, the focus was to gather data as collected in its natural form during the care process. The ability to detect the presence of an effect in this study relied on adequate power, adequate variation within the variables, and a strong analytical design.

Process/Provider

While the literature was not conclusive, the documentation and system supports for the care planning process may or may not have an impact on the completeness and quality of the care plan written by the nurse. As the same systems were in place in both units, study results can only extend to units using the same documentation. In this study, a threat to external validity existed in that the introduction and explanation of the project to the nurses could change their behavior in completing care planning process.

Client/Inputs

Primary threat to the study related to the study design. It was not an experimental

design. A convenience, consecutive sample was used. As the entire population for the period was used, the amount and type of sampling bias could not be estimated. New subjects were enrolled for a three month period to capture a sample which would hopefully reflect the normal variability in the population. Cost and time constraints prohibited a full year of data gathering which would minimize the impact of any seasonal variability.

Implications for Nursing

Given the complexity of healthcare today, it is essential that nursing take advantage of the principles of nursing informatics and the foundational framework of the OMHCR (Holzemer, 1992, 1994; Holzemer & Reilly, 1995). The large number of variables are needed to fully understand a phenomenon requires a large database. As the electronic medical record becomes a reality, use of data captured during the normal course of care will maximize the potential of nursing to quantify the impact of nursing nationally and across settings of care.

Nursing's future ability to quantify its impact on the health of the client will be dependent on the nurse documenting her/his independent practice in the medical record. Of greater importance, nurses must recognize and value their independent practice, and incorporate it into their daily routine. In this study, in two very similar facilities, there were no significant differences in practice in the identification of problems and required interventions in the areas of functional status and the physiological basis for admission. There were remarkable differences between the two facilities in the nurses' focus on health related problems. If a main focus of the nursing profession is to maximize the health of its clients, then it is critical that we understand why, when, and where this emphasis does or does not occur in practice. Answers to these questions will be of importance to those controlling our educational institutions, as well as for the nursing executives responsible for the environment supporting practice.

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Appendix A

The Relationship Between Health Status Scores on Hospital Admission and the Care Planned by the Nurse

The Relationship Between Health Status Scores on Hospital Admission and the Care Planned by the Nurse

I. Study Aim, Background, and Design. The purpose of this passive-observational, cross-sectional study is to examine the relationships between the hospital admission scores on a health status instrument, and the care planned by the nurse at hospital admission for the patient. Retrospective chart audit will be used as the primary method of data collection. Health status domains being studied include functional status, engagement in healthcare, and psychosocial well-being. The health status scores will be obtained from the hospital admission assessment forms normally completed by nursing personnel. The care prescribed by the nurse will be captured from the orders and interventions documented on the care plan and/or care path. Nursing orders entered into the facility workload measurement system will be obtained from the mainframe databases in addition to data on severity of illness from the case abstracting system. In order to control for possible covariates, data will also be collected on age, gender, race, nurse experience, and the educational background of the nurse. If the results of the study demonstrates that nurses plan care based on admission health status information, then the foundation for future research into the impact of nursing interventions on patient health outcomes will be provided. Four research questions are addressed in this study:

1. After controlling for the effects of patient characteristics, what are the relationships between HSOD factor scores and the patient problems identified by the nurse?
2. After controlling for the effects of patient characteristics, what are the relationships between HSOD factor scores and nursing intervention groups selected by the nurse?
3. After controlling for patient characteristics, will there be a relationship between admission HSOD factor scores and the total time to complete interventions selected by the nurse on patient admission.
4. Does the education or years of experience of the nurse predict the care which will be prescribed for the patient?

2. Subject Population: Inclusion/Exclusion Criteria, Use of Special Subject Groups, and Methods of Access. The consecutive, convenience sample of 500 medical patients will be drawn over a four month period from three acute care medical/surgical units within the Vallejo and Walnut Creek hospitals of the Kaiser Permanente Medical Care Program, Northern California Region (KPNCR). Medical patients admitting diagnoses in one of five groups and with a length of stay of at least 24 hours will be included in the study. The five medical groups include: acute pulmonary,

acute cardiac, acute metabolic, acute cerebrovascular, and oncology. With the exception of length of stay and requirement for admitting diagnosis falling into one of five identified groups, there are no exclusion criteria. A sample size of 500 is needed to provide sufficient power for the analysis required for the multiple covariate and independent variables. There will be no patient contact.

As nurse education and years of experience may impact the content of the care prescribed by the patient, demographic information will be collected via survey for each nurse working on the three study units. During a 30 minute class introducing the goals and objectives of the project, a one page explanation of the study will be provided to the nurse along with a survey form. The survey will request the name, highest nursing degree, years of experience, facility, and home unit of the nurse. Except for the class there will be no contact with the nurses.

Approvals to conduct the research in the Vallejo and Walnut Creek Kaiser Permanente facilities has been received from their Patient Care Leader, from their nursing research committee, and from their physician chiefs of research. Documentation of formal consent from the from the KPNCR Institutional Review Board (IRB) is attached. Evidence of the local approvals are included in the KPNCR IRB approval document.

3. Procedures to be Done for Purposes of the Study. *Instruments:* The health status scores will be collected from the admission assessment forms routinely used in the study units. The data elements include information on functional status, knowledge, engagement in care, and the psychosocial well-being of the patient and their family. The data elements were derived by a taskforce within the Kaiser Permanente Northern California Region for the purpose of studying outcomes sensitive to the intervention of the nurse. A survey instrument has been developed to collect the demographic data for the nurse (Appendix B). *Procedure:* The health status data will be collected from the admission assessment form. The interventions planned for the patients will be collected from the admission care plan and/or care path, as well as from the workload measurement database located on the mainframe. Co-variate data will be collected from the medical record and from the regional electronic databases. Data linking the nurse to the patient assessment will be obtained from the medical record. The Co-PI or the RA will be responsible for the data collection. The study variables are shown in Appendix C. Data will be transferred to an SPSS file for multiple analyses.

4. Risks: Potential Risks/Discomforts to Subjects, Including Possible Loss of Confidentiality, and Methods of Minimizing These Risks. This study involves no patient contact. Medical record number and case number will be used to link the patient's paper-based medical record with data

derived from the regional electronic databases. The health information management (HIM) supervisor will have the required sheets copied from the medical record. Data from the copied sheets will be entered into a laptop computer within the HIMs department. The copies of the medical record will be shredded in the HIMs department following data entry. Medical record numbers and case numbers will also be linked to the nurse within the database. The medical record and case numbers will be stripped from the database file once the manual data entry and the down-load from the mainframe computer are merged and links between the nurse and the patient nurse made. The computer and back-up disks will be locked in the office of the Co-PI.

After the class introducing the project, there will be no contact with the nurses. Data from the nurse demographic data form will be entered into a database on a laptop. The nurse data will be entered into the computer via the identification number. The original records will be kept in the locked research files of the Co-PI. The medical record numbers for those patients for whom the nurse completed the admission plan of care will be entered into the database via a laptop computer in the HIMs department from copies of the medical record. The paper records will shredded in the HIMs department once data entry is complete. The computer and back-up disk will be kept in the locked office of the Co-PI. Only the PI, the Co-PI, and the research assistant will have access to the data.

5. Benefits: Potential Direct Benefits to Subjects and General Benefits to a Subject Group, Medical Science and/or Society. There are no direct benefits to the subjects (either patients or nurses), participating in the study. If the results of the study demonstrates that nurses plan care based on admission health status information, then the foundation for future research into the impact of nursing interventions on patient health outcomes will be provided.

6. Consent Process and Documentation. No patients will be contacted for participation in the study. The study uses existing documents which are collected as a routine part of patient care. Nurses will be introduced to the study, provided with a one page summary of the project, and asked to complete a form requesting demographic data. The nurse's completion of the form will be considered their consent to participate.

7. Qualifications of Investigators. Dr. Henry is faculty in the School of Nursing and is PI.. Ms. Lush, the Co-PI, is a doctoral candidate in the School of Nursing. Ms. Lush is also the Regional Nursing Systems Consultant for the Kaiser Permanente Medical Care Program, Northern California.

Appendix B

Nurse Provider Data Form

Nurse Provider Data Form

This information is being collected to help us interpret the results of the study. All data collected will be reported as a whole. No individual information will be shared or reported.

Name: ____________________________ Facility: ________________________

Date: _________________ Unit: __________________ Shift: ______________

Years of experience as a registered nurse: ____________________________________

Highest nursing degree obtained: ___ AA; ___ Diploma; ___ BSN; ___ MS/MSN

This section to be completed only by research personnel

ID # ____________________

May 7, 1997

1113 Santa Clara Ln.
Petaluma, CA. 94954

UMI Dissertation Services
300 North Zeeb Road
P.O. Box 1346
Ann Arbor, MI 48106-1346

Regarding Dissertation: The Relationship Between Health Status Scores on Hospital Admission and the Care Planned by the Nurse.

There are two copyrighted forms included in the above dissertation. They are the Health Status Outcome Dimensions instrument located in Appendix C and the Admission Assessment Form located in Appendix D. The owners of these forms, the Kaiser Permanente Medical Care Program, **does not provide permission** for the distribution of these forms beyond the original dissertation manuscript. Those interested in obtaining the forms should contact:

Director of Shared Hospital and Nursing Services
Kaiser Permanente Medical Care Program
1950 Franklin, 19th Fl.
Oakland, CA 94612

Sincerely,

Mary T. Lush, RN, PhD

Appendix C

Health Status Outcome Dimension Instrument

KAISER PERMANENTE

Health Status Outcome
Dimensions Instrument (HSOD)

NURSE EVALUATING ADULT OR ADOLESCENT (12th Birthday Plus One Day →)

DATE
FACILITY
LOCATION
USER I.D.

IMPRINT AREA

#1 BATHING

Washing and cleaning the body with soap and water.

4 Full self-care.
3 Requires the use of equipment ksxdevice.
2 Requires assistance or supervision from another person.
1 Dependent/does not participate.
➤ ☐ Unable to Assess or ☐ N/A (Check one)

#2 GROOMING

Combing hair and attending to cleanliness activities - brushing teeth, shaving, etc.

4 Full self-care.
3 Requires the use of equipment or device.
2 Requires assistance or supervision from another person.
1 Dependent/does not participate.
➤ ☐ Unable to Assess or ☐ N/A (Check one)

#3 DRESSING

Applying or putting on clothes, socks, shoes, etc.

4 Full self-care.
3 Requires the use of equipment or device.
2 Requires assistance or supervision from another person.
1 Dependent/does not participate.
➤ ☐ Unable to Assess or ☐ N/A (Check one)

#4 TOILETING

Managing the elimination of urine and stool.

4 Full self-care.
3 Requires the use of equipment or device.
2 Requires assistance or supervision from another person.
1 Dependent/does not participate.
➤ ☐ Unable to Assess or ☐ N/A (Check one)

#5 PHYSICAL PERFORMANCE

Completing movement or motion activities to accomplish a purpose or task.

4 Asymptomatic with full ADL.
3 Symptomatic with full ADL.
2 Symptomatic - bedfast part of the time.
1 Symptomatic - bedfast all of the time.
➤ ☐ Unable to Assess or ☐ N/A (Check one)

#6 AMBULATION

Walking.

5 Ambulates.
4 Ambulates with assist from a device.
3 Ambulates with assist from a person.
2 Chairbound.
1 Bedfast.
➤ ☐ Unable to Assess or ☐ N/A (Check one)

#7 PATIENT'S INVOLVEMENT IN HEALTH CARE MANAGEMENT

Participation and **interaction** with providers in decisions related t health promotion, disease prevention and treatment.

4 Involvement in **preventive** behaviors. Actively participates with providers in decisions regarding wellness. Seeks information /continues to learn.
3 Expressed or observed **desire** for participation in preventive behaviors. Willing to learn. Participates with providers in decisions with encouragement.
2 Follows health care treatments only in **illness**. Allows others to make decisions.
1 **No** participation with providers in decisions. No willingness motivation to follow health care treatment.
➤ ☐ Unable to Assess or ☐ N/A (Check one)

#8 KNOWLEDGE

Adequacy of information and age appropriate **understanding needed** to participate in own care.

4 **Well** informed. Comprehends **more advanced** information.
3 Informed. Comprehends **basic information** to participate in own health care.
2 Minimally informed. Does not comprehend basic informatio to participate in own health care.
1 Uninformed. Lacks information to participate in own health c
➤ ☐ Unable to Assess or ☐ N/A (Check one)

MISCELLANEOUS COMMENTS

NURSE EVALUATING ADULT OR ADOLESCENT (12th Birthday Plus One Day →)

#9 PATIENT'S FEAR

"**Identifiable source**" creating a physiological or emotional response to perceived danger.

4 None.
3 Mild fear demonstrated.
2 Moderate fear demonstrated.
1 Severe - Unmanageable fear response or inappropriate total absence of fear response.
➤ ☐ Unable to Assess or ☐ N/A (Check one)

#10 PATIENT'S ANXIETY

"**Unidentifiable source**" creating a physiological or emotional response to perceived danger.

4 None.
3 Mild - Sleeplessness and repeats questions.
2 Moderate - Difficulty concentrating. Palpitations, Tremors, Tachypnea. Difficulty adapting-analyzing.
1 Severe - Distracted. Unable to concentrate. Hyperventilation, Tachycardia. Headache. "Feeling of impending doom."
➤ ☐ Unable to Assess or ☐ N/A (Check one)

#11 PATIENT'S COPING

Individual efforts to master or minimize conditions of harm, threat or challenge.

4 Effective. Able to master their response to stress.
3 Partially effective ability to minimize response to stress.
2 Minimally sucessful attempts to minimize their response to stress.
1 Unable to minimize their response to stress.
➤ ☐ Unable to Assess or ☐ N/A (Check one)

#12 PATIENT'S ALTERED ROLE PERFORMANCE

Individual's disruption of role performance.

4 None - Able to carry out role functions.
3 Mild - Able to carry out most role functions.
2 Moderate - Able to only partially carry out role functions.
1 Severe - Limited or incapable of carrying out role functions.
➤ ☐ Unable to Assess or ☐ N/A (Check one)

#13 PRIMARY CAREGIVER'S KNOWLEDGE (IF PATIENT IS SELF-CARE – CIRCLE N/A)

Adequacy of information and **understanding needed to participate** in patient's care.

4 **Well** informed. Comprehends **more advanced** information.
3 Informed. Comprehends **basic** information to participate in patient's health care.
2 Minimally informed. Does not comprehend basic information to participate in patient's health care.
1 Uninformed. Lacks information to participate in patient's health care.
➤ ☐ Unable to Assess or ☐ N/A (Check one)

#14 PRIMARY CAREGIVER'S INVOLVEMENT IN HEALTH CARE MANAGEMENT (IF PATIENT IS SELF-CARE – CIRCLE N/A)

Participation and interaction with providers in **decisions** related to health promotion, disease prevention and treatment.

4 Involvement in **preventive** behaviors. Actively participates with providers in decisions regarding wellness. Seeks information/continues to learn.
3 Expressed or observed **desire** for participation in preventive behaviors regarding wellness. Willing to learn. Participates with providers in decisions with encouragement.
2 Follows health care treatments only in **illness**. Allows others to make decisions.
1 **No** participation with provider in decisions. No willingness or motivation to follow patient's health care treatment(s).
➤ ☐ Unable to Assess or ☐ N/A (Check one)

#15 PRIMARY CAREGIVER ROLE STRAIN (IF PATIENT IS SELF-CARE – CIRCLE N/A)

Caregiver's felt difficulty in performing the caregiver role.

4 None - No strain.
3 Mild - Minimal worry about care provision issues. Mild feelings of loss due to change(s) in relationship(s). Stress or nervousness that is manageable. Sometimes depressed.
2 Moderate - Frequent worry about care provision issues. Feelings of loss due to change(s) in relationship(s). Episodes of stress, nervousness and/or depression are increasing.
1 Severe - Constant worry about care provision issues. Overwhelming loss due to change(s) in relationship(s). Overwhelming feelings of stress, nervousness and depression.
➤ ☐ Unable to Assess or ☐ N/A (Check one)

#16 FAMILY STRAIN

Family unit's emotional and/or physical **tension** created by a change in member's health status.

4 None - No strain.
3 Mild - Minimal worry about care provision issues. Mild feelings of loss due to change(s) in relationship(s). Stress or nervousness that is manageable. Sometimes depressed.
2 Moderate - Frequent worry about care provision issues. Feelings of loss due to change(s) in relationship(s). Episode of stress, nervousness and/or depression are increasing.
1 Severe - Constant worry about care provision issues. Overwhelming loss due to change in relationship(s). Overwhelming feelings of stress, nervousness and depression.
➤ ☐ Unable to Assess or ☐ N/A (Check one)

#17 FAMILY COPING

Family's ability to master, tolerate or minimize conditions of harm, threat or challenge.

4 Able to handle demands and conflicts. Effective communication. Effective problem-solving.
3 Mild difficulty in handling demands and conflicts. Mild disruption in communication. Mild disruption in problem-solving.
2 Moderate difficulty in handling demands and conflicts. Difficulties in communication. Difficulties in problem-solving.
1 Inability to handle demands and conflicts. Disruptive communication. Inability to problem-solve.
➤ ☐ Unable to Assess or ☐ N/A (Check one)

Appendix D

Admission Assessment Form

KAISER PERMANENTE

ADMISSION RECORD – ADULT

Information obtained from ☐ Patient ☐ Other ____________

ADMITTED FROM ☐ Home ☐ ER ☐ Clinic ☐ Gurney ☐ Ambulatory ☐ Wheelchair ☐ Other ____________

LANGUAGE

ADMITTED TO ROOM #

TIME

☐ ID Band Checked & Correct ☐ Allergy Band ☐ Interpreter Needed

IMPRINT AREA

ORIENTATION TO ENVIRONMENT ☐ Nurse call ☐ TV control/bed control ☐ Bathroom ☐ Visiting policy ☐ Discharge Time ☐ NO Smoking ☐ Valuables sent home ☐ Telephone/bed light ☐ Electrical Appliances

CHIEF COMPLAINT (ASK PATIENT)

SPECIAL DIET ☐ None

ALLERGIES (NAME AND DESCRIBE REACTION) ☐ None Known

Ht ______ Wt ______ Usual Wt ______

TYPE OF SCALE USED ☐ Bed ☐ Chair ☐ Standing

Cigarette Smoking ☐ Never ☐ Ex-Smoker Date Stopped ____________ ☐ Smokes – Amount ____________

Alcohol Intake ☐ None ☐ Occasional ☐ Frequent Amount ____________ Date/Time last intake ____________

Substance use ☐ None ☐ Yes Type/Comments ____________

HOME ENVIRONMENT ☐ Alone ☐ Friend ☐ Spouse ☐ Parent ☐ Relative ____________ ☐ Significant Other ☐ SNF ☐ Board & Care ☐ Other ____________

PRINT NAME	TITLE	SIGNATURE

MEDICATIONS	DOSE	USUAL TIMES	LAST TIME TAKEN/DATE	REASON FOR TAKING

EQUIPMENT USE	Cane	Walker	Crutches	Commode	Hospital Bed	Oxygen	Wheelchair	IV Meds
Has at home								
May need on discharge								
☐ No equipment needed	☐ Other ____________							

FUNCTIONAL ABILITY	Full self-care	Requires Equipment	Requires Assistance	Dependent	Unable to Assess
Bathing					
Elimination					
Grooming					
Dressing					
Physical Performance	ASYMPTOMATIC	SYMPTOMATIC WITH FULL ADL	SYMPTOMATIC – PARTIALLY BEDFAST	SYMPTOMATIC TOTAL BEDFAST	

At Risk to Fall ☐ No ☐ Yes Initiate Fall Protocol

PRINT NAME	TITLE	SIGNATURE
	LVN/RN	

The following must be completed by an RN Only. Circle # reflecting assessment.

Patient's Involvement in Health Care Management ☐ Unable to Assess ☐ N/A

4 Involvement in preventive behaviors. Actively participates with providers in decisions. Seeks information/continues to learn.

3 Informed. Comprehends basic information to participate in own health care.

2 Minimally informed. Does not comprehend basic information to participate in own health care.

1 Uninformed. Lacks information to participate in own health care.

07975-5 (1-96)

Knowledge Patient assessed for readiness to learn ☐ Barriers to learning *See Progress notes ☐ Unable to read/write English ☐ Other

4 Well informed. Comprehends more advanced information.
3 Informed. Comprehends basic information to participate in own health care.
2 Minimally informed. Does not comprehend basic information to participate in own health care.
1 Uninformed. Lacks information to participate in own health care.

☐ Pre-op ☐ Post-op ☐ Diabetic ☐ Body Mechanics ☐ Medications ☐ Cardiac ☐ Treatment/Procedures

Patient's Fear

4 None.
3 Mild fear demonstrated.
2 Moderate fear demonstrated.
1 Severe – Unmanageable fear response or inappropriate total absence of fear response.

☐ Financial ☐ Family ☐ Health ☐ Social ☐ Living Situation

Patient's Anxiety "Unidentifiable source" creating a physiological or emotional response to perceived danger

4 None.
3 Mild – Sleeplessness and repeats questions.
2 Moderate – Difficulty concentrating, palpitations, tremors, tachypnea, difficulty adapting–analyzing.
1 Severe – Distracted. Unable to concentrate. Hyperventilation. Tachycardia. Headache. "Feeling of impending doom."

Patient's Coping

4 Effective. Able to master response to stress.
3 Partially effective ability to minimize response to stress.
2 Minimally successful attempts to minimize response to stress.
1 Unable to minimize response to stress.

Patient's Altered Role Performance

4 None – Able to carry out role functions.
3 Mild – Able to carry out most role functions.
2 Moderate – Able to only partially carry out role functions.
1 Severe – Limited or incapable of carrying out role functions.

Primary Caregiver's Knowledge Caregiver assessed for readiness to learn.

☐ Unable to assess ☐ N/A ☐ Barriers to learning *See progress notes ☐ Unable to read/write English

4 Well informed. Comprehends more advanced information.
3 Informed. Comprehends basic information to participate in patient's health care.
2 Minimally informed. Does not comprehend basic information to participate in patient's health care.
1 Uninformed. Lacks information to participate in patient's health care.

Primary Caregiver's Involvement in Health Care Management ☐ Unable to assess ☐ N/A

4 Involvement in prevention behaviors. Actively participates with providers in decisions regarding wellness. Seeks information/continues to learn.
3 Expressed or observed desire for participation in preventive behaviors regarding wellness. Willing to learn.
Participates with providers in decisions with encouragement.
2 Follows health care treatments only in illness. Allows others to make decisions.
1 No participation with provider in decisions. No willingness or motivation to follow health care treatment.

Primary Caregiver Role Strain ☐ Unable to Assess ☐ N/A

4 None.
3 Mild – Minimal worry about care provision issues. Mild feelings of loss due to change(s) in relationship(s).
Stress or nervousness manageable. Sometimes depressed.
2 Moderate – Frequent worry about care provision issues. Feeling of loss due to change(s) in relationship(s).
Episodes of stress, nervousness and/or depression are increasing.
1 Severe – Constant worry about care provision issues. Overwhelming loss due to change(s) in relationship.
Overwhelming feelings of stress, nervousness and depression.

Family Strain ☐ Unable to Assess ☐ N/A ☐ Financial ☐ Social ☐ Living Situation ☐ Health

4 None
3 Mild
2 Moderate
1 Severe

Family Coping ☐ Unable to Assess ☐ N/A

4 Able to handle demands and conflicts. Effective communication. Effective problem solving.
3 Mild difficulty in handling demands and conflicts. Mild disruption in communication. Mild disruption in problem-solving.
2 Moderate difficulty in handling demands and conflicts. Difficulties in communication. Difficulties in problem solving.
1 Inability to handle demands and conflicts. Disruptive communication. Inability to problem solve.

Referrals:
☐ Social Service
☐ Enterostomal Nurse
☐ Diabetes Coordinator
☐ Physical Therapy
☐ Home Health
☐ Discharge Planning
☐ Hospice Coordinator
☐ Respiratory Therapy
☐ Chemical Dependency Services
☐ Cardiac Education/Rehab
☐ Nutritional Service
☐ Other

PRINT NAME R.N.	DATE/TIME COMPLETED	SIGNATURE R.N.