Delirium in the hospitalized elderly: Clinical indicators found in medical records

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DELIRIUM IN THE HOSPITALIZED ELDERLY: CLINICAL INDICATORS FOUND IN MEDICAL RECORDS

by

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A thesis submitted in partial fulfillment of the requirements for the

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Delirium in the Hospitalized Elderly: Clinical Indicators Found in the Medical Record

by

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Delirium, which can be reversible and preventable, is one of the most significant complications affecting the hospitalized elderly today. The purpose of this descriptive retrospective chart review was to determine if medical records contain sufficient evidence to identify elderly patients who were at risk for developing delirium within 72 hours of hospital admission, and if accepted, evidence-based criteria were used to document the acute confusion. The chart’s of 100 patients, at least 65 years of age, admitted to a rural hospital were reviewed retrospectively. The review indicated that there was sufficient evidence, based solely on the descriptors and clinical information, available in the medical record to make a diagnosis of delirium. The chart review revealed that sixteen of the subjects met full clinical criteria to receive a medical diagnosis of delirium, however only one patient was diagnosed by a physician as having delirium.
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CHAPTER 1

INTRODUCTION

Background

Delirium, also known as acute confusional state, is a common serious, and potentially preventable source of morbidity and mortality, among hospitalized older patients (Inouye, 1994). Delirium is best thought of as a syndrome with multiple potential etiologies rather than a specific diagnosis (Bair, 2000). Delirium has particular importance because it has an estimated prevalence of 15% to 50% among hospitalized elderly (Casey, DeFazio, Vansickle, & Lippman, 1996; Inouye, 1998).

Patients who develop delirium require intensification of nursing care, closer nursing surveillance, an increased length of hospital stay, and higher incidence of nursing home placement. These patients also have an increased morbidity and mortality during hospitalization and after discharge (Francis & Kapoor, 1990). Delirium has been shown to independently contribute to poor outcomes of acute care (Foreman, Wakefield, Culp, & Millisen, 2001). Additionally, patients who are delirious often experience greater in-hospital functional decline as compared to patients who are not delirious, and there is a high frequency of complications such as falls, infections, and decubiti (Meagher, 2001). Long-term consequences related to delirium include a decrease in functional ability in activities such as feeding, elimination, bathing, walking, and dressing (Morency, 1990).
Functional status may be permanently compromised leading to a loss of independence and a diminished quality of life (Cole & Primeau, 1993).

Delirium has detrimental effects on the health care system including inappropriate resource utilization and increased health care costs (Buckwalter & Buckwalter, 1998). Each year delirium complicates hospital stays for more than 2.3 million older people. These entail 17.5 million inpatient days for patients over 65 years of age and equates to more than 48% of all hospital case days (Inouye, 1998). Foreman et al., (1996) state that delirium annually accounts for more than $4 billion dollars (1994 dollars) of Medicare expenditures.

While delirium has been recognized as a problem for centuries (Lipowski, 1990), it remains largely under-diagnosed and under-treated by both physicians and nurses (Foreman, Wakefield, Culp & Milison, 2001; Lacko, Bryan, Dellasega, & Salerno, 1999). Because of overlapping criteria, delirium may be misclassified as dementia or depression, resulting in inappropriate treatment (Foreman, Wakefield, Culp, & Milison, 2001). A study by Palmateer and McCartney (1985) demonstrated that nurses had difficulty recognizing and charting altered mental status in hospital patients (Lacko, Bryan, Dellasega, & Salerno, 1999). An observational analysis by Dellasega (1992) revealed that nurses used terms such as "disoriented and confused" when describing mental status changes and depended on questions about orientation to assess overall cognition. Reliance on nurses' individual clinical judgments rather than use of standardized approaches led to inaccurate conclusions about their patients' mental statuses. Additionally, the misdiagnosis or under-diagnosis of delirium can lead to
increased incidences of falls, incontinence, and the inappropriate use of restraints and psychoactive medications (Buckwalter & Buckwalter, 1998).

Problem

The problem then becomes that delirium is often overlooked and remains a neglected clinical problem for the elderly hospitalized patient. The haphazard and incomplete assessment of cognitive function by physicians and nurses leads to the under-detection of delirium (Foreman, Theis, & Anderson, 1993). Other research indicates similar deficits with documentation making it imperative that delirium be detected as soon as possible (Inouye, Charpentier, & Pelter, 1996). Chart review of the hospitalized elderly patient’s medical record, particularly review of the patient’s history, physical examination, medication review, and certain laboratory tests, should be adequate to determine patients at high risk for delirium. In addition, chart reviews can be used where no clinically recognized tools have been implemented (Inouye, 1994).

According to Inouye (1998), primary prevention is the most effective strategy to reduce the incidence of delirium. The optimal prevention strategy includes identification the risk factors of delirium (Inouye, Viscoli, Horwitz, Hurst, & Tinetti, 1993; Levkoff & Marcantonio, 1994). A primary focus of intervening to minimize or reverse the deleterious consequences of delirium is prompt detection. Regular, systematic screening of mental status in the hospital setting can ensure that new or pre-existing impairments are recognized and treated (Lacko, Bryan, Dellasega, and Salerno, 1999).
Purpose

The overall purpose of this research study was to determine whether rural hospital medical records contain sufficient evidence necessary to identify patients who are at risk for developing delirium within 72 hours of admission when accepted, evidence-based criteria are used to identify or diagnose delirium. A similar three-year study of hospitalized elderly patients revealed that even though nurses were generally not able to recognize delirium, it was determined that nursing notes alone contained sufficient information for physicians to make a diagnosis, when they used established criteria for diagnosis of delirium (Bair, 2000).
CHAPTER 2

REVIEW OF RELEVANT LITERATURE

Introduction

Delirium in the acute care setting has been well described in the literature. It has been studied by a variety of scientific disciplines including: medicine, nursing, psychology, sociology, aging studies, and healthcare economics. However, what the literature demonstrates is disturbing. Delirium, especially in the elderly, remains largely unrecognized and under-diagnosed when they are hospitalized. A review of the current literature explores the history, causes, prevalence, the multi-etiologic nature of delirium, and a review of current assessment methods to diagnose delirium.

Background

The phenomenon of delirium is one of the oldest known to medicine. The earliest reporting of delirium dates over 2500 years ago in the writings of Hippocrates (Lipowski, 1990). Delirium is derived from the Latin word deliria, which literally means to "be out of your furrow." In another historical context, two words were used to describe confused patients. One was the Roman word deliri, which referred to an agitated and confused person. The other was from the Greek word lethargus, which was used to describe a quietly confused person (Ely, Seigel, & Inouye, 2001).
Delirium Defined

For the purpose of this study, delirium is defined as a global cognitive impairment and includes decreased ability to maintain attention, and disorganized thinking (Crawley & Miller, 1998). Research in the field of delirium, including the clinical care of patients, has been hampered by the lack of generally recognized definition of the condition and inconsistent terminology. In the past, delirium has been known by a variety of names, including acute organic brain syndrome, acute confusional state, toxic psychoses and acute encephalopathy (Casey et al, 1996). However, the Diagnostic and Statistical Manual of Mental Disorders 4th edition (DSM-IV) provides consistent terminology and diagnostic criteria for delirium, that are now generally accepted. The principle elements of DSM-IV diagnosis are 1) a disturbance of consciousness indicated by reduced awareness of the environment, along with a diminished ability to focus, sustain or shift attention, 2) a change in cognition (which may include deficits of memory, language or orientation) or onset of a perceptual disturbance not better accounted for by dementia. 3) development over a short period with a tendency to fluctuate during the course of the day.

DSM-IV categorizes delirium by presumed etiology (including delirium secondary to a medical condition, substance intoxication, and substance withdrawal), mixed or multiple etiologies, and uncertain etiologies (Alagiakrishnan & Blanchette, 2001).

Delirium is almost always reversible when recognized. The hallmark of delirium is an abrupt change in cognitive function and an inability to sustain attention (Bair, 2000). Any sudden change in cognition should be considered delirium, unless proven otherwise (Espino, Avril, Jules-Bradley, Johnson & Mouton, 1998). Delirium should be suspected
in any elderly patient with changes in mental status, personality or behavior.

Additionally, delirium in the older adult should be treated as a medical emergency (Chan & Brennan, 1999).

Historically, aging has been considered synonymous with cognitive decline; as such, the occurrence of delirium was thought to be inevitable and beyond the influence of health care professionals. During the last 20 years, the notions and attitudes about the elderly have changed (Foreman, 1989). Although it has been demonstrated that cognitive decline is not an inevitable concomitant of aging, there are age-related changes in the brain, which have a relationship to the occurrence of delirium. The age-related changes in the brain according Luxembourg (1996) include the following:

(a) Cognitive reserve: the equivalent to the familiar cardiac reserve, referring to the tendency of the brain to malfunction under extraordinary stress. For example, a young adult can tolerate major stress such as a serious infection, without decompensation and the development of acute delirium. A variety of physiologic changes and disease states, however, make older brains more vulnerable to severe stress. A new drug, the stress of a new environment (such as decompensation resulting in delirium, agitation, or impaired alertness). This propensity to delirium can be considered decreased cognitive reserve.

(b) CNS anatomic and physiologic changes with aging: the aging brain undergoes several physiologic changes that may predispose older persons to delirium. These included loss of neuronal mass, changes in the concentration of CNS neurotransmitters such as acetylcholine, serotonin, dopamine, and
norepinephrine. Additional predisposing age related physiologic changes involve alteration in drug disposal or in end organ response to drugs, especially in the presence of disease states (e.g., decreased blood flow to the liver or kidneys, decreased autoregulation of cerebral blood flow, cerebral arteriosclerosis). In addition, because of decreased hearing and vision, the elderly may misinterpret external stimuli, adding to disorientation and potentiating any tendency to become delirious (pp 452-453).

Causes of Delirium

Delirium represents an etiologically nonspecific syndrome due to widespread and complex cerebral dysfunction that may be caused by a wide range of organic factors (Foreman, Wakefield, Culp, & Milisen, 2001). These organic factors can be grouped into four general classes: 1) primary cerebral diseases, such as infection, neoplasm, trauma, epilepsy, and stroke; 2) systemic diseases that affect the brain, notably metabolic diseases, infections, cardiovascular and collagen diseases; 3) intoxication with exogenous substances, i.e., medical and recreational drugs and poisons of industrial plant, and animal origin; and 4) withdrawal from substances of abuse in a person addicted to them, primarily, alcohol and sedative-hypnotic drugs (Jacobsen & Schreibman, 1997).

Any condition that compromises brain function can cause delirium (Chan & Brennan, 1999). Common causes of delirium include: electrolyte imbalance or abnormalities, acid-base disturbances, hypoxia, hypercarbia, hypoglycemia, hyperglycemia, azotemia, infections, decreased cardiac output, dehydration, acute blood loss, acute myocardial infarction, congestive heart failure, small cortical stroke,
medications, hypothermia, hyperthermia, acute psychoses, transfer to unfamiliar surroundings, fecal impaction, and urinary retention (Espino et al, 1998; Lipowski, 1990). Any intracranial process can cause delirium including neoplasm, trauma, subdural hematoma, infarction of the right cerebral artery, epilepsy or stroke (Sumner & Simons, 1994). Exogenous toxic agents and withdrawal from alcohol or sedative-hypnotic agents can cause delirium due to secondary effects on the brain. Systemic diseases can produce delirium. The most common diseases include congestive heart failure, pneumonia, urinary tract infections, cancer, uremia, malnutrition, electrolyte disorders, myocardial infarction, thyroid disease and diabetes (Sumner & Simons, 1994).

Medication intoxication is one of the most common causes of delirium in the elderly. Almost any drug can cause delirium, but anticholinergic agents are most commonly implicated and have a particular propensity for inducing delirium (Meagher, 2001; Schor, Levkoff, et al, 1992). Fourteen of the twenty-five most commonly prescribed medications for the elderly, including lasix, digoxin, and theophylline have detectable anticholinergic effects. All classes of psychoactive medications have the potential to precipitate delirium in the elderly, and the elderly receive a disproportionately large share of all the psychoactive medications prescribed (Sumner & Simon, 1994).

Delirium in the aged is also caused from substance abuse. Alcohol is the most common drug associated with withdrawal causing delirium in the elderly (Jacobson & Schreibman, 1997). This susceptibility of the elderly to delirium is due to the likelihood of the presence of several concurrent disease processes, requiring multiple medications and age-related change in drug pharmacokinetics (Sumner & Simon, 1994). Based on the
results from various studies, medications are acknowledged as the most reversible causes of delirium, with psychoactive medications the most common.

Delirium may also be characterized as hyperactive or hypoactive. Inouye (1994) suggested that in the elderly, hypoactive delirium tends to be more common, less recognized and often dismissed by caregivers. Medical personnel stereotype elderly hospitalized patients and therefore expect to see certain symptoms for delirium. Delirium is often recognized when an elderly patient exhibits inappropriate behavior, agitation, or hallucinations; however, it is typical for an elderly patient to exhibit decreased activity and lethargy as the only clinical manifestations of delirium. This provides a situation where delirium is often overlooked or not recognized in the elderly. It has been shown that the very development of delirium is associated with fewer interactions and less time spent by nurses and physicians in direct patient care (Ely et al., 2001). Additionally, depression, lack of social support, and psychological stress, along with sleep deprivation, pain, intravenous infusions, or urinary catheters, and other iatrogenic causes have been suggested in various studies to contribute to delirium (Inouye, 1994). The setting in which the patient receives care may also play a role; delirium often develops in patients who experience frequent room changes, lack of normal day and night cycles, and unfamiliar physical environment, such as a hospital room (Casey et al, 1996; Inouye, 1994).

Predisposing and Precipitating Factors for Delirium

Delirium occurs more commonly among patients with certain predisposing
features and age is probably the most important of all of these (Casey et al, 1996).

However, the literature is often unclear about describing particular markers, which would be predictive of delirium. Neelon (1990) states "the risk of the development of delirium is cumulative function of the patient's vulnerability (level of illness and functional impairment), the timing and magnitude of the effect of multiple added physiologic and environmental stressors, and support of the patient's biopsychosocial integrity by the health care team" (p 583). Patients who are highly vulnerable to delirium may develop the disorder following only minor physiologic stresses, while those with low baseline vulnerability require an exposure to multiple significant precipitating factors to develop delirium (Meagher, 2001)

The development of delirium involves a complex interrelationship between baseline patient vulnerability and the precipitating factors, which occur during hospitalization. Multiple risk factors appear to have a multiplicative rather than additive effect (Inouye, & Charpentier, 1996). Delirium particularly in the critically ill or elderly hospitalized patient often has multiple etiologies. Francis and Kapoor (1992) found that while 56% of elderly patients with delirium had single definite or probable etiology, the remaining 44% had an average of 2.8 etiologies per patient.

According to Inouye (1998), delirium represents a common multifactorial geriatric syndrome representing a complex interrelationship between a vulnerable patient with significant predisposing or precipitating factors. Predisposing factors place a patient at risk for delirium and are present on admission. Inouye (1998) identified the following predisposing factors: (a) baseline cognitive impairment, (b) severity of underlying illness, (c) vision impairment, and (d) dehydration. Inouye demonstrated that patients who are
highly vulnerable to delirium on admission may develop delirium with relatively benign precipitating factors. As the number of predisposing factors increase, the likelihood of delirium increases.

Precipitating factors of delirium are potential causes that can lead to the development of delirium during hospitalization. Potential precipitating factors include (a) four or more medications added on admission; or (b) the use of physical restraints, or (c) the use of indwelling bladder catheters; and (d) iatrogenic causes, such as complications from diagnostic procedures, transfusion reactions, over coagulation, or digoxin toxicity; and (e) malnutrition (Inouye, 1998; 1993; Inouye & Charpentier, 1996).

Prevalence of Delirium

The prevalence of delirium in the general hospitalized patient ranges from 10% to 30%. In the hospitalized elderly patient the rate of delirium prevalence ranges from 10% to 40%. Estimated rates of delirium for surgical patients vary widely, ranging from 6% to 52% (Levkoff & Marcantonio, 1994). Delirium has been reported in 10% to 15% of older general surgical patients and over 50% in patients treated for hip fractures (Ballard-Ferguson, 1997). One of every four patients over the age of 65 may become delirious during a hospital stay (Hall & Wakefield, 1996). Fitzpatrick and Stevenson (1993) report the prevalence of delirium at discharge at 29%.

Levkoff et al (1992) investigated the occurrence and prevalence of delirium in elderly hospitalized patients. Delirium was present in 10.5% of all patients on admission; 31.3% developed new onset delirium; and 32% of the participants also experienced individual symptoms of delirium without meeting full criteria. Only 49% experienced
complete resolution of all symptoms before discharge, and only 20.8 % and 17.7%, respectively had resolution of all symptoms by three and six months after discharge.

Delirium is major reason for nursing home placement (Levkoff et al, 1996). One half to three quarters of elders in long term care environments experience cognitive impairment. The cost of caring for the delirious elderly in the community or long term care facilities for people over the age of 65, amounts to $40 billion per year. For many patients, transfer to a long-term care facility is followed by progressive deterioration in cognitive and physical function, increased medical illness, and decreased quality of life and life expectancy. The adverse consequences for the health care system and for the society as a whole and increased costs are inappropriate resource utilization (Buckwalter & Buckwalter, 1998).

Evaluation of Delirium

Although standard psychiatric, general medical, neurological histories and examinations are usually sufficient to diagnose and evaluate the severity of delirium, they can be supplemented by assessments using formal instruments. A large number of delirium assessment methods have been designed and are intended for both clinical evaluation and research purposes.

The literature search reveals that there is considerable disagreement over how to best assess delirium and whether a certain assessment tool is preferable for more accurate diagnosis than another. The apparent disparity can most likely be attributed to the fact there are multiple disciplines researching the delirium phenomenon.
Assessment Methods

Inaba-Roland & Maricle (1992) and Dyer et al., (1995) proposed that the mental status interview is the gold standard for the diagnosis of delirium, and that the assessment must focus on the quality of cognitive, affective, and behavioral function, and must include the quality of the patient's arousal, attention, concentration, orientation, thought content, and perceptual alterations.

Smith, Breitbart, and Platt (1995), reviewed several instruments for the evaluation of delirium including the NEECHAM Scale, the Confusion Assessment Method Instrument (CAM), and Diagnostic Statistical Manual of Mental Disorders, Third Edition (DSM-III) scales. The authors emphasize the necessity to select the most appropriate instrument based on administration time, patient constraints, level of expertise and training available. And type of information desired.

**NEECHAM Scale**

Siemens, Miller, Newman, and Lucas (1992), compared the clinical utility of the NEECHAM Scale for bedside assessments of delirium, the Mini-Mental State Exam, and self-report of perceived mental clarity. The authors found that in respect to reliability and validity, the NEECHAM tool provided the most accurate information for bedside patient care when combined with patient and caregiver perceptions of mental status. Neelon, Champagne, Carlson, and Funk (1996), also supported the NEECHAM scale as a valid and reliable bedside instrument for assessing delirium. They considered it most effective for the early detection of delirium and for detecting changes in its severity based on "high internal consistency and inter-rater reliability."
Trzepacz (1994) reviewed instruments used to measure delirium, and found that many lack strong construct validity and few report reliability and validity information for specific populations, like the elderly. It has also been argued that of all the instruments, only the Delirium Rating Scale (DRS), used to measure symptom severity, and the Confusion Assessment Method (CAM) fulfill the criteria for usefulness in diagnosis (Inouye, 1994). The DRS, most widely used, is also the best tested and used to detect symptoms over a 24-hour period. The DRS has demonstrated utility in screening for delirium, in the presence of dementia, however, the detail and length of the tool may limit its use. The CAM may have greater feasibility across settings (Inouye et al., 1999). Others support concurrent use of the NEECHAM Confusion scale and the CAM (Millisen et al., 1998).

**Mini Mental Status Exam**

One of the most popular and widely used brief tools is the Mini Mental Status Exam (MMSE). It evaluates the severity of cognitive impairments and does not address the cognitive elements of delirium. It has been criticized in the literature for having a relatively narrow focus. It lacks sensitivity and cannot diagnosis delirium. It is weaker as an assessment tool for delirium, because it cannot differentiate delirium from dementia and reliance upon a single score on the MMSE is unacceptable when summarizing mental status (Espino et al., 1998; Jacobsen, 1997; Trzepacz, 1994; Rummans et al., 1995; Smith et al., 1995; Taylor & Lewis, 1993). Of importance to this study, there was no assessment tool, specific to the nursing discipline found.

**DSM-III and DSM-IV**
Definitions and diagnostic criteria for delirium have evolved over the years as understanding of its pathophysiologic basis has improved. The epidemiology of delirium has been studied since the 1940s and in 1968 the American Psychiatric Association (A.P.A.) published the second edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-II). (Levkoff et al., 1991). The DSM-II distinguished psychotic disorders from non-psychotic organic brain syndrome and further distinguished acute from chronic brain syndromes. However, the DSM-II did not outline specific criteria for either of these terms.

In 1980, The A.P.A. published the DSM-III, which provided criteria for delirium. The DSM-III criteria were based on expert opinion and extensive clinical experience, particularly the experience of general hospital psychiatrists (Liptzin, Levkoff, Gottlieb, & Johnson, 1993). The diagnostic criteria were divided into two categories, (a) explicit criteria; and (b) non-explicit criteria (Levkoff, Clearly, Liptzin, & Evans, 1991). Both categories were weighted equally and therefore are equally important in the diagnosis of delirium.

Cameron, Thomas, Mulvill, and Bronheim (1987) reported that, "delirium could be readily and reliably detected using DSM-III criteria" (page 1008). Of significance to this study is research by Johnson et al (1990), concerning follow-up of operationalized DSM-III criteria and determined the incidence and prevalence of delirium by using an instrument geared to bedside assessment. Johnson et al (1990) concluded that of those patients studied, the syndrome of delirium was most prevalent upon admission although substantially less during hospitalization.
In 1994, the APA published the DSM-IV, which made some updates to the section in DSM-III on delirium. In DSM-III delirium was placed in a section titled “Organic Mental Syndromes and Disorders.” The term organic mental disorder was eliminated in the newer DSM-IV revision because previously it incorrectly implied that "nonorganic" mental disorders do not have a biological basis(1994). In the DSM-IV, delirium is now discussed in a chapter called “Delirium, Dementia, and Amnestic and Other Cognitive Disorders.” The discussion of delirium in DSM-IV is roughly the same in the two previous versions. Additionally, DSM-IV presents the “Diagnostic Criteria for Delirium Due to Multiple Etiologies” which is almost identical to the criteria set forth in DSM-III except it combines the criteria “Disorientation and Memory Impairment” with the other criteria for “Changes in Cognition”, such as perceptual disturbances, incoherent speech, sleep disturbances, and changes in psychomotor activity. The DSM-IV criteria also adds the following provision as an extra criterion: 1) Evidence that an organic factor initiated and maintained the confusion, and 2) Confusion cannot be accounted for by any nonorganic mental disorder. The operationalization of the DSM –III criteria is more clearly defined and using both the DSM-III criteria coupled with the DSM-IV criteria provides a way at looking at the entire phenomena of delirium from a more comprehensive perspective. A comparison of the two types of DSM criteria is included in From I Appendix IV. For the purpose of this study, the diagnostic criteria established in DSM –III was used, as the nursing literature review supports its use, has been more thoroughly researched and described in the literature.
Documenting Delirium

Typically, poor documentation of delirium is found in patient charts, and usually no documentation is found concerning attempts to assess or treat cognitive disturbances (Gustavson, Brannstrom, Norberg, Bucht & Winblad, 1991). When documentation was found, restless patients had substantially more documentation completed than non-restless patients (Shedd, Kobokovich & Slatterly, 1995). According to Lipowski (1983, 1990) recognition of the agitated patient would account for only one of three types of confusion with the lethargic and mixed (alternating between the agitated and lethargic mood) ignored.

Abnormal motor behavior is often an early indication of the development of delirium (Lipowski, 1990). Thus accurate documentation of motor behavior is essential to the early identification of high-risk patients. Also, nurses rather than physicians are generally found to document this problem more frequently. This is attributed to their closer interaction with patients (Matthiesen, Sivertsen, Foreman, & Cronin-Stubbs, 1994).

The literature indicates that the type of terminology typically documented in medical records to suggest the risk of delirium is vague, inadequate and does not clearly describe the syndrome, thereby perpetuating the potential to overlook high-risk patients for delirium. Shedd et al. (1995) described three studies (Evans, 1987; Ryden, Bosen, Maier, & McLachlan, 1991; Struble & Silverstein, 1987) in which the investigators found that nurses used combinations of cognitive, behavioral, and verbal terms to describe and identify the patients.
Assessing and Diagnosing Delirium

As previously noted, delirium has multiple causes and therefore patterns of clinical manifestations, making assessment difficult (Neelon, 1990). The difficulty of assessing delirium is due to the fluctuating nature of the condition within one person across time and variable manifestations across individuals (Foreman, 1986). In two studies involving elderly medical patients, nurses were found to rely solely on the level of orientation and alertness for their cognitive assessment. In several cases, the nursing staff was not aware that the patient was experiencing significant confusion until notified by the research team (Miller et al., 1996; Siemsen, Miller, Newman, & Lucas, 1992). Without accurate assessment, effective treatment is hindered (Miller et al., 1997).

The onset of delirium frequently signals a worsening of the primary illness or a complication of treatment. The syndrome is often the first sign that brain function is compromised and can be either the prominent presenting feature of life-threatening physical illness or a serious complication of disease or treatment. Failures to detect, diagnose, and treat the underlying condition causing the delirium can result in permanent brain damage or death. Consequently, early recognition and treatment of delirium and the primary disease can return the elderly patient to premorbid function (Levkoff, Safran, Clearly, Gallop, & Phillips, 1998).

According to Levkoff and Marcantonio (1994) the key elements to diagnosing delirium include a thorough history, knowledge of the patient's baseline mental status, physical examination and awareness of mental status changes, followed by a thorough search for correlation of contributing factors. The best way to manage delirium is through
primary prevention and effective prevention requires the early identification of patients who are at risk for delirium (Inouye, Viscoli et al., 1993; Levkoff & Marcantonio, 1994).

Summary

The literature search revealed that delirium in the hospitalized elderly patient is a prevalent geriatric syndrome (Levkoff & Marcantonio, 1994; Ballard-Ferguson, 1997; Hall & Wakefield, 1996; Fitzpatrick & Stevenson, 1993; Levkoff et al, 1992) which is under recognized and under diagnosed (Foreman, Wakefield, Culp & Milison, 2001; Lacko, Bryan, Dellasaga & Salerno, 1999; Palmateer & McCartney, 1998). Misdiagnosis of delirium often results in mismanagement and poor health outcomes, the older patient.

The literature review also demonstrated that delirium is a syndrome of multiple etiologies (Francis & Kapoor, 1992; Inouye & Charpentier, 1996) with several predisposing and precipitating factors for its development (Inouye, 1998; Inouye & Charpentier, 1996; Lipowski, 1990). The literature also revealed disagreement over how to best assess and diagnose delirium. The research revealed that many delirium assessment tools have been developed, but that in many cases the tools are too time consuming for acute care nurses to use, don't give a complete picture of the whole delirium phenomena, don't address functional and cognitive behavior, and were not specifically developed for nursing professionals to use. In addition to addressing the predisposing and precipitating risk factors for delirium, a more complete, comprehensive, and effective evaluation of delirium can be made by using the criteria established by the American Psychiatric Association’s DSM-III criteria for delirium (Cameron, Thomas,
Mulvihill, and Bronheir, 1987; Johnson et al., 1990; Liptzin et al., 1991) and The American Psychiatric Association’s subsequent DSM-IV criteria.

This research project focused on a thorough, multifaceted chart review of the hospital record, which incorporated an evaluation of the predisposing risk factors, the precipitating risk factors, and the DSM-III criteria for identifying delirium in the hospitalized elderly patient.
CHAPTER 3

FRAMEWORK

The Betty Neuman Health Care Systems Model (1989) provided the framework for this research study. Neuman’s model incorporates a total person approach to patient problems and conceptualizes health on a continuum dependent upon equilibrium of the state of the system (Alligood & Marriner-Tomey, 1997). Because of the multiple etiologies associated with delirium, it is necessary to look at the patient/individual as a holistic being with many factors influencing health.

The Neuman Systems Model is particularly adaptable to viewing the patient/individual as an open system, which reacts and adapts to both internal and external stressors. The Neuman Systems Model is based on numerous concepts and sub-concepts, some of which are: stress, adaptation, homeostasis, levels of prevention, intra, inter, and extra personal factors, optimal wellness and basic structure (Tomey & Alligood, 1998).

Neuman Systems Model Definitions

The framework for this study the Neuman Systems Model (NSM) is a nursing model that is based on theories of stress adaptation, and views the individual as a multidimensional being who is in constant and dynamic change with the environment. The role of the nurse is viewed in terms of degree of reaction to stressors, and the use of
primary, secondary, and tertiary interventions. Because of the multi-factorial nature of delirium, the NSM is particularly well suited to describing the entire phenomena of the delirium syndrome and for providing a framework which can demonstrate Neuman's concept of "prevention as intervention." An understanding of this concept can aid the nurse in providing appropriate nursing interventions at the primary, secondary, and tertiary levels of care. The following definitions are taken directly from the Neuman System’s Model (2002) and are included to help demonstrate how understanding the NSM can help better conceptualize the delirium syndrome.

**Basic Structure**- The basic structure or central core consists of common client survival factors related to system variables as well as unique characteristics. It represents the basic energy resources.

**Flexible lines of defense**- The flexible line of defense is a protective, accordion-like mechanism that surrounds and protects the normal line of defense from invasion by stressors. The greater the expansiveness of this line from the normal line of defense, the greater the degree of protectiveness.

**Normal line of defense**- An adaptational level of health developed over time and considered normal for a particular individual client or system; it becomes a standard for wellness deviance determination.

**Lines of resistance**- Protection factors activated when stressors have penetrated the normal line of defense, causing the reaction symptomatology. The resistance lines ideally protect the basic structure and facilitate reconstitution toward wellness during and following treatment, as the stressor reaction is decreased and client resistance is
increased. All lines of defense and resistance are considered to contain both internal and external resources.

Five variables- The five variables of person in interaction with the internal and external environments are: Spiritual, Physiological, Psychological, Sociocultural, and Developmental.

Prevention as intervention- Intervention typology or modes for nursing action and determinants for entry of both client and caregiver into the health care system. Intervention can be made at the primary, secondary and tertiary levels.

Primary prevention- Preventative measures taken before a reaction to stressors occurs.

Secondary prevention- Treatment of symptoms following a reaction to stressors.


Stressors- Environmental factors that are intra-, inter-, and extrapersonal in nature and have the potential for disrupting system stability by penetrating the system lines of defense and resistance. Their outcome may be either positive or negative; client perception and coping ability are major considerations for caregivers and clients.

Major Concepts of the Neuman Systems Model

The following description of the model is a brief summary of the concepts contained in the Neuman systems Model (NSM), as described by Tomey and Alligood (1998) in their book, "Nursing Theorists and Their Work". In this description and explanation of the model (Appendix I, Figure 1), the client will only be considered to be an individual, as this is how the model will be used to further understand delirium.
The patient/individual system is represented by a series of solid and broken circles. The central circle is the basic structure or energy source, which includes basic survival factors common to the species. Some examples are genetic response patterns, the strengths or weaknesses of body organs, ego structure and normal temperature range. The basic structure also consists of the characteristics, which are unique to a given individual.

The outermost solid line is referred to as the normal line of defense, and represents the individual/patient’s normal state of adaptation, which the person has maintained. The broken line outside the normal line of defense is the flexible line of defense. It acts as a buffer or protection to the normal line of defense. Ideally, the flexible line of defense is fluid in its function. When expanded, greater protection is provided to the individual/patient. When it is narrowed, and therefore closer to the normal line of defense, its ability to protect is decreased.

The broken circles surrounding the basic structures are lines of resistance, which are defined as the reactions that occur within the patient system when a stressor succeeds in penetrating the normal line of defense. Their function is to restore equilibrium and protect the basic structure of the individual.

Five variables are seen as over-lapping and inter-acting with and/or influencing all functions of the client system. All responses of the individual/patient’s systems can be viewed within the context of the five variables, which are believed to be present and interactive in all individual systems. Those five variables are physiological, psychological, socio-cultural, spiritual, and developmental. Any stressor or reaction to a stressor will fall under one of these five variables. Variables can and do often overlap.
Another component of the Neuman Systems Model addresses the intra, inter and extra personal aspects of the system. This component helps the user of the model recognize that stressors may occur at any of the three levels. Neuman’s model also includes the concept of prevention at the primary, secondary, and tertiary levels. Neuman (1989) postulates that the main goal of nursing is to facilitate optimal wellness for the client and nursing actions are designed to retain, attain, and maintain optimal individual wellness by incorporating interventions at each of the three levels. Interventions that occur at the primary level can help strengthen the flexible lines of defense by educating the client and caregivers about the ways to help prevent illness. Interventions at the secondary level help restore the client system to equilibrium by treating symptoms that occur after penetration of the lines of defense by a stressor. Interventions that occur at the tertiary level can help to prevent further damage and help maintain the stability after reconstitution has occurred.

As previously discussed, delirium represents a common multi-factorial geriatric syndrome representing a complex inter-relationship between a vulnerable patient with predisposing factors, noxious insults, or precipitating factors (Inouye, 1998). As such, if viewed in terms of a relationship, which is meshed with the concepts in Neuman’s model, delirium and its effect can be better understood. Secondly, the importance of nursing interventions at all three levels of prevention becomes more clearly evident.

Delirium is multi-factorial in etiology and as such, can cause the normal lines of defense to be diminished and cause the flexible lines of defense to be deflated. In delirium, there is often a physiologic disruption that can be so overwhelming to the basic
structure, that the flexible lines of defense are so severely compromised that the patient is put at risk for whole system failure.

To promote optimal patient wellness, nursing interventions, in response to all the stressors, must be initiated before resistance levels are penetrated in both the reaction and reconstitution phases. When considering the role of stressors on the development of delirium, as defined by Neuman, it is important to consider that the individual is usually being exposed and reacting to multiple stressors simultaneously, rather than as a single occurring event. In acute confusional states such as delirium, it would be expected that delirium will occur as multiple stressors which narrow the individual's physiological, psychological, socio-cultural and developmental lines of defense.

In the primary prevention level of the model (Figure 2, Appendix I) nursing interventions can be initiated that would address the need for early identification of the predisposing risk factors and the precipitating risk factors that can be predictive of the development of delirium. By intervening at this point, it is possible that the incidence numbers and percentages of patients who become delirious would be reduced. Additionally, by using evidence based nursing practice, patients, particularly the elderly, could be assessed before surgeries or planned hospitalizations to help strengthen and enlarge the flexible lines of defense, before the expected stressors attack the defense lines.

Nursing interventions that address secondary prevention of delirium include early identification of the elderly experiencing delirium in the hospital setting. Early nursing intervention can help stop the debilitating effects of the assaulting stressors that contribute to the severity of delirium. At this point, nursing interventions can also address
treatment of symptoms for both the client and for the family. Also, it is plausible to think that medications could be changed, cognitive orientation exercise initiated, and that the delirium syndrome progression could be slowed or reversed.

Nursing interventions aimed at tertiary prevention are perhaps the hardest to address in a patient experiencing delirium. After the onslaught of stressors have already compromised an elderly delirious patient, it is difficult to know how long the effects will be present. The effects can last form days to months. This makes the interventions aimed at primary and secondary prevention even more relevant and necessary.

The object of this retrospective research project is to identify the clinically relevant indicators of delirium found in the medical records of elderly hospitalized patients. As such, the level of prevention most applicable to this study is secondary prevention. For example, if the markers are present which are predicative or indicative of delirium, how can that information be used to later create nursing interventions that will help slow or stop the progression of the more serious sequelae of delirium?

The retrospective medical record review of the study population will include the examination of the following documentation records: Registration Record, Emergency Department Flow Sheet, ED Physician Assessment Record, Nursing Admission Assessment Record, 24 Hour Assessment Record, Daily Patient Care Record, Interdisciplinary Progress notes, laboratory reports, physician orders, medication profiles, initial physician history and physical, and the discharge summary.
Research Questions

The research questions for this study were developed from the Betty Neuman Health Care Systems Model (1989) and findings from the extensive literature review.

1) What categories of DSM-III criteria for delirium are documented in the hospital record upon admission, at 24 hours, 48 hours, and 72 hours after admission?

2) How many DSM-III criteria for delirium are documented in the hospital record at the four time periods: admission, at 24 hours, at 48 hours, and 72 hours after admission?

3) What predisposing risk factors for delirium are associated with each of the DSM-III criteria are found in the medical record?

4) What precipitating risk factors for delirium are associated with each of the DSM-III criteria found in the medical record?

5) What descriptive terms do members of the health care team use to document patient behaviors known to be suggestive of delirium and/or reflective of DSM-III criteria for delirium?

6) Using Neuman's definition of "prevention as intervention," what nursing interventions are currently documented in the medical record, which are implemented in the care of the confused elderly patient at the primary, secondary, and tertiary levels?
Conceplual and Operational Definitions

The Neuman Systems model provides a framework for the systematic and evidence-based examination of the delirium syndrome. The research questions are based in the fundamental concepts and ideology of the NSM, namely, that the individual's response and ability to respond to multiple external and internal environmental stressors, largely determines whether delirium will develop and/or progress.

The following conceptual and operational definitions are provided to clarify terms used in this research and to show how the concepts in the research questions will be measured and addressed.

**Delirium**- is defined as a global cognitive impairment and includes decreased ability to maintain attention and disorganized thinking (Crawley & Miller, 1998). Further clarification of terms used in this research follows.

_The Delirium Checklist_- A data gathering tool, based on the use of descriptive data, DSM-III criteria and the empirical markers for Delirium Risk. It was developed to use with a retrospective hospital medical chart review.

_The Hospital Medical Record_- refers to the participating hospital's medical record and is inclusive of all emergency room records, all nursing documentation and records, interdisciplinary progress notes, laboratory reports, physician order sheets, medication profiles, history and physical records, and the discharge summary. This record is exclusive of any private physician medical records.

_DSM -III Criteria for Delirium_- Criteria established by the American Psychiatric Association's Diagnostic and Statistical Manual of Mental Disorders( 3rd edition). The DSM-III criteria has important significance to this study because the categories of
diagnostic criteria that define delirium were developed by expert opinion and from extensive hospital clinical experience by the psychiatrist authors (Liptzin, Levkoff, Gottlieb, & Johnson, 1993).

_Predisposing factors for delirium_- Factors which place a patient at risk for developing delirium. Inouye (1998) identified the following factors as being particularly important in the development of delirium: a) baseline cognitive impairment, b) severity of underlying illness, c) vision impairment, and d) dehydration.

_Precipitating factors for delirium_- Precipitating factors of delirium are potential causes that can lead to the development of delirium during hospitalization. Potential precipitating factors include :a) four or more medications added on admission, b) the use of physical restraints, c) the use of indwelling catheters, d) iatrogenic causes, and e) malnutrition (Inouye, 1998;1993; Inouye & Charpentier, 1996).

Research Questions 1 and 2 explore the use of the DSM-III criteria and how it operationalized in the clinical setting. A description of these five categories of the DSM-III criteria are included in the Delirium Checklist (Appendix B) in Section VIII- DSM-III criteria. Additionally, the categories will be analyzed in relation to four measurement periods: a) at admission, b) at 48 hours, c) at 48 hours, and d) at 72 hours after admission.

Research Question 3 addresses the predisposing risk factors for delirium, as identified in the literature search. Because of the multi-etiological nature of delirium, it is necessary to address the predisposing factors for delirium in several ways. As such, the predisposing factors are addressed in all the following sections of the Delirium Checklist:
Section II-Demographic Data, Section III-Health Status, Section VI-Physiologic Data, Section VII-Laboratory Data, and in Section IX-Chart Descriptors.

Research Question 4 addresses the precipitating factors for developing delirium. They are addressed in Section X-Precipitating Factors on the Delirium Checklist.

Research Question 5 is centered on exploring the descriptive terms that health care professionals use in documenting delirium in the hospital medical record. These chart descriptors are found in Section IX-Chart Descriptors on the Delirium Checklist.

Research Question 6 is based in the Neuman Systems Model definition of "Prevention as intervention," and explores what, if any, nursing interventions are being utilized in the participating rural hospital to prevent delirium at a primary, secondary, and tertiary level. The most commonly used nursing interventions as described in the literature review (Rapp, 2001) are listed in Section XII-Nursing Intervention Descriptors.

Summary

The effective management of delirium requires early identification and recognition of the clinically significant risk factors and criteria for diagnosis. A thorough and comprehensive chart review of the medical record can lay a strong foundation for early identification of stressors that would require timely intervention by a nurse. Use of Neuman's Systems based nursing theory can help the nurse identify the necessary interventions at the primary, secondary, and tertiary levels, and also make more meaningful and evidence based assumptions about the risk factors and stressors that induce delirium in the hospitalized elderly patient.
CHAPTER 4

METHODOLOGY

This chapter describes how this study was conducted. The subsections covered include: study design, sample, setting, instruments and measurements, human subjects rights, data collection and analysis.

Design

A descriptive convenience design was used for this study. The type and quantity of DSM-III criteria along with the predisposing and precipitating risk factors that potentially identify patients at risk of having delirium, and chart descriptors used to describe behaviors suggestive of delirium were evaluated through the retrospective review of patient medical records.

Population

The target population was English speaking patients, age 65 or greater, without a schizophrenia diagnosis, who were admitted to either the intensive care unit or medical/surgical floor of the participating rural hospital. The accessible population was any patient who met the above criteria and was admitted to the participating rural hospital between June 2001 and May 2002.
Sample

A convenience sampling method was used. A list of all patients who met inclusion criteria was generated using the Healthcare Management Systems (HMS) software package at the participating hospital. The sample consisted of 100 medical records of all intensive care, medical or surgical patients admitted to the facility and discharged during the period of June 2001 through May 2002. A total of 100 charts were reviewed. The criteria for record eligibility in the study were:

1. Non-terminal, medical and surgical patients ≥65 years of age.
2. English speaking.
3. Admitted for a minimum of 72 hours and,
4. Does not have a documented admission diagnosis of Schizophrenia.

Setting

The study was conducted at a 75-bed, for-profit, rural, community hospital. The hospital records of patients discharged from medical and surgical units were reviewed.

Instruments and Measurements

For the purpose of this study, Lipowski’s (1990) definition of delirium was used, which states that delirium is a transient organic brain syndrome characterized by a global disorder of cognition and attention, a reduced level of consciousness, abnormally increased or reduced psychomotor activity, disturbed activity levels, a disturbed sleep wake cycle, and acute onset.
The diagnosis of delirium was evaluated by using the Diagnostic Statistical Manual of Mental Disorders, 3rd Edition, commonly known as DSM-III. (American Psychiatric Association, 1980). The DSM-III was selected based on prior use in other prospective studies for delirium (Schor et al., 1992; Johnson et al., 1990; Cameron et al., 1987). The DSM-III provides specific criteria necessary for the diagnosis of delirium (Form I, Appendix IV).

An instrument called the Delirium Checklist, developed by the researcher, was used to identify the presence of delirium from the chart data. Its development was based on an extensive literature review of the most prevalent markers, which are predictive and indicative of the risk of delirium for intensive care, medical, and surgical patients. The Delirium Checklist includes the DSM-III criteria for delirium and the most prevalent predisposing and precipitating factors for delirium.

The Delirium Checklist was divided into four separate time periods: Admission, Day 1 (24 hours), Day 2 (48 hours), and Day 3 (72 hours). Despite some literature which indicates that between 25% and 60% of delirium occurs upon admission to hospital (Inouye, 1998), other studies suggest that delirium is detected within 48 hours of admission (Morency, 1990) or develops sometime during the hospital stay (Foreman et al., 1995). Therefore, the admission, 24, 48, and 72 hour time periods were used to determine the effect, if any, of these time frames on the documentation of the clinical markers suggestive of delirium. The checklist was divided into eleven sections. Each section included specific descriptive data designated by the Roman Numerals I through XII as shown in Table 2.
Content Validity

Content validity was assessed by two independent experts familiar with delirium syndromes who reviewed and validated the Delirium Checklist tool for appropriateness, accuracy, and fulminate representation of the delirium syndrome. The panel was provided with the theoretical definitions of the concepts and a list of the items they was asked to review. Reviewers judged how well each of the concepts is represented in the instrument. Their findings were validated without modification to the Delirium Checklist.

Inter Rater Reliability

The Delirium Checklist was tested prior to beginning this study. Two investigators were asked to independently review the same five medical records and record their results. Each of the criteria established as either DSM-III criteria, a predisposing, or precipitating factor for delirium was assessed.

The inter-rater reliability scores for the delirium checklist were obtained by adding the number of agreements between investigators per medical record. The total number of agreements per chart was designated as the numerator and the total number of charts was the denominator. Initially, the sleep wake cycle (insomnia at night and daytime drowsiness) created the most difficulty. The disagreement between the investigators was due to the fact that one investigator coded the disturbance as absent, while the other coded the sleep wake cycle present based on terminology documented in the medical record. Terminology accepted included terms such as daytime lethargy, drowsiness, and insomnia or by the documentation of the administration of a night time sleeping pill. After making these terminology agreements, the results of a p value ≥ .90 was achieved for each category. This was deemed acceptable as inter-rater reliability for
this study. Modifications in interpretation for the Checklist data tool was made until $r = .9$ or greater was achieved.

**Human Subjects Rights**

Human Subjects rights approval was obtained from the Department of Nursing and the Human Subjects Rights Committee at the University of Nevada, Las Vegas. Additionally, written permission was received from the Chief Executive Officer of the participating hospital to access the hospital records. Anonymity of the information was assessed by coding the subject data to ensure that patient confidentiality was strictly maintained. No reports included any names of patients or the hospital.

**Data Collection**

Data were collected from the medical records of patients discharged between June 2001 and May 2002. Potential hospital records were identified and generated from a computer list of all discharged medical and surgical patients who were 65 years of age or older on admission. The Delirium Checklist was used to review the daily documentation found in the hospital record at the specific time frames, previously outlined. Military time was used and the day of admission was considered to be from the time of admission up to 2400, of the same day, regardless of the number of hours in the hospital.

Age was measured in whole years. General demographic information included race, sex, marital status, admission date and time, and pre-admission residence (home, nursing home etc) derived from the hospital admission registration data. The number of admission and discharge summary diagnoses were determined by the total number
documented at the time of admission and discharge, the physician admission assessment, history & physical and discharge summaries.

The literature search revealed that the following laboratory data is essential to making the diagnosis of delirium. Laboratory data reviewed includes: albumin, blood urea nitrogen (BUN), creatinine, BUN/Creatinine ratio, fasting blood glucose, white blood cell count (WBC), and sodium levels. These data were recorded as documented in the medical record. The participating hospital's Joint Commission on Accreditation of Healthcare Organization's (JCAHO) approved lab procedures and values were used for recording normal & abnormal values.

To help provide consistency in the data collection process, physiologic parameters such as temperature were recorded as the highest temperature during a twenty-four hour period. Admission blood pressure, pulse and respiratory rates were obtained from the initial nursing assessment. The arterial oxygen saturation was obtained from the nursing assessment record and/or the interdisciplinary progress notes.

A measure of nutritional status was recorded as a percentage of Ideal Body Weight (IBW), as documented in the initial admission assessment. IBW was reported as percentage of the actual weight divided by ideal weight times 100.

Functional status was categorized as independent or dependent based on the initial nursing assessment. This assessment was based on patient self-reporting of ability to complete the tasks of daily living (ADLs) independently. Functional status was also recorded by using documentation from both the initial nursing assessment and also from the Daily Patient Care Record. Patients who were able to perform these activities without assistance were considered to be independent.
The diagnosis of delirium was based on the presence or absence of the specific terminology as outlined in the DSM-III (Form I, Appendix IV) and documented in the medical record.

Assumptions

Ideally, clinical practice would be guided by the results of randomized clinical trials. However, these studies are often not feasible or practical. The retrospective study can be a useful tool to begin defining and understanding a clinical issue.

Chart review studies are subject to the interpretive bias of the researcher obtaining the data. In this study it is believed that this bias was minimized by using carefully defined criteria for outcomes, treatments, chart descriptors, and group assignment.

Analysis

Nominal and ordinal data was collected for this study. Both descriptive and inferential statistics was used to analyze the data. The Statistical Package for Social Sciences (SPSS, version 10) was used for data analysis. The qualitative data, such as functional status, was assigned a numerical value for scoring purposes. (e.g., 0=no; 1=yes). The data were summarized using a range of descriptive statistics. For each variable, the frequency distributions, the various measures of central tendency were used as appropriate.

Research Question one, what categories of DSM-III criteria are documented in the medical record upon admission, at 24 hours, 48 hours, and 72 hours after admission?
These data was presented as a frequency distribution of the documented occurrences per patient per data collection period (n=of charts reviewed) and displayed in table format.

Research Question 2, what quantity of DSM-III criteria for delirium is documented in the medical record upon admission, at 24 hours, at 48 hours, and 72 hours after admission? A frequency distribution was generated to present the number of positive DSM-III criteria per patient by day. The DSM-III criteria identified to make a diagnosis of delirium included: clouding of consciousness, perceptual disturbance, incoherent speech, sleep-wake disturbance, increase/decrease psychomotor activity, disorientation, memory impairment, acute onset, fluctuating mental status, and etiological factors. These data are displayed in a table format.

Research Question 3, what predisposing risk factors for delirium are associated with each of the DSM-III criteria found in the medical record? These data were presented as a frequency distribution of the most frequently recognized predisposing risk factors associated with delirium, as described by the literature search. These data are displayed in table form.

Research Question 4, what precipitating risk factors for delirium are associated with each DSM-III criteria found in the medical record? The five primary precipitating factors identified in the literature search include: the use of physical restraints, use of an indwelling bladder catheter, an occurrence of an iatrogenic event, four or more medications, and malnutrition. These data were generated and displayed using a frequency distribution.

Research Question 5, what descriptive terms do members of the health care team use to document patient behaviors known to be suggestive of delirium and are reflective
of DSM-III criteria for delirium? The DSM-III chart descriptors which are indicative of delirium include: confusion, mental status change, disorientation, restlessness, agitation, lethargic, drowsy, combativeness, unusually quiet, and incoherent. These data are displayed as a frequency distribution at admission, day one (24 hours), day 2 (48 hours) and day 3 (72 hours).

Research Question 6, using Neuman's definition of "prevention as intervention", what nursing interventions are documented in the medical record, which are implemented in the care of the confused elderly patient at the primary, secondary, and tertiary levels? In analyzing question 6, common nursing interventions used for caring the confused elderly patient was assessed, analyzed as a frequency distribution and displayed in table format. Interventions were assessed at the primary, secondary, and tertiary levels. Interventions were assessed from the five variable categories described by Neuman, namely physiologic measures, socio-cultural measures, developmental measures, spiritual measures, and psychological measures.

Additionally, characteristics of the study population were analyzed to determine prevalence statistics for gender, race, marital status, and admission type. Frequencies of primary and secondary diagnosis, derived from the medical record ICD-9 Codes are also presented.
CHAPTER 5

RESULTS

In this chapter, the data analysis and research findings are presented. Included is a description of the sample and setting, the data analysis procedures and the results from these analyses.

Description of the Sample

The target population for this study was any English speaking persons admitted to the participating hospital with a stay of at least 72 hours, aged 65 or over, without a schizophrenia diagnosis, and discharged between June 1, 2001 and May 31, 2002.

Statistics from the 2000 United States Census reveal that there are 2,676 people who are 65 or over in the hospital's service area. The census reflects that there were 1291 (48%) men and 1385 (52%) women. Hospital records indicate that there were 778 patients aged 65 or over admitted to the facility during the time frame studied. Of these, 339 (43%) were men and 439 (57%) were women. A total of 334 of the 778 patients admitted to the participating hospital were excluded from the study because they did not meet inclusion criteria; either because of short lengths of stay or they were not English-speaking patients.

A list of all intensive care, medical and surgical patients ages 65 and older were generated using the hospital's Healthcare Management Systems (HMS) software. The records of both male and female subjects were generated on this list by admission dates.
There was no bias in choosing female or male patient charts. The reviewed charts were assigned a number and 150 numbers were randomly drawn out of a container. The first 100 charts that met inclusion criteria were accepted.

This retrospective study, consisted of reviewing 100 charts from the above mentioned sample of 444 individuals who met the inclusion criteria. The sample (N=100) was randomly selected from the 444 charts and included charts of 39 men (39%) and 61 women (61%). This sample roughly matches the overall accessible hospital population. The sample included patients from 65 years of age to 100 years of age. The sample was normally distributed with regards to age.

Characteristics of the study population used in this analysis are outlined in Table 1. The mean age of the patients was 78.28 years of age, with 58% of the patients in the 65 to 79 age group and 42% being in the 80 to 100 age group. The admission records show that 81% of patients were admitted from their homes not another care facility. The study group consisted of 90% Caucasians. Marital status showed that 50% were widowed, 34% were married, and the remaining percentage were either single, separated or divorced.

The principal admission diagnoses as documented in the admission data are summarized in Table 2. The two most prevalent principal diagnoses were cardiac diseases (50%) and respiratory diseases (41%). The prevalence of pre-existing brain or cognitive disorder was 28% compared to 32% on discharge. Most patients had 3-4 co-morbidities. Of the 100 study patients, 22% were admitted to the Intensive Care Unit, 56% were admitted with a medical diagnosis, and 22% were admitted for a surgical procedure.
Research Questions

Research Question One

What categories of DSM-III criteria for delirium are documented in the hospital record upon admission, at 24 hours, 48 hours, and 72 hours after admission?

The categories of the documented occurrences of each diagnostic criterion for delirium upon admission, at 24, 48, and 72 hours respectively are described in Table 3. The most frequently documented diagnostic criteria for delirium during the first 72 hours of hospitalization were etiological factors related to delirium. This is to be expected because the etiologic causes are reflective of the major disease processes that cause elderly patients to be admitted to a hospital. For the purposes of this discussion, etiologic factors will not be discussed in relation to delirium, other than to say these factors should always be considered the primary criterion for the potential development of delirium in the elderly. The second most frequently diagnostic criteria during the first 72 hours was disorientation and memory impairment, followed by acute onset and mental status fluctuation.

On admission, 24 hours, and 48 hours the most commonly occurring criterion was disorientation and memory impairment. At 72 hours, acute onset and fluctuation in mental status slightly edges out disorientation and memory impairment. The least documented DSM-III criteria during the course of the 72 hours were perceptual disturbances and incoherent speech.

The results also reveal that there is a noticeable increase (143 to 215, an increase of 34%) in the number of delirium criteria between admission and at 24 hours. Between 24 and 48 hours there was an increase of 32 (an increase of 13%) patients. At 72 hours
the number drops by 3 (a decrease of 1%) to a total of 244 criteria. The results clearly demonstrate the prevalence of delirium seems to develop within the first 48 hours of admission. The data do not allow identification of a pre-existing or perhaps an iatrogenic cause.

According to the criteria set forth in DSM-III, there must be five criteria present to make a diagnosis of delirium. Table 4 displays the number of patients who met the number of criteria for a diagnosis of delirium. The data are also divided by age, as advanced age was also described in the literature as being of importance to the development and likelihood of a patient becoming delirious. In the sample population, a total of 16 patients fully met the criteria for diagnosing delirium. Of the patients with 5 of the criterion (minimum needed for diagnosis of delirium) 5 (30%) were between 65-79 years of age, and 11 (70%) were over 80 years of age. These statistics are also reflective of the numbers suggested in the literature. In the group of patients between 65 and 79 years of age, 10 patients had 3 criteria for delirium. Even more startling was the fact that in the group over 79 years of age, 26 patients had at least 3 criteria for delirium. Only six of the patients did not have at least one criterion for developing delirium, and they were all in the younger age (65-79) group. Every subject in the over 80 year-old group had at least one criterion. Combining the patients who fully met the diagnostic criteria with those who had at least 4 of the required 5 criteria, 29% had notes that the indicated observation of noticeable cognitive deficits.

Research Question Two

How many DSM-III criteria for delirium are documented in the hospital record at the four periods: on admission, at 24 hours, at 48 hours, and at 72 hours after admission?
Table 5 does not look at individuals but rather looks at the number of criteria that were met at the different time periods (admission, 24 hours, 48 hours, and 72 hours) by the 100 patients. This table clearly demonstrates that delirium develops over time, and shows the rapidly developing and acute onset nature of delirium. At admission, 6 of the patients met at least 5 criteria. At 24 hours, 10 patients had at least 5 criteria. At 48 hours, 11 patients had at least 5 criteria. At 72 hours 12 patients had at least 5 criteria for delirium. As previously stated, patients who meet three or more criteria for delirium, often had behaviors that can significantly affect their hospitalization. Between admission and 24 hours there was an increase of 10 more patients who had at least 3 criteria for delirium. By the 48 hour mark, 17 more patients had developed at least three criteria for delirium than on admission, and at the 72 hour mark, 16 patients were still exhibiting at least criteria for delirium. See Table 7 for a summary of these data.

Research Question Three

In response to Research Question 3, the most frequently recognized predisposing risk factors associated with delirium were examined. These included baseline cognitive impairment, severity of illness, dehydration, and vision impairment (Table 6). DSM-III etiological criterion was not included in this table because 96% of patients under the age of 80, and 100% of the patients older than 80 were considered to have an organic cause resulting in their hospitalization. The most frequently documented predisposing risk factor was dehydration (N=29), which was defined as a BUN/Creatinine ratio >17). The second highest occurring predisposing factor was brain disorders such as senile delirium, dementia, depression, and organic brain syndrome. Of these brain disorders, depression was most often included as a primary or secondary diagnosis.
Vision acuity was not documented or addressed in any way in the medical records reviewed. Consequently, vision impairment was measured using and indirect manner through data related to the patient's activity of daily living (ADL) status. The most frequently documented DSM-III criteria for delirium that were associated with the predisposing factors were clouding of consciousness, disorientation/memory impairment, and mental status changes.

**Research Question Four**

What precipitating risk factors for delirium are associated with each of the DSM-III criteria found in the medical record?

Table 7 describes the frequency of occurrence of each of the precipitating risk factors found in patients with individual diagnostic criterion for delirium as documented in the medical record. Once again, etiological factors were not included because 94% were admitted with a medical problem that was based on an organic cause. The most frequent precipitating risk factor documented in the medical record was use of an indwelling bladder catheter (N=16), followed by immobilization (N=15), and the medication (Narcotics N=16, Anticholinergics N=5, Benzodiazepines =11, and Anti-depressants = 3).

Each of the most frequently documented precipitating risk factors were found with the most prevalent occurring DSM-III criteria documented in the medical record. The least documented precipitating factor was an iatrogenic event. Only 5% of patients experienced an iatrogenic event during the course of their hospital stay. Three of the iatrogenic events were related to drug toxicity, and two were related to blood transfusions.
Malnutrition has been identified as one of many potential causes for delirium, none of the study patients had an Ideal Body Weight (IBW) less than 100% on admission by documentation. In this study, severity of illness was determined by the patient being admitted to the Intensive Care Unit, rather than the general medical/surgical unit.

Medications, with their many associated side effects, appear to be an important risk factor in the development of delirium. Table 8 describes the average number of medications taken per patient at admission, at 24 hours, at 48 hours and at discharge. This study showed that the mean number of medications taken at admission was 5.22. At 24 hours the mean number of medications per patient was 7.97, at 48 hours the mean was 8.33 medications, and at 72 hours the mean number of medications was 8.44. At discharge the mean number was 6.51. The use of high risk medications associated with developing delirium fluctuated daily as shown in Table 9. However, patients receiving benzodiazepines and narcotics had more positive DSM-III criteria documented, followed by anticholinergic and antidepressant medications.

Research Question Five

What descriptive terms do members of the healthcare team use to document patient behaviors suggestive of delirium?

In response to Research Question 4, the chart descriptors used by the health care team to describe behaviors are outlined in Table 10. Confusion (N=105), mental status changes (N=90), and disorientation (N=106) were the chart descriptors most frequently documented in the medical record. Confusion was documented the most often at admission and at 24 hours (N=18). Disorientation was documented the most at 48 hours (N=24) and 72 hours (N=33). The least documented chart descriptors were Unusual
Quietness (N=11) and Lethargy (N=24). The results also demonstrate that confusion, mental status changes, and disorientation are also the terms that most nurses use to describe the three most frequently documented DSM-III criteria acute onset and fluctuation of mental status, disorientation/memory impairment, and disturbance in psychomotor activity.

Research Question Six

Using Neuman's definition of "prevention as intervention," What nursing interventions are currently documented in the medical record and which interventions are implemented in the care of the confused elderly patient at the primary, secondary, and tertiary levels? Figure 2, Appendix IV shows how the Neuman Systems Model (NSM) can be adapted to help nurses describe and understand the delirium syndrome. This figure (The Modified Neuman Systems Model ) reflects the fact that the delirium syndrome affects the individual in the physiological, spiritual, developmental, socio-cultural, and psychological dimensions simultaneously. The Neuman Systems Model addresses the intra, inter and extra personal aspects of the system. Neuman's model also includes the concept of prevention at the primary, secondary, and tertiary levels.

Delirium is multi-factorial in etiology and as such, can cause the normal lines of defense to be diminished and cause the flexible lines of defense to be deflated. In delirium, there is often a physiologic disruption that can be so overwhelming to the basic structure, that the flexible lines of defense are so severely compromised that the patient is put at risk for whole system failure.

Table 11 shows 25 of the most common nursing interventions described in the literature used in caring for an elderly confused patient and the frequencies that these
interventions were mentioned in this retrospective chart review. The nursing
interventions that were most frequently described in this study were managing a patient’s
pain (N=57), maintaining normal nutrition patterns (N=54), and maintaining normal fluid
and electrolytes (N=48). The least described interventions were keeping the environment
quiet (N=2) and keeping the environment safe (N=2). These findings demonstrate that
there are many interventions that are implemented in the physiologic realm, but not
always addressed in the others. Certainly there should be consideration given to
interventions which look at socio-cultural factors and also at safety and environmental
areas. This study shows that there is room to more fully address the delirium syndrome
more wholistically.

Summary

To summarize, RESEARCH QUESTION 1 results demonstrated that the most
common criteria for delirium were the etiologic factors. Ninety-four out of the 100
patients had a primary or secondary diagnosis which was considered an etiologic factor.
The three most common etiologic factors were identified as cardiac diagnoses (N=50),
respiratory diagnoses (N=41), and cognitive or brain diagnoses (N=28). The two most
common DSM-III categories for delirium identified in this research after etiologic factors
were disorientation and memory impairment (N=116) and acute onset and mental status
impairment (N=108).

Research Question 1 also demonstrated a noticeable increase in the number of
delirium (143-215, an increase of 34%) in the number of delirium criteria between
admission and 24 hours. Between 24 and 48 hours, there was an increase of 32 (an
increase of 13%) patients. From admission to 48 hours after admission, the number of
criteria present increased from 143 to 247. At 72 hours, 244 criteria are still present in
the patient population at the participating hospital. This is clearly indicative of the fact
that delirium does definitely develop in the hospital elderly, and it does indeed, have an
acute onset.

Research Question 1 also revealed that age is a significant factor in determining if
delirium will develop. The results demonstrate that 5 patients under the age of 80,
developed all 5 diagnostic DSM-III criteria, while in the 80 and over age group, 11
patients fully met diagnostic criteria for a delirium diagnosis. In total, 16 patients met full
diagnostic criteria for delirium, and only 1 of these patients was actually identified and
received a medical diagnosis of delirium. The nursing documentation records reveal that
nurses did not address delirium, as such, in any patient records.

The results from RESEARCH QUESTION 2 show the total number of criteria per
patient, at the different time measurement periods. The results show that the number of
criteria per patient increased dramatically between admission and 48 hours. It also
demonstrates that many patients demonstrate behaviors indicative of delirium, while not
meeting full criteria.

The results from RESEARCH QUESTION 3 demonstrate that the most common
predisposing factors of delirium identified in this study were dehydration (N=29), brain
disorders (N= 28). Results from RESEARCH QUESTION 4 revealed that the most
common precipitating factors that patients had which were suggestive of delirium were
the use of an indwelling bladder catheter (N= 16), followed by immobilization (N= 15),
and use of the medications that were identified in the literature as being highly correlated to developing delirium.

RESEARCH QUESTION 5 looked at the descriptive terms, based on the literature search, that health care team members used to describe delirium. Confusion (N=105), mental status changes (N=90) and disorientation (N=106) were the terms most commonly used. The results also revealed that there was relatively small recognition of elderly patients being unusually quiet (N=11) or lethargic (N=24).

RESEARCH QUESTION 6 looks at how nurses intervene and what nursing interventions are made, at the primary, secondary, and tertiary levels in caring for their elderly confused patients. The Neuman Systems Model was used as the model for exploring how nurses intervened. The results revealed that nurses were very appropriate in intervening at the physiologic level, but that nurses do not always regularly intervene, or document what they do in meeting the socio-cultural, spiritual, and environmental needs of their elderly clients.
CHAPTER 6

DISCUSSION, CONCLUSIONS, AND RECOMMENDATIONS

The purpose of this retrospective chart review was to determine if it was possible to determine whether hospital medical records contain sufficient evidence to identify patients who are at risk for developing delirium and also to identify patients who met the diagnostic criteria for making a medical diagnosis of delirium. This chapter discusses the major findings in relation to the research questions, study framework, and previous research studies. Limitations that were identified are discussed as well as implications for nursing practice and recommendations for further research.

This retrospective study identified a common profile of patients who are risk for delirium. The patient profile included the following characteristics: age >79, a history of brain disorder on admission, dehydration as a primary or secondary diagnosis of admission, and dependency in ADL function. The most frequent occurring precipitating factors were the presence of an indwelling bladder catheter and immobilization. Patient behaviors suggestive of delirium were disorientation and memory impairment, acute onset and fluctuation of mental status, and disturbance of psychomotor activity.

This study lends support to the results of several previous studies conducted on delirium. Sixteen patients in this study met full diagnostic DSM-III defined delirium (Research Questions 1 and 2). However, 94 patients in this study did meet partial DSM-III criteria in varying degrees. This study (Table 4) revealed that 31% of patients met at
least 3 positive DSM-III criteria during their hospitalization. The results of this study were comparable with Foreman et al. (1995) that indicated 36% of their elderly patients had at least 3 positive DSM-III criteria. The data from this research supports the literature review data that the prevalence of delirium developing in the elderly is between 10-20% of admitted patients, but that it is under diagnosed. In this chart review, although 16 patients fully met all criteria for diagnosing delirium, there was only one actual diagnosis code used for delirium by the attending physician. This study further supports the study of Levkoff et al. (1995) findings that concluded that incomplete manifestations of delirium were common. According to Inouye (1998a) acute onset and fluctuation of mental status are the most useful diagnostic criteria for delirium. Results from this study supported Inouye’s findings as acute onset and fluctuation of mental status was one of the most frequently documented DSM-III criteria. This study also demonstrated that not all diagnostic criteria for delirium must be present before patients exhibit symptoms of the syndrome.

Certain predisposing risk factors were found to be more predominant with DSM-III criteria than others (Research Question 3). Dehydration (29%) was found to be most prevalent, followed closely by brain disorder on admission (28%), and severity of illness (22%). These findings were consistent with the predictive model developed by Inouye (1998a) that defined baseline vulnerability of patients who were at risk for developing delirium. Further, these risk factors were found in patients with the most frequently documented DSM-III criteria: disorientation mental status change, and psychomotor disturbance.
Several precipitating risk factors and positive DSM-III criteria were more frequently documented in patient medical records (Research Question 4). In response to question 4, the literature review revealed that the precipitating factors for delirium included a) the use of physical restraints, b) use of an indwelling bladder catheter, c) an occurrence of an iatrogenic event, four or more medications added on admission and e) malnutrition. The literature suggested that elders experience functional decline during hospitalization not so much due to their diagnosis, but because aspects of care such as forced bedrest, immobilizing procedures, and devices (such as intravenous lines, catheters, and oxygen) and lack of encouragement of independence of self-care. This research demonstrated that the prevalence of patients, who had an indwelling bladder catheter inserted some time during their hospitalization (29%), who were immobilized (29%), as well as received benzodiazepines (34%) were found to have positive DSM-III criteria for delirium.

Immobility is a precipitating risk factor for delirium. Encouraging the maintenance of usual activity and promoting mobility is important in preventing delirium. Immobilization can be offset by nursing measures such as passive range of motion, dangling, standing as tolerated and progressive ambulation. Nurses should also promote strategies to eliminate the need for indwelling catheters in order to decrease the risk for the development of delirium.

The precipitating factors of use of an indwelling bladder catheter and immobilization were associated with the same DSM-III criteria with predisposing risk factors, mental status change, disorientation/memory impairment, and disturbed psycho motor activity. These results further support the precipitating factors as outlined in the
predictive model for delirium developed by Inouye (1998a). The precipitating factors are associated with the manifestations of delirium.

Ten descriptors were used by the health care team to describe behaviors suggestive of delirium (Research Question 5). The descriptive terms documented most often were disorientation, confusion, mental status change, and restlessness. These terms are consistent with the DSM-III criteria most often mentioned in the literature which are mental status change, disorientation, and psychomotor disturbance. The chart descriptors used are the most recognizable from the literature review, however, in caring for the confused elderly adult, many nurses might not be aware that some of the chart descriptors (unusually quiet, lethargic, drowsy) are even clinical indicators of delirium. This research demonstrated that an educational intervention for nurses about the recognizing the signs and symptoms of delirium (chart descriptors) would be an ideal primary prevention intervention.

Despite the fact that delirium is considered a medical emergency, it was under-diagnosed or misdiagnosed in this study population. The hallmark of delirium is “mental status change” (Francis, Martin, & Kapoor, 1990, Johnson et al., 1992) and despite the fact this term was one of the most frequently used to note a change in the patient’s cognitive function, delirium was only diagnosed one time.

Consistent through this study was the fact that the behaviors most frequently associated with the recognized predisposing and precipitating risk factors for delirium, and their chart descriptors were used to denote behavior suggestive of delirium. However, except in the one documented case of delirium, there wasn’t any documentation of
investigation or follow-up as to the cause or causes of these behaviors and no appropriate interventions were documented.

There was nothing in any of the charts suggesting that the nursing staff identified any of their confused patients as having delirium. Nurses, who are the primary caregivers for hospitalized elderly patients have greater contact with patients and therefore have greater opportunities to recognize, and/or detect, and intervene in the treatment of delirium (research question 6). Nurses, caring for the delirious elderly patient, or working in settings where they are educating patients and families about the possibility of the development of delirium, or nurses who are helping rehabilitate a patient who may have already become delirious, have the unique opportunity to intervene at the primary, secondary, and tertiary levels of prevention as defined by Betty Neuman.

This study demonstrated that while nurse, were very good at identifying the physiologic needs of their elderly patients, that many times interventions which could have been implemented to help reduce the severity of delirium, were not implemented or even considered in the care plan. The literature stressed the important of maintaining environmental controls, and the chart review revealed that these interventions were not used.

These findings support a need for nurses to be educated about how on how to be vigilant in identifying high-risk elderly patients on admission. Admission assessments should target patients who meet the profile for developing delirium. When identified, these patients should receive a more intensive and systematic cognitive assessment, especially if presenting with any reported change in mental status. Any findings of acute onset and fluctuation in mental status along with behaviors such as
disorientation/memory impairment and psychomotor activity disturbance should warrant
more intensive cognitive assessment for delirium by using instruments such as the
Confusion Assessment Method (CAM) or the NEECHAM Confusion Scale. A thorough
assessment of any precipitating factors such as multiple medications, immobility, and the
presence of an indwelling bladder catheter should be closely followed for any change in
mental status.

Delirium is a clinical diagnosis, based on specific diagnostic criteria and bedside
observations, data collected from the medical records and information obtained from
other sources such as families and caregivers. The implications of misdiagnosis or under
detection of delirium can have grave consequences for the hospitalized elderly patient.
Primary prevention is the most effective strategy to reduce the occurrence of delirium.
The optimal prevention strategy includes early identification of patients who are at risk
for delirium on admission to the hospital, treatment of the underlying causes and
implementation of appropriate nursing interventions to provide a maximally supportive
environment.

Neuman’s main goal for nursing is to facilitate optimal wellness for the client and
nursing actions are designed to retain, attain, and maintain optimal individual wellness by
incorporating interventions at each of the three levels. Interventions that occur at the
primary level can help strengthen the flexible lines of defense by educating the client and
caregivers about the ways to help prevent illness. Interventions at the secondary level
help restore the client system to equilibrium by treating symptoms that occur after
penetration of the lines of defense by a stressor. Interventions that occur at the tertiary
level can help to prevent further damage and help maintain the stability after reconstitution has occurred.

As previously discussed, delirium represents a common multi-factorial geriatric syndrome representing a complex inter-relationship between a vulnerable patient with predisposing factors, noxious insults, or precipitating factors (Inouye, 1998). As such, if viewed in terms of a relationship, which is meshed with the concepts in Neuman’s model, delirium and its effect can be better understood.

This research showed the importance of nursing interventions being implemented at all three levels of prevention. To promote optimal patient wellness, nursing interventions, in response to all the stressors, must be initiated before resistance levels are penetrated in both the reaction and reconstitution phases. When considering the role of stressors on the development of delirium, as defined by Neuman, it is important to consider that the individual is usually being exposed and reacting to multiple stressors simultaneously, rather than as a single occurring event. This research demonstrated that delirium, did indeed occur as multiple stressors which narrowed the patients’ physiological, psychological, socio-cultural and developmental lines of defense. The Neuman System’s Model (NSM) can help provide a template for developing nursing careplans and critical pathways that can help nurses intervene in a much broader and appropriate ways than by simply caring for the patient’s physical needs.

Limitations

Various limitations in this study may have altered the data and thus reduced the reliability of the results. First, this study only looked at the records from one small rural
hospital. As such, the patients were all treated by the same relatively small number of medical and nursing staff, and their knowledge and/or lack of knowledge concerning delirium, or how to describe or document delirium may have affected the results. Second, because delirium is transient in nature and symptoms vary in intensity and clinical presentation for each patient, the detection of delirium may have been hindered. Third, because this study was retrospective in nature and no actual patient interviews were conducted, verification of terms used to describe specific behaviors of delirium could not be wholly validated and must be assumed to be accurate. Fourth, these results may not be generalized to all elderly patients because this sample contained only patients who were admitted for over 72 hours. Fifth, by operationalizing the DSM-III criteria to both the literal words and the implications, these results may be different than other studies. Sixth, although the delirium checklist was very detailed, not all of the abstracted data were used in this study. The focus of this study was to identify descriptive data from the hospital record not the physiological factors associated with delirium. And lastly, although the Delirium Checklist was useful in obtaining descriptive data, and content validity was checked by other nursing professionals, more testing of this instrument would need to be conducted to establish its validity and reproducibility in other hospital settings.

Nursing Practice Implications

This study has contributed to the growing body of knowledge about delirium. The study findings demonstrate that specific diagnostic DSM-III criteria, chart descriptors, predisposing and precipitating risk factors that are documented in the medical record are suggestive of delirium. These indicators can provide valuable diagnostic information to
the health care team enabling them in promptly identifying patients who are at risk for delirium. A number of studies have shown that patients who develop delirium have higher complications rates; longer hospital stays, and increased rates of transfer to rehabilitation or long-term care facilities (Inouye, 1994). One important way nursing can use these findings would be to develop specific clinical pathways or protocols for preventing, identifying, or aggressively managing delirium and its complications. Use of these pathways or protocols has the potential to both improve patient outcomes and reduce the cost of care.

Another important practice implication is that nurses play a key role in identifying and managing the problems associated with medication usage in the hospitalized elderly. Patients taking more than 5 medications are 9.3 times more likely to develop delirium than those taking no medications or only one drug. (Meredith, 1998). Therefore, an intensive medication history should be completed on admission for all elderly patients and all unnecessary medications should be discontinued. Medication usage should be monitored daily in relation to changes in the mental status of the patient, especially because the study revealed that a significant number of medications were added during the first 72 hours after admission. Elderly patients should be monitored for at least 24 hours after any new medication is added or when medication dosages are increased.

Effective management of delirium requires strategies to identify patients upon admission with delirium or at high risk for delirium, as well as strategies to reduce the incidence of delirium among the hospitalized elderly. A process improvement effort is required and would involve a collaborative multidisciplinary team approach. A team approach is needed to implement a cognitive assessment tool that documents the patient's
baseline cognitive functioning, to provide ongoing monitoring (noting any changes in mental status or behavioral and functional abilities) and to implement a protocol based intervention for patients identified as being at risk for or having delirium.

Effective strategies for the management for delirium would not be complete without appropriate and timely staff education and outcome measures to determine the effectiveness of the strategies implemented to reduce the incidence of delirium. The education process should include the signs and symptoms of delirium, differentiation of the signs and symptoms of depression, dementia and delirium, and appropriate measures to prevent delirium from occurring. Awareness of risk and surveillance for subtle changes in behavior and mental status will improve the detection of delirium.

Since delirium is a reversible disorder, early diagnosis through assessment is imperative to successful intervention and treatment. Primary prevention is the most effective strategy to reduce the occurrence of delirium. The optimal prevention strategy includes identification of patients who are at high risk for delirium on admission to the hospital, treatment of the underlying causes and implementation of appropriate nursing interventions to provide an optimal supportive environment.

By implementing these strategies, nurses and other members of the health care team can appropriately intervene with patients at risk for developing delirium. The routine, systematic and comprehensive assessment, detection, and intervention with patients who are at risk for delirium may significantly influence the management of hospitalized elderly patients. These strategies can positively impact the negative outcomes associated with the development of delirium and therefore improve the quality of life of the hospitalized elderly.
Nursing Research Implications

This study demonstrated that there are numerous areas for continuing nursing research on the topic of delirium. This retrospective chart review demonstrated that the statistics about the prevalence of delirium cited in the literature were fairly consistent with the data collected at the research hospital. Studies need to be completed to see if this study’s results are reproducible in hospitals of all sizes and in different geographic locations. More studies into this problem so that knowledge obtained can guide health care facilities in the development of more efficacious methods of delirium assessment, prevention, and intervention strategies.

The literature review also revealed that delirium adds to the length of stay in the patient who develops delirium. Further research as to how delirium affects length of stay in the confused elderly patient would be beneficial. This study showed that there was only one documented and coded diagnosis of delirium out of the 16 patients who met full diagnostic criteria for a delirium diagnosis. Further research might demonstrate that delirious patients do indeed have longer lengths of stay, and that under the current Medicare reimbursement practice based on Diagnostic Related Groups (DRGs) that hospitals may be providing tens or hundred thousands of dollars in uncompensated care. Further research might also show how many criteria and which of the criteria result in increased lengths of stay.

In the 16 cases identified in this study, only one diagnosis of delirium was made. This negated the hospital’s full reimbursement for treating patients with delirium. Compilation of how much the hospital would have been reimbursed if the diagnosis of delirium was included as one of discharge diagnoses for the other 15 cases would be a

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A strong incentive for future research. Data also needs to be collected to determine if an education process or intervention would help physicians and nurses recognize and diagnose delirium, code for it, and then determine what the actual reimbursement figures would be when compared to a case where delirium was not identified.

This research also demonstrated that many of the patients, especially the over 79 years of age group, while not developing fulminating delirium, did exhibit many of the behavior criteria suggestive of delirium. Further studies should be conducted that look specifically at the older elderly age groups. The results of this study demonstrated that individuals of eighty or over, are at a much higher risk of developing delirium, and exhibit higher numbers of the behavioral criteria throughout their hospitalizations. Certainly advanced age should be considered a significant risk factor for delirium. It would be appropriate to study all facets of delirium in relation to advancing age.

Further investigation is warranted to see how development of delirium affects the patient’s discharge assignment and discharge functional status. Are patients who exhibit delirium placed in some kind of institutionalized care, when before the hospital admission they were functionally independent? Another area of research would be to determine, what are the experiences of family members and how do they react when an elderly family member develops acute onset of delirium symptoms? Are there education interventions that could be implemented to help them?

Conclusions

In summary, the results of this study demonstrated that it is possible to diagnosis delirium from the clinical indicators found in medical records. This study supports the
work of others (Crawley & Miller, 1998) that indicate documentation exists in the medical record which supports a diagnosis of delirium. However, in this research study, only one diagnosis of delirium was made and treated as such. For the other fifteen subjects who met the full diagnostic criteria, there were no effective intervention strategies initiated to reduce the effects of delirium or reverse the condition. This study demonstrates that there are numerous areas for continued study and research on delirium. Further, this study demonstrated that an understanding and use of an established nursing framework, like Betty Neuman’s Health Care Systems Model, which incorporates a total person approach to patient problems, can aid the entire health care team, the patient, and the family in understanding, intervening and reacting to the entire delirium syndrome.
REFERENCES


Diagnostic approach to the confused elderly patient. *American Family Physician* 7,(3).


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FIGURE 1
The Neuman Systems Model

![Diagram of the Neuman Systems Model](image)

FIGURE 1-3. The Neuman Systems Model. (Original diagram copyright © 1970 by Betty Neuman.)
**FIGURE 2**

The Neuman Systems Model:

(Modified for this Study)

Prevention as Intervention for Delirium:

Primary, Secondary and Tertiary Levels

The Neuman Systems Model applied to the Delirium Syndrome
APPENDIX II

TABLES
Table 1

Characteristics of Study Sample

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender</strong></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>61 (61%)</td>
</tr>
<tr>
<td>Male</td>
<td>39 (39%)</td>
</tr>
<tr>
<td><strong>Race</strong></td>
<td></td>
</tr>
<tr>
<td>Caucasian</td>
<td>90 (90%)</td>
</tr>
<tr>
<td>African American</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Native American</td>
<td>8 (8%)</td>
</tr>
<tr>
<td>Hispanic</td>
<td>2 (2%)</td>
</tr>
<tr>
<td>Other</td>
<td>0 (0%)</td>
</tr>
<tr>
<td><strong>Marital Status</strong></td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>34 (34%)</td>
</tr>
<tr>
<td>Separated</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Widowed</td>
<td>50 (50%)</td>
</tr>
<tr>
<td>Divorced</td>
<td>8 (8%)</td>
</tr>
<tr>
<td>Single</td>
<td>8 (8%)</td>
</tr>
<tr>
<td><strong>Admission Type</strong></td>
<td></td>
</tr>
<tr>
<td>Emergency Admission</td>
<td>73 (73%)</td>
</tr>
<tr>
<td>Direct Admission</td>
<td>27 (27%)</td>
</tr>
<tr>
<td><strong>Admitted From</strong></td>
<td></td>
</tr>
<tr>
<td>Home</td>
<td>81 (81%)</td>
</tr>
<tr>
<td>Long Term Care Facility</td>
<td>14 (14%)</td>
</tr>
</tbody>
</table>
Table 2

Frequencies of Primary/Secondary Diagnoses from ICD-9 Codes Present on Admission (Etiologies)

<table>
<thead>
<tr>
<th>Etiologies Admission</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dehydration/Hypovolemia Diagnosis</td>
<td>22</td>
</tr>
<tr>
<td>Renal Failure Diagnosis</td>
<td>7</td>
</tr>
<tr>
<td>Diabetes Diagnosis</td>
<td>24</td>
</tr>
<tr>
<td>Urinary Tract Infection Diagnosis</td>
<td>12</td>
</tr>
<tr>
<td>Cognitive or Brain Diagnosis</td>
<td>28</td>
</tr>
<tr>
<td>Cardiac Diagnosis</td>
<td>50</td>
</tr>
<tr>
<td>Hip Fracture Diagnosis</td>
<td>8</td>
</tr>
<tr>
<td>Liver Failure Diagnosis</td>
<td>2</td>
</tr>
<tr>
<td>Respiratory Diagnosis</td>
<td>41</td>
</tr>
<tr>
<td>Anemia Diagnosis</td>
<td>22</td>
</tr>
<tr>
<td>Electrolyte Disturbance</td>
<td>26</td>
</tr>
</tbody>
</table>
Table 3

Frequency of Occurrence of DSM Diagnostic Criteria for Delirium Per Patient Per Day (n=100) at Admission, 24 hours, 48 hours, 72 hours, and at Discharge.

<table>
<thead>
<tr>
<th>DSM Criteria</th>
<th>Admission</th>
<th>24 hours</th>
<th>48 hours</th>
<th>72 Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Clouding of Consciousness</td>
<td>9</td>
<td>18</td>
<td>18</td>
<td>21</td>
</tr>
<tr>
<td>2. a. Perceptual Disturbances</td>
<td>1</td>
<td>7</td>
<td>11</td>
<td>7</td>
</tr>
<tr>
<td>2. b. Incoherent Speech</td>
<td>6</td>
<td>14</td>
<td>18</td>
<td>16</td>
</tr>
<tr>
<td>2. c. Sleep-wake Cycle Disturbances</td>
<td>1</td>
<td>14</td>
<td>19</td>
<td>26</td>
</tr>
<tr>
<td>2. d. Disturbed Psychomotor Activity</td>
<td>2</td>
<td>13</td>
<td>22</td>
<td>20</td>
</tr>
<tr>
<td>3. Disorientation and Memory Impairment</td>
<td>19</td>
<td>30</td>
<td>34</td>
<td>33</td>
</tr>
<tr>
<td>4. Acute Onset &amp; Mental Status Fluctuation</td>
<td>14</td>
<td>28</td>
<td>32</td>
<td>34</td>
</tr>
<tr>
<td>5. Etiological Factors</td>
<td>91</td>
<td>91</td>
<td>93</td>
<td>87</td>
</tr>
</tbody>
</table>
Table 4
Frequencies of Subjects Meeting Using DSM-III Criteria

<table>
<thead>
<tr>
<th>Number of DSM-III criterion met:</th>
<th>Ages 65-79 N=58</th>
<th>Ages 80-100 N=42</th>
<th>Total N=100</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>6</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>1</td>
<td>37</td>
<td>15</td>
<td>52</td>
</tr>
<tr>
<td>2</td>
<td>5</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
<td>9</td>
<td>13</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
<td>11</td>
<td>16</td>
</tr>
<tr>
<td>Total</td>
<td>58</td>
<td>42</td>
<td>100</td>
</tr>
</tbody>
</table>
Table 5

Sum of Positive DSM Criteria For Delirium Per Patient By Day at Admission, 24 hours, 48 hours, and 72 hours.

<table>
<thead>
<tr>
<th># of DSM Criteria / Chart Descriptors Sum</th>
<th>Admission</th>
<th>24 Hours</th>
<th>48 Hours</th>
<th>72 Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>74</td>
<td>60</td>
<td>58</td>
<td>58</td>
</tr>
<tr>
<td>1</td>
<td>7</td>
<td>8</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>5</td>
<td>8</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td>3</td>
<td>6</td>
<td>10</td>
<td>11</td>
<td>8</td>
</tr>
<tr>
<td>4</td>
<td>2</td>
<td>4</td>
<td>9</td>
<td>8</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
<td>3</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>6</td>
<td>0</td>
<td>6</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>0</td>
<td>1</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>8</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>
### Table 6

Predisposing Risk Factors Per Patient with DSM Criteria

#### DSM Criteria and Predisposing Risk Factors for Delirium

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Brain Disorder on Admission N=28</td>
<td>4</td>
<td>1</td>
<td>3</td>
<td>0</td>
<td>1</td>
<td>12</td>
<td>8</td>
</tr>
<tr>
<td>Dehydration N=29</td>
<td>BUN/Creatinine Ratio &gt;17</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Severity of Illness N=22</td>
<td>Admit to ICU</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>ADL Function on Admission N=20</td>
<td>Dependent</td>
<td>4</td>
<td>1</td>
<td>3</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>
Table 7
Precipitating Risk Factors Identified Per Patient with the DSM Criteria for Delirium

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Immobilization</td>
<td>N=15</td>
<td>5</td>
<td>0</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>Bladder Catheter</td>
<td>N=16</td>
<td>4</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>Iatrogenic Event</td>
<td>N=5</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Medications</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Narcotics</td>
<td>N=16</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Anticholinergic</td>
<td>N=5</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Benzodiazepines</td>
<td>N=11</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Antidepressants</td>
<td>N=3</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>
Table 8

Mean Numbers of Medications at Admission, 24 hours, 48 hours, 72 hours and at Discharge

<table>
<thead>
<tr>
<th>N Valid</th>
<th>Adm Total Meds</th>
<th>24 total medications</th>
<th>48 total medications</th>
<th>72 total medications</th>
<th>Discharge- total medications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Missing</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Mean

- 5.22
- 7.97
- 8.33
- 8.44
- 6.51

Median

- 5.00
- 8.00
- 8.00
- 8.00
- 6.00

Std. Deviation

- 3.37
- 3.00
- 2.88
- 2.85
- 2.94

Minimum

- 0
- 2
- 1
- 3
- 1

Maximum

- 19
- 17
- 18
- 16
- 15
Table 9

Number of Medications Used Per Patient Per Day

<table>
<thead>
<tr>
<th>Type of Medication</th>
<th>N (%)</th>
<th>N (%)</th>
<th>N (%)</th>
<th>N (%)</th>
<th>N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Patients</td>
<td>Admission</td>
<td>24 Hours</td>
<td>48 Hours</td>
<td>72 Hours</td>
</tr>
<tr>
<td>Anticholinergic</td>
<td>5</td>
<td>30</td>
<td>35</td>
<td>36</td>
<td>4</td>
</tr>
<tr>
<td>Benzodiazepine</td>
<td>11</td>
<td>26</td>
<td>31</td>
<td>35</td>
<td>20</td>
</tr>
<tr>
<td>Narcotics</td>
<td>16</td>
<td>59</td>
<td>63</td>
<td>62</td>
<td>39</td>
</tr>
<tr>
<td>Antidepressants</td>
<td>3</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>5</td>
</tr>
</tbody>
</table>
Table 10

Quantity and Type of Chart Descriptors Used by the Healthcare Team To Describe Delirium.

<table>
<thead>
<tr>
<th>Chart Descriptor</th>
<th>Admission</th>
<th>24 Hours</th>
<th>48 Hours</th>
<th>72 Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Confusion</td>
<td>18</td>
<td>29</td>
<td>29</td>
<td>29</td>
</tr>
<tr>
<td>Disorientation</td>
<td>14</td>
<td>22</td>
<td>27</td>
<td>27</td>
</tr>
<tr>
<td>Lethargic</td>
<td>4</td>
<td>9</td>
<td>13</td>
<td>15</td>
</tr>
<tr>
<td>Agitation</td>
<td>6</td>
<td>8</td>
<td>12</td>
<td>14</td>
</tr>
<tr>
<td>Combativeness</td>
<td>4</td>
<td>4</td>
<td>10</td>
<td>8</td>
</tr>
<tr>
<td>Unusually Quiet</td>
<td>2</td>
<td>3</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>Incoherence</td>
<td>5</td>
<td>10</td>
<td>12</td>
<td>12</td>
</tr>
</tbody>
</table>

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Table 11

Frequency Table of Nursing Interventions Used in the Care of Confused Elderly Patient Documented in the Medical Record

<table>
<thead>
<tr>
<th>Nursing Interventions From Literature Search</th>
<th>N=100 (100%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maintain normal fluid and electrolytes</td>
<td>N=48</td>
</tr>
<tr>
<td>Maintain normal nutrition</td>
<td>N=54</td>
</tr>
<tr>
<td>Maintain normal body temperature</td>
<td>N=06</td>
</tr>
<tr>
<td>Maintain normal sleep-wake patterns</td>
<td>N=14</td>
</tr>
<tr>
<td>Maintain normal elimination patterns</td>
<td>N=22</td>
</tr>
<tr>
<td>Maintain normal oxygenation patterns</td>
<td>N=46</td>
</tr>
<tr>
<td>Maintain normal blood pressure</td>
<td>N=15</td>
</tr>
<tr>
<td>Minimize fatigue/Allow rest</td>
<td>N=22</td>
</tr>
<tr>
<td>Manage patient’s pain</td>
<td>N=57</td>
</tr>
<tr>
<td>Identify and treat infections</td>
<td>N=45</td>
</tr>
<tr>
<td>Encourage patient to be involved in own care</td>
<td>N=15</td>
</tr>
<tr>
<td>Acknowledge the patient’s feelings and fears</td>
<td>N=13</td>
</tr>
<tr>
<td>Limit extraneous noise</td>
<td>N=05</td>
</tr>
<tr>
<td>Use reality orientation</td>
<td>N=18</td>
</tr>
<tr>
<td>Repeat information as needed</td>
<td>N=18</td>
</tr>
<tr>
<td>Help maintain a safe environment</td>
<td>N=02</td>
</tr>
<tr>
<td>Move the patient closer to the nursing station/nurse</td>
<td>N=11</td>
</tr>
<tr>
<td>Use on-on-one care</td>
<td>N=06</td>
</tr>
<tr>
<td>Medicate as needed for symptoms</td>
<td>N=05</td>
</tr>
<tr>
<td>Use restraints</td>
<td>N=08</td>
</tr>
<tr>
<td>Encourage family to help with the patient’s care</td>
<td>N=07</td>
</tr>
<tr>
<td>Keep environment quiet</td>
<td>N=02</td>
</tr>
<tr>
<td>Provide the patient with their glasses/hearing aids</td>
<td>N=28</td>
</tr>
<tr>
<td>Monitor patient for adverse effects of medications</td>
<td>N=06</td>
</tr>
<tr>
<td>Use patient alarms/doors</td>
<td>N=08</td>
</tr>
</tbody>
</table>
APPENDIX III

PERMISSIONS
December 26, 2001

The Northeastern Nevada Regional Hospital administration agrees to allow Diane M. Elmore, University of Nevada at Las Vegas Master's in Nursing student to conduct a Master's thesis project on delirium at this facility.

The scope of the research at the participating hospital will be a medical records review only. Anonymity of the information will be assured by coding the subject data to ensure that patient confidentiality is strictly maintained.

Sincerely,

[Signature]

Chief Executive Officer
Log Number: April 22, 2002
Title of Project: Delirium in the Rural Hospitalized Elderly: Indicators Found in Medical Records
Investigator: Diane M. Elmore

After reviewing this proposal, the members of the Department of Nursing, Human Subjects Rights Review Committee have indicated below their approval/disapproval of this proposal.

<table>
<thead>
<tr>
<th>Signature of Committee Members</th>
<th>Approve</th>
<th>Disapprove</th>
</tr>
</thead>
<tbody>
<tr>
<td>[Signature]</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>[Signature]</td>
<td>□</td>
<td>□</td>
</tr>
</tbody>
</table>

The above named project is hereby approved/disapproved (Circle one)

Date: 4-23-2002

Committee Chairperson Signature
Notice of Approval to Conduct Research Involving Human Subjects

DATE: April 19, 2002

TO: Diane M. Elmore, Nursing
Dr. Margaret Louis (Advisor)
M/S 3018

FROM: Dr. Jack Young, Chair
UNLV Biomedical Sciences Institutional Review Board

RE: Status on Research Project Entitled: Delirium in the Rural Hospitalized Elderly: Indicators Found in Medical Records

OPRS Number: 50150402-338
Approval Date: April 18, 2002

This memorandum is official notification that the protocol for the project referenced above has been reviewed by the Office for the Protection of Research Subjects (OPRS) and has been determined as having met the criteria for exemption from full review by the UNLV Biomedical Sciences Institutional Review Board (IRB) as indicated in regulatory statues 45CFR 46.101. The protocol has been submitted through the expedited review process and has been approved for a period of one year from the date of this notification. Work on the project may proceed.

Should the use of human subjects described in this protocol continue beyond January 09, 2003, it will be necessary to request an extension. Should there be ANY changes to the protocol, it will be necessary to submit those changes to the Office for the Protection of Research Subjects.

If you have questions or require any assistance, please contact the Office for the Protection of Research Subjects at 895-2794.

cc: OPRS File

Office for the Protection of Research Subjects
4505 Maryland Parkway • Box 451046 • Las Vegas, Nevada 89154-1046
(702) 895-2794 • FAX: (702) 895-0605
APPENDIX IV

FORMS
Form 1 Diagnostic Statistical Manual III and Diagnostic Statistical Manual IV of Mental Disorders Criteria for the Diagnosis of Delirium

<table>
<thead>
<tr>
<th>Diagnostic DSM-III Criteria</th>
<th>Diagnostic DSM-IV Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Clarity of consciousness (reduced clarity of awareness of the environment), with reduced capacity to shift, focus, and maintain attention to environmental stimuli</td>
<td>A. Reduced ability to maintain attention to external stimuli and to appropriately shift attention to new external stimuli by least 1 of: 1. Questions had to be repeated because attention wandered 2. Perseverated answers to previous questions</td>
</tr>
<tr>
<td>2. At least two of the following: a. Perceptual disturbance (Misinterpretation, illusions, or hallucinations) b. Speech that is sometimes incoherent. c. Disturbance of sleep-wakefulness cycle, with insomnia or daytime drowsiness. d. Increased or decreased psychomotor activity.</td>
<td>B. Disorganized Thinking</td>
</tr>
<tr>
<td>3. Disorientation and memory impairment</td>
<td>C. Confusion developed over short period of time</td>
</tr>
<tr>
<td>4. Clinical features that develop over a short period of time (usually hours to days) and tend to fluctuate over the course of the day.</td>
<td>D. Fluctuating level of confusion</td>
</tr>
<tr>
<td>5. Evidence, from the history, physical examination, or laboratory tests, of a specific organic factor judged to be etiologically related to the disturbance</td>
<td>E. At least 2 of the 6 of: 1. Reduced level of consciousness 2. Perceptual disturbance 3. Disturbance of sleep-wake cycle 4. Increased or decreased psychomotor activity 5. Disorientation to time place or person 6. Memory impairment</td>
</tr>
</tbody>
</table>

Operationalization of DSM-III Criteria and DSM-IV Criteria

Criteria will be considered present if the following descriptors are evident in the chart:

DSM-III criteria 1 and DSM-IV criteria A

Attention Disorder: distractibility or inability to concentrate; need to repeat instructions or reorient the patient to the tasks at hand.

DSM-III criteria 2 and DSM-IV criteria B

Sees people, bugs, or animals; hears noises, music, voices not present; nonsensical speech: calling out yelling swearing or unusual speech. Speech that is rambling, irrelevant or incoherent. Sleeps during the day (between 9 a.m. and 8 p.m.); awake or agitated at night (between midnight and 6 a.m.; Hyperactivity: pulling at tubes, attempting to crawl over the side rails; picking at bed clothes, dressing or undressing; keyed up; Hypoactivity: inactivity or paucity of movement or thought.

DSM-III criteria 3 and DSM-IV criteria C

Verbal or nonverbal manifestations of disorientation to time, place or persons in the environment; cannot learn new information, cannot remember simple facts.

DSM-III Criteria 4 and DSM-IV criteria D and E

Acute onset and fluctuation: Acute mental status change defined as a change from presence to absence of symptoms with the exception of the sleep-wake variable within a 24-hour period.

Note:
Since all patients were admitted with a medical diagnosis, it was presumed that an etiological factor was present requiring hospitalization.
<table>
<thead>
<tr>
<th>Section/Category</th>
<th>Descriptive Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Section I. Identifying Data</td>
<td>Medical record number; date of hospital admission, admitted through; admitted from</td>
</tr>
<tr>
<td>Section II. Demographic Data</td>
<td>Sex, age, race, number of years in school; functional status on admission; functional status daily</td>
</tr>
<tr>
<td>Section III. Current Health Status</td>
<td>Primary and secondary diagnoses</td>
</tr>
<tr>
<td>Section IV. Medication</td>
<td>Total number of medications; total number of narcotic received; total number of antidepressant drugs received; total number of anticholinergics; total number of benzodiazepines</td>
</tr>
<tr>
<td>Section V. Physical Stature</td>
<td>Height; weight; % of Ideal Body Weight</td>
</tr>
<tr>
<td>Section VI. Physiologic Data</td>
<td>Temperature; admission systolic and diastolic blood pressure, pulse, respirations; arterial oxygen saturation on admission and daily; oxygen use</td>
</tr>
<tr>
<td>Section VII. Laboratory Data</td>
<td>Serum Albumin; serum blood urea Nitrogen; serum creatinine; fasting blood glucose; white blood cell count, &amp; serum sodium</td>
</tr>
<tr>
<td>Section VIII. DSM-III/DSM IV Criteria</td>
<td>Refer to table 1.</td>
</tr>
<tr>
<td>Section IX. Chart Descriptors</td>
<td>Presence of disorientation; combativeness; confusion; restlessness; agitation; incoherent speech; unusually quiet; lethargic; change in mental status; drowsy</td>
</tr>
<tr>
<td>Section X. Precipitating Factors</td>
<td>Immobilization due to restraints, bed rest, or bedside commode; use of indwelling bladder catheter; iatrogenic causes such as transfusion reaction, over anticoagulation or digitalis intoxication.</td>
</tr>
<tr>
<td>Section XI. Discharge Status History</td>
<td>Primary and secondary diagnoses</td>
</tr>
<tr>
<td>Section XII. Chart Descriptors of Nursing Interventions</td>
<td>Presence of documentation of common nursing interventions used in caring for the confused elderly patient. Primary, Secondary, and Tertiary Interventions in the five client system variables will be documented.</td>
</tr>
</tbody>
</table>
# Delirium Checklist – Admission Data

Instructions: Data are to be obtained from medical records of patients discharged between June 1, 2001 and May 31, 2002. Each record will first be assigned a 3 digit number followed by the letter A. Designating Admission Data (001A, 002A etc.)

Leave any data missing blank

1. Patient ID #

Instructions: These data are to be obtained from the registration record.

## I. Identifying Data:

1. Medical record number
2. Date of hospital admission
3. Patient admitted through:
   1 = Emergency Room
   2 = Direct Admit
4. Patient admitted:
   0 = Home
   1 = LTC facility
   2 = Unknown

## II. Demographic Data:

1. Sex:
   1 = male
   2 = female
2. Age in years
3. Race:
   1 = Caucasian
   2 = Black
   3 = Native American
   4 = Hispanic
   5 = Asian
4. Marital Status:
   1 = Married
   2 = Separated
   3 = Divorced
   4 = Widowed
   5 = Single

Instructions: These data are to be obtained from the registration record.

## III. Health Status History

1. Primary admitting diagnosis:
   a. ICD-9 code

2. Does the patient have any of the following primary or secondary diagnoses on admission?
   Code: 0 = No
   1 = yes

   a. ICD-9 code #276.5 (dehydration or hypovolemia)
   b. ICD-9 code #584.9, #585.0 (Acute or Chronic Renal Failure)
   c. ICD-9 code #250.0-250.9 (Type I or II diabetes)
   d. ICD-9 code #599.0 (Urinary Tract Infection)
   e. ICD-9 code #290.3, #293.0, #296.3, #294.8-9 (Chronic Cognitive Impairment or Brain Syndrome, Dementia, Organic)
Cognitive Impairment or Brain Syndrome, Dementia, Organic Brain Syndrome, Depression, Delirium)

- ICD-9 code #414.0, #428.0, #428.1, #410.0-9, #482.1, #507.0 (Coronary Artery Disease, Congestive Heart Failure, Pulmonary Edema, Myocardial Infarction)

- ICD-9 code #820.0-.9 (Hip Fracture)

- ICD-9 code #572.8, 570.0 (Liver Failure)

- ICD-9 code #284.8, #280.0, #276.8, #276.5, #276.0, #276.1 (Anemia due to chronic disease, acute or chronic blood loss)

- ICD-9 code #276.8, #276.9, #276.0, #276.1 (Hyperkalemia, Hypokalemia, Hypernatremia, Hyponatremia)

Instructions: Data are to be obtained from initial history and physical documentation by the physician or nursing admission assessment record. (Exclude vitamins, minerals, ASA, and /or Tylenol.) Count the number of medications prescribed by the physician on hospital admission.

### IV. Medications

1. Total number of medications
2. Total number of narcotics (Demerol, Morphine, Percocet, etc.)
3. Number of psychoactive drugs (Ativan, Xanax, etc.)
4. Number of anticholinergic medications (Benadryl, Vistaril, Phenergan, Reglan, Lomotil, etc.)
5. Number of Benzodiazepines (Valium, Dalmane, Librium, Halcion, etc.)

Instructions: Data are to be obtained from nursing admission assessment record.

### V. Physical Stature

1. Height: record data in feet and inches to two decimals
2. Weight: record weight in pounds and ounces to two decimals
3. % of Ideal Body Weight: actual is <80% of IBW
   - Code: 0 = no, 1 = yes

Instructions: Data are to be obtained from the admission nursing assessment record.

### VI. Physiological Data:

1. Temperature: Fahrenheit Code: 0 = 97°-99° 1 = > 99°
2. Admission Systolic Blood Pressure
3. Admission Diastolic Blood Pressure
4. Radial Pulse on admission
5. Respiratory rate on admission
6. Arterial oxygen saturation level
7. Oxygen Code: 0 = not in use 1 = in use

Instructions: Data are to be obtained from laboratory reports Code: 88 = not done

### VII. Laboratory Data

1. Serum albumin (G/DL)
2. Serum urea (Mg/DL)
3. Serum creatinine (Mg/DL)
4. Fasting blood glucose (Mg/DL)
5. White blood cell count ($\times 10^3$)
### VIII. DSM III/IV Criteria

1. Clouding of consciousness (Inability to maintain focus, easily distracted)
2. At least two of the following criteria:
   - a. perceptual disturbances (misinterpretations, illusions, hallucinations)
   - b. incoherent speech (rambling speech, incomprehensible speech)
   - c. sleep-wake-cycle disturbance (insomnia at night, daytime drowsiness)
   - d. disturbed psychomotor activity (restlessness, pulling at tubes, picking at bedclothes etc.)
3. Disorientation and memory impairment (disorientation to person, place, or time; and/or inability to learn new material or remember past events)
4. Mental status fluctuation (changes in mental status over a short period of time; symptoms fluctuate over the course of the day)
5. Etiological causes (refer to section III. Health History)

### IX. Chart Descriptors

1. Disorientation
2. Combativeness
3. Confused
4. Restlessness
5. Agitated
6. Incoherent
7. Unusually quiet
8. Lethargic
9. Change in mental status
10. Drowsy

### X. Precipitating Factors

1. Immobilization (Restraints, bedrest, bedside commode only)
2. Use of indwelling bladder catheter
3. Iatrogenic causes (transfusion reaction, over anti-coagulation, digitalis intoxication, etc.)
**Delirium Checklist – Day 1 (24 hours, 48 hours, & 72 hours)**

**IV. Medications**

1. Total number of medications
2. Total number of narcotics (Demerol, Morphine, Percocet, etc.)
3. Number of psychoactive drugs (Ativan, Xanax, etc.)
4. Number of anticholinergic medications (Benadryl, Vistaril, Phenergan, Reglan, Lomotil, etc.)
5. Number of Benzodiazepines (Valium, Dalmane, Librium, Halcion, etc.)

**V. Physical Status**

1. Height: record data in feet and inches to two decimals
2. Weight: record weight in pounds and ounces to two decimals
3. % of Ideal Body Weight: actual is <80% of IBW
   - Code: 0 = no  1= yes

**VI. Physiological Data**

1. Temperature: Fahrenheit  
   - Code: 0 = 97°-99°  1= > 99°
2. Admission Systolic Blood Pressure
3. Admission Diastolic Blood Pressure
4. Radial Pulse on admission
5. Respiratory rate on admission
6. Arterial oxygen saturation level
7. Oxygen  
   - Code: 0= not in use  1= in use

**VII. Laboratory Data**

1. Serum albumin (G/DL)
2. Serum urea (Mg/DL)
3. Serum creatinine (Mg/DL)
4. Fasting blood glucose (Mg/DL)
5. White blood cell count (X 10³)
6. Serum sodium (Mmol/L)
### VIII. DSM III/DSM IV Criteria

1. Clouding of consciousness (Inability to maintain focus, easily distracted)
2. At least two of the following criteria:
   a. perceptual disturbances (misinterpretations, illusions, hallucinations)
   b. incoherent speech (rambling speech, incomprehensible speech)
   c. sleep-wake-cycle disturbance (insomnia at night, daytime drowsiness)
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1. Disorientation
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8. Lethargic
9. Change in mental status
10. Drowsy

### X. Precipitating Factors

1. Immobilization (Restraints, bedrest, bedside commode only)
2. Use of indwelling bladder catheter
3. Iatrogenic causes (transfusion reaction, over anti-coagulation, digitalis intoxication, etc.)
4. (From—II. Demographic Data)

<table>
<thead>
<tr>
<th>Functional Status as recorded on the daily care record</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code: 0= Independent 1= Dependent</td>
</tr>
</tbody>
</table>

102
# Delirium Checklist – Discharge Summary

**Instructions:** These data are to be obtained from the discharge summary documented by the physician. Codes are to be obtained from the face sheet of the medical record as documented by the inpatient coder.

## Discharge Status History

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Primary discharge diagnosis:</td>
<td>1.</td>
</tr>
<tr>
<td>a. ICD-9 code</td>
<td>a.</td>
</tr>
</tbody>
</table>

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Does the patient have any of the following primary or secondary diagnoses on discharge?</td>
<td></td>
</tr>
<tr>
<td>Code: O = No   I = yes</td>
<td></td>
</tr>
<tr>
<td>a. ICD-9 code #276.5 (dehydration or hypovolemia)</td>
<td>a.</td>
</tr>
<tr>
<td>b. ICD-9 code #584.9, #585.0 (Acute or Chronic Renal Failure)</td>
<td>b.</td>
</tr>
<tr>
<td>c. ICD-9 code #250.0-250.9 (Type I or II diabetes)</td>
<td>c.</td>
</tr>
<tr>
<td>d. ICD-9 code #599.0 (Urinary Tract Infection)</td>
<td>d.</td>
</tr>
<tr>
<td>e. ICD-9 code #290.3, #293.0, #296.3, #294.8-9 (Chronic Cognitive Impairment or Brain Syndrome, Dementia, Organic Brain Syndrome, Depression, Delirium)</td>
<td>e.</td>
</tr>
<tr>
<td>f. ICD-9 code #414.0, #428.0, #428.1, #428.2, #410.0-9, #482.1, #507.0 (Coronary Artery Disease, Congestive Heart Failure, Pulmonary Edema, Myocardial Infarction)</td>
<td>f.</td>
</tr>
<tr>
<td>g. ICD-9 code #820.0-3 (Hip Fracture)</td>
<td>g.</td>
</tr>
<tr>
<td>h. ICD-9 code #572.8, 570.0 (Liver Failure)</td>
<td>h.</td>
</tr>
<tr>
<td>i. ICD-9 code #485.0-486.0, #480.0-480.9, #466.0, #490, #491.20-491.21, #493.90-493.91, #492.8, #507.0, #518.81-84 (Pneumonia, Bronchitis, Asthma, Emphysema, COPD, Respiratory Failure)</td>
<td>i.</td>
</tr>
<tr>
<td>j. ICD-9 code #284.8, #280.0, #285.1 (Anemia due to chronic disease, acute or chronic blood loss)</td>
<td>j.</td>
</tr>
<tr>
<td>k. ICD-9 code #276.8, #276.9, #276.0, #276.1 (Hyperkalemia, Hypokalemia, Hypernatremia, Hyponatremia)</td>
<td>k.</td>
</tr>
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</table>

**Instructions:** Data are to be obtained from initial history and physical documentation by the physician or nursing admission assessment record. (Exclude vitamins, minerals, ASA, and/or Tylenol.) Count the number of medications prescribed by the physician on hospital admission.

## IV. Medications

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<table>
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<tbody>
<tr>
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<tr>
<td>2. Total number of narcotics (Demerol, Morphine, Percocet, etc.)</td>
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</tr>
<tr>
<td>3. Number of psychoactive drugs (Ativan, Xanax, etc.)</td>
<td>3.</td>
</tr>
<tr>
<td>4. Number of anticholinergic medications (Benadryl, Vistaril, Phenergan)</td>
<td>4.</td>
</tr>
</tbody>
</table>
Reglan, Lomotil, etc.)
5. Number of Benzodiazepines (Valium, Dalmane, Librium, Halcion, etc.)

6. (From - II. Demographic Data)
   Functional status as recorded on daily care record
   Code: 0= Independent  1= Dependent

Instructions: Data are to be obtained from the emergency flow sheet, nursing admission assessment record, 24 hour assessment record, and the interdisciplinary progress notes. Code: 0= no  1= yes

XII. Nursing Intervention Descriptors

| 1. Establish and maintain normal fluid and electrolyte balance |
| 2. Establish and maintain normal nutrition |
| 3. Establish and maintain normal body temperature |
| 4. Establish and maintain normal sleep/wake patterns |
| 5. Establish and maintain normal elimination patterns |
| 6. Establish and maintain normal oxygenation patterns |
| 7. Establish and maintain normal blood pressure |
| 8. Minimize fatigue by planning care that allows for separate rest/activity patterns |
| 9. Manage the patient’s pain or discomfort |
| 10. Identify and treat infections |
| 11. Encourage patients to be involved in and control as much of their care as possible. |
| 12. Acknowledge patient’s feelings and fears |
| 13. Limit extraneous noises |
| 14. Use reality orientation |
| 15. Repeat information as needed |
| 16. Maintain a safe and uncluttered environment |
| 17. Move patient closer to the nursing station |
| 18. Use one-on-one care |
| 19. Medicate as necessary for symptoms |
| 20. Use restraints |
| 21. Encourage family to help with care |
| 22. Keep environment quiet |
| 23. Provide glasses and hearing aids, if necessary |
| 24. Monitor for adverse effects of medications |
| 25. Patient alarms- bed/doors |

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Committee Member, Dr. Roseann Colosimo R.N., PhD.
Graduate Faculty Member, Dr. Andy Fontana, PhD.