1995

Prediction of In-Hospital Delirium in Elderly Hip Fracture Patients Using Family Assessment of Pre-Morbid Cognitive Behaviors

Ronell R. Ruhlandt
Grand Valley State University

PREDICTION OF IN-HOSPITAL DELIRIUM IN ELDERLY HIP FRACTURE PATIENTS USING FAMILY ASSESSMENT OF PRE-MORBID COGNITIVE BEHAVIORS

By

Ronell R. Ruhlandt

A THESIS

Submitted to
Grand Valley State University
in partial fulfillment of the requirements for the
degree of

MASTER OF SCIENCE IN NURSING

Kirkhof School of Nursing

1995

Thesis Committee Members:

Andrea C. Bostrom, Ph.D., R.N.

Mary Horan, Ph.D., R.N.

Theresa Bacon-Baguley, Ph.D., R.N.

ABSTRACT

PREDICTION OF IN-HOSPITAL DELIRIUM IN ELDERLY HIP FRACTURE PATIENTS USING FAMILY ASSESSMENT OF PRE-MORBID COGNITIVE BEHAVIORS

By

Ronell R. Ruhlandt

The elderly are the fastest growing segment of the population in the United States. Elderly persons are at high risk for developing delirium when hospitalized. The purpose of this study was to determine if pre-morbid cognitive behaviors were predictive of in-hospital delirium in elderly hip-fracture patients. The ability to predict or diagnose delirium early could prevent complications during hospitalization and decrease the length of hospital stays. The study was descriptive correlational. Subjects were admitted to a metropolitan teaching hospital during February through August 1993, were 60 years or older, and were diagnosed with hip fracture. Admission assessments included the Cognitive Behavior Rating Scales, a family assessment of pre-morbid cognitive behaviors. The Confusion Assessment Method, a delirium specific assessment tool was completed on admission and every shift. Of the 41 subjects, 12% (n = 5) became delirious. None of the subscales on the CBRS were predictive of delirium as defined by the CAM.

DEDICATION

This thesis is dedicated to my husband, Allen, and our children, Carina and Derek. Thank you for your support through five tough years of school. Thanks for doing the laundry, house cleaning, and dishes with a cheerful attitude, so I could work on school and work projects. I could not have done it without you.

ACKNOWLEDGMENTS

The author wishes to express sincere thanks to Dr. Andrea Bostrom for her expertise in developing this study and for serving as chairperson of the thesis committee. Thank you for enduring through my industrious streaks and not forgetting me during my inactive periods. Special thanks also goes to Dr. Mary Horan for inspiring me, beginning with my first course in nursing theory and ending with being on my thesis committee. Your encouragement was always appreciated. Particular thanks to Dr. Theresa Bacon-Baguley for her expertise in physiology which kept me grounded in science. Special recognition to the registered nurses of 7 North, the orthopedic-neuro unit at Saint Mary's Health Services for their contribution to the study as data collectors.

Table of Contents

Table of Contents Continued

List of Tables

List of Figures

List of Appendices

APPENDIX

CHAPTER 1

INTRODUCTION

The elderly are the fastest growing segment of the population in the United States. It is estimated that by the year 2000, the elderly will comprise 12% of the general population. The percentage of the elderly is expected to increase to 21% by the year 2030. It is this age group that accounts for 39% of the total acute hospital day bed census (Dubin, 1992). By the year 2000, the elderly are expected to occupy 50% of all hospital beds (Hague & Moody, 1993).

Elderly persons are at high risk for developing delirium when hospitalized. Selective loss of neuronal populations and a decrease in the function of acetylcholine are thought to account for the increased susceptibility of delirium in the elderly (Adams, 1988). These changes added to a critical, acute illness and/or a functional disability, such as hip fracture, can lead to delirium. Therefore, astute assessment and prompt management of the delirium in elderly hip-fracture patients is imperative. Failure to treat delirium may result in increased complications and lengthened hospital stays (Sullivan, Wanich, & Kurlowicz, 1991).

Delirium is a transient disorder of cognition and attention that is accompanied by disturbances of the sleep-wake cycle and psychomotor behavior (Lipowski, 1987). Lipowski (1987) further describes delirium as one of the "organic mental syndromes that constitute psycho-pathological manifestations of brain dysfunction" (p. 1789).

Delirium has been described as indicative of a life-threatening physiologic disruption for some individuals (Tess, 1991). Medical and psychiatric practitioners state that delirium can be as life-threatening as a cardiac or respiratory arrest. The occurrence of delirium is indicative of the patient's mental and physical status during hospitalization. Sullivan et al. (1991) state that controlled clinical trials show convincing evidence that patients who become delirious have a lower level of function in the hospital and at discharge, and are more likely to be readmitted to the hospital, admitted to a nursing home, or die within three months after discharge, when compared to non-delirious patients.

Delirium results in significant nursing care problems (Rasin, 1990). Patients are in danger of doing harm to themselves during the delirious period. Delirious patients may climb out of bed, or pull out catheters, intravenous lines, or feeding tubes. They are frightening to

themselves, to their families and to other patients. The nurse must be concerned about prevention of injury as well as the additional time and supplies required to provide patient care (Rasin, 1990).

Delirium has been shown to lengthen hospital stays due to an increase in complications (Berggren et al., 1987; Brannstrom, Gustafson, Norberg, & Winblad, 1989). Patients who develop delirium can have more complications such as urinary tract infections, decubitus ulcers, and feeding problems than their non-delirious cohorts (Berggren et al., 1987; Gustafson et al., 1988).

Prevention or early detection and treatment of delirium is vital (Rasin, 1990; Sullivan et al., 1991). Crippen and Ermakov (1992) state that delirium disrupts neuronal function and decreases the ultimate cognitive function of the patient. If treated early, the delirium has less chance of affecting the patient's quality of life. Nurses are key players in prevention or early detection of delirium (Sullivan et al., 1991; Tess, 1991; Rasin, 1990). By alerting nurses to the risk factors and teaching them more uniform assessment techniques, delirium might be detected and treated earlier.

Family members or significant others familiar with the patient's normal day-to-day behaviors are a rich source of assessment data. The Cognitive Behavior Rating Scale

(CBRS) is a family assessment tool designed by Williams (1987) that collects behavioral information about the patient. The CBRS data could be useful in predicting delirium in hospitalized elderly persons.

The purpose of this study was to examine the relationships of pre-hospital behavior of elderly hip-fracture patients to the development of in-hospital delirium. Identification of the relationships among these behaviors added to the existing nursing knowledge concerning pre-morbid cognitive behaviors and the development of delirium. The ability to predict and possibly prevent delirium could be an important step toward decreasing the length of hospital stays, preventing complications, and returning elders to the home after hospitalization.

CHAPTER 2

REVIEW OF LITERATURE AND CONCEPTUAL FRAMEWORK

Review of Literature

Literature searches on delirium were difficult due to the recent adoption of the term delirium. Other terms used for delirium include acute mental status changes, acute confusional state, ICU psychosis, and confusion. Standardization of terminology and criteria was introduced in 1980 when the American Psychiatric Association published the third edition of the Diagnostic and Statistical Manual (DSM-III). With its recent revision (DSM-III-R) in 1987, further clarification has been possible (DSM-IV was published in spring of 1994 after these data were collected). However, the term is still not used universally by practitioners or researchers.

Definition of delirium. Delirium, according to the DSM-III-R (American Psychiatric Association, 1987), is defined as an acute and fluctuating disorder of attention and cognition. The criteria for delirium from DSM-III-R include:

> 1) Reduced ability to maintain attention to external stimuli and to appropriately shift attention to new external stimuli; 2) Disorganized thinking, as

indicated by rambling, irrelevant, or incoherent speech; 3) At least two of the following: a) Reduced level of consciousness, b) Perceptual disturbances: misinterpretations, illusions, or hallucinations, c) Disturbances of sleep-wake cycle with insomnia or daytime sleepiness, d) Increased or decreased psychomotor activity, e) Disorientation to time, place, or person, f) Memory impairment, e.g., new material or past material; 4) Clinical features develop over a short period of time and tend to fluctuate over the course of a day; 5) Either one of the following: a) Evidence from the history, physical examination, or laboratory tests of a specific organic factor (or factors) judged to be etiologically related to the disturbance, or b) In the absence of such evidence, an etiologic organic factor can be presumed if the disturbance cannot be accounted for by any nonorganic mental disorder (p. 100-103).

Patients with delirium show a wide variation in clinical presentation. In part, this variability is due to the unpredictable fluctuations in cognition. Delirium probably involves a complex, interwoven array of precipitating factors that act on persons with some degree of frailty (Inouye, Viscoli, Horwitz, Hurst, & Tinetti, 1993).

Difficulties with delirium studies. The DSM-III-R definition of delirium remains ambiguous, e.g., acute onset is not given a specific time frame. There is failure to agree whether all symptoms need to coexist simultaneously or if chronic behavioral problems should be counted as symptoms (Francis, 1992). Some criteria may be difficult to assess in severely lethargic or uncooperative patients. Inouye et al. (1990) have stated that the DSM-III-R criteria may be too complex for use by non-psychiatric clinicians. They have devised the Confusion Assessment Method (CAM) to be more user friendly, although it is based on the same criteria.

Documentation and assessment are also problems encountered with delirium studies. Lack of consistency in assessment and/or documentation of delirium were cited in the study by Gustafson, Brannstrom, Norberg, Bucht, and Winblad (1991). Gustafson, Brannstrom, Norberg et al. (1991) compared two prospective samples of patients 65 years and older treated for femoral neck fractures (n = 111 and n = 57). Their study was undertaken to determine the accuracy of diagnosis and documentation of delirium in the medical records of patients with hip fracture. The subjects were initially assessed clinically for delirium by the researchers. The results of the clinical study were compared with the findings in the medical record.

Retrospective review of the medical records, to find the noted incidence and treatment of delirium, was compared to the clinical findings.

The findings included unsatisfactory diagnosis and poor documentation of delirium symptoms in the medical records as compared with the results of the clinical studies. The nurses and physicians together documented delirium in 48 of 111 cases (43.2%) in the medical record review. But in the clinical study 68 of 111 cases (61.3%) were diagnosed with delirium by investigators using the DSM-III-R criteria. This difference was significant ($p <$ .01). The authors also found that: 1) there was no systematic mental test in use, 2) there was no documentation of any effort to treat the delirium, and 3) there was no consistent terminology used by physicians and nurses to describe the patients' mental status. The clinicians also neglected to obtain any data from the families or former caregivers regarding the patients' abilities and behavior prior to the fracture.

Risk factors associated with delirium. Studies have been done with elderly patients, both medical and surgical, to determine the risk factors associated with delirium. The findings were noteworthy because they pointed to a medical complication that was often ignored.

Foreman (1989) studied elders hospitalized for non-

surgical reasons in order to find the incidence and risk factors associated with the onset of confusion. The sample included 71 elderly patients (over 60 years) admitted for medical diagnoses to the medical critical care units of a university teaching hospital. The tools used to determine confusion were the Mini-Mental State Examination (MMSE), the Clinical Assessment of Confusion (CAC), the Visual Analogue Scale for Confusion (VAS-C) and the Visual Analogue Scale for Depression (VAS-D). The patients were selected within 24 hours of admission. The investigator interviews, both initial and daily, required 20 to 30 minutes to complete the MMSE, CAC, and the VAS-D. The nursing staff completed the VAS-C and CAC once per shift. If a change was noted from the last shift, the nurse also completed an MMSE.

Of the 71 subjects, 38% (n = 27) developed confusion within 6 days of admission. The investigator reported that the groups, confused (n = 27) and not confused (n = 44), were homogeneous with respect to age, sex, race and diagnoses. The author stated that the two groups differed significantly with respect to educational preparation (Mean scores - Confused = 9.33, Not confused = 11.43; t = 3.09, $d.f.$= 69, p < .003) and depression (Mean scores - Confused = .89, Not confused = .03; t = -6.02, $d.f.$= 69, p < .001). A MANOVA was also used to examine the differences between

confused and non-confused patients with respect to multiple variables. The variables were organized using Levine's Conservation Principles and will be discussed more completely in the conceptual framework section. Foreman concluded that confusion (delirium) was a significant health problem for hospitalized elders. His recommendations included a careful and systematic assessment of the patient's physical and mental status on admission and throughout the hospitalization. His assessment did not include a family assessment of pre-morbid cognitive behaviors.

The strengths of Foreman's study included assessment of the patients over time, evaluation of numerous variables, and a consistent investigator doing the interviews. The limitations were related to the small size of the sample and the large number of variables related to multiple medical diagnoses.

Bowman's (1992) descriptive study was conducted to explore the possible relationships among anxiety, the expectedness of a surgical event and delirium. In the convenience sample of 44 patients, 22 were scheduled surgical patients and the other 22 were emergent or unscheduled. The subjects were over 60 years old, had no validated history of dementia or chronic mental impairment, and no history of chronic alcohol consumption. The

instruments used included the State-Trait Anxiety Inventory (STAI), the Mini-Mental State Exam (MMSE), and the nurse's form for recording delirium signs. The STAI (state and trait) and MMSE were administered preoperatively. The state portion of the STAI was readministered on the first post-operative day. The MMSE was administered on each of the 5 post-operative days. Staff nurses were asked to record any behavioral manifestations of delirium each shift for the 5 postoperative days.

Eight of the 44 patients developed delirium. The incidence of delirium in the emergent group was 32% (7 of 22) compared to a 4.5% (1 of 22) in the scheduled surgery group. The incidence of delirium was statistically significant ($X^2 = 3.819$; $df = 1$; $.05 < P < .10$; using Yates' correction). The greatest incidence was seen on the third postoperative day.

Bowman concluded that the best determinant of delirium was the expectedness of the surgery which encompassed the opportunity for psychological preparation. She recommended further studies of coping skills in the elderly. The study does not mention any family interaction to obtain information regarding the pre-hospital cognitive behaviors of the patients.

The strengths of the study include the preoperative and ongoing assessment of the patients, and the consistency

of the interviewer. The limitations of the study include the small sample size, and the variation in surgical interventions. The scheduled group underwent proportionately more urinary tract surgeries versus a large number of orthopedic surgeries in the emergent group. The difference in the mobility for the orthopedic group has been raised in other studies as a risk factor for delirium.

The goal of a study by Williams et al. (1985) was to identify factors that put elderly hip-fracture patients at risk for confusion (delirium). The subjects, who were over 60 years, were admitted to four general hospitals with traumatic hip fracture. The sample (n = 237) was divided into three nonrandomized groups. The main sample of 170 had a mean age of 78.8. The sample was 84% female. Most subjects (89%) lived either independently or with modest assistance in the community. The comparison group of 24 was observed to have some mental impairment prior to the injury, but had not been diagnosed with mental impairment. They were significantly older, less active, complained of less pain, had more vision problems, and lived in nursing homes more often than the main sample. The control sample of 43 were similar in characteristics to the main sample.

The collected data included the Short Portable Mental Status Questionaire (SPMSQ), background questions, laboratory data, clinical data and occurrence of confusion

from admission through the fifth postoperative day. The definition of confusion was similar to the DSM-III definition of delirium, i.e., "a disturbance in mental processes incorporating impaired memory, thinking, attention, and orientation to time and place. There can be misperceptions of person and objects and hallucinations and there also may be accompanying hyper or hypoactivity or emotional changes. The state may be transient or prolonged" (Williams et al., 1985, p. 32-33).

The model in the study was developed using multiple logistic regression with confusion/no confusion as the dependent variable. The independent variables compared were the SPMSQ score, age, pre-hospital activity, admission hemoglobin and hematocrit, and time from injury to admission. The regression equation that was statistically significant contained SPMSQ score, age and pre-hospital activity. Overall the prediction of the model was 54% accurate when the confusion was divided into 3 categories (no confusion, mild confusion, or moderate/severe confusion). When a two-category system was used (no confusion vs. some confusion), the accuracy increased to 65.5%. The validity testing for the model included: 1) a comparison between the main sample with no history of mental impairment and the group that had a questionable history of mental impairment (n = 24), 2) a comparison

between the model's prediction of confusion for the validation sample (n = 43) and the clinicians' prediction of confusion based on admission histories, and 3) a determination of agreement between the predictions of the model and those of the clinicians. When the three-category model was used, the nurses were 13% better than chance, the physicians were 11% better, and the model was 10% better than chance. When the two-category model was used, the nurses were 38% better than chance, physicians 23% better, and the statistical model was 12% better.

The authors stated that increased age, low level of pre-morbid physical activity and increased errors on the admission mental status exam were core predictors of the development of confusion. "Errors on the test may indicate existing but previously undetected mental impairment or the stress of trauma and hospital admission" (Williams et al., 1985, p. 39).

The strengths of the study were the use of three groups and the size of the sample. Using patients from four different sites added to the external validity and ability to generalize the findings. The primary limitation of the study was that prediction models only bring out the recurrent major risk factors. The infrequently appearing factors are momentous to the individual patients, but did not show up in the study. The models were better at

distinguishing between confusion and no confusion than between levels of confusion. In the initial assessment of the patients, no mention was made of a family assessment of pre-morbid cognitive behaviors.

Francis, Martin, and Kapoor (1990) undertook a prospective study to determine etiologies, risk factors, and common manifestations of delirium. The convenience sample of 229 elderly patients was obtained from consecutive admissions to the general medical service of a university teaching hospital. All patients were 70 years or older and admitted directly from the community. Nursing home patients were excluded. The patients were evaluated within 48 hours of admission. The tools used for evaluation were the MMSE, an assessment of activities of daily living (ADL), and the Blessed's Dementia Rating Scale. Follow-up interviews were done at 48 hour intervals including a chart review and the MMSE. The DSM-III-R definition of delirium was used. The control group (n = 176) consisted of the patients who did not show any signs of delirium during hospitalization. The delirium group (n = 50) showed signs of delirium at some time during the hospitalization. The risk factors identified by the study were dependence in ADL, higher rates of chronic cognitive impairment, urgent or emergent admission, more severe illness, and a higher number of active medical diagnoses.

The risk factors were evaluated by comparing baseline (admission) clinical variables between delirious and nondelirious patients.

The mean age of the patients was 78 years, with women constituting 63% of the entire study sample. Whites made up 78% of the population and 83% were admitted emergently or urgently. An average of 3.5 diagnoses were made per patient. The delirious patients had greater impairment in ADL (46% vs. 24%, $p < .05$) and higher rates of chronic cognitive impairment (26% vs. 7%, $p < .05$), when compared to the non-delirious patients. They were more likely to have been admitted emergently or urgently (96% vs 79%, $p < .05$) and had more active medical diagnoses (3.9 vs. 3.4, $p < .05$). Patients with three or more risk factors or potential etiologies had a 60% rate of delirium. Delirious patients stayed 12.1 days in the hospital versus 7.1 days for nondelirious patients.

The interviewers used the family and/or primary caregivers to assess the patient using a standardized interview that included estimating the duration of cognitive decline and completing Blessed's Dementia Rating Scale. They concluded that dementia was a strong predictor of delirium with 50% of demented patients manifesting delirium.

The strengths of the study included evaluations of

comorbidity as well as interviews over time, the large sample size, and the consistency of the interviewers. The limitations included use of one site for data collection and the lack of cognitive evaluation earlier in hospitalization.

Rogers et al. (1989) studied orthopedic surgical patients to determine the risk factors associated with post-operative delirium. The sample (n = 46) was a convenience sample of patients 60 years and older who were scheduled for elective hip or knee joint replacement. The admission cognitive assessment was done using the following tools: the Mood Adjective Checklist (MACL), the Zung Depression Scale, Speilberger's Anxiety Inventory Scale, and the Health Assessment Questionaire (HAQ). The variables selected for stepwise logistic regression analyses were use of scopolamine, propanalol, and/or flurazepam; morphine sulfate equivalents on post-operative days one through four of greater than 20 mg/day; diagnosis of rheumatoid arthritis or osteoarthritis; auditory attention scores over days 2, 3, and 4; age; hip vs. knee joint; depression on admission; spinal vs. general anesthesia; and sex.

Of the 46 patients, thirteen (28%) were diagnosed as possibly (n = 8) or definitely (n = 5) delirious. All episodes were mild and were not diagnosed by the clinical

practitioners, but only by the study team. Use of scopolamine, propanolol, and/or flurazapam was strongly associated with delirium (Fisher's Exact Test, $p < .002$). Of the ten persons who took one or more of these drugs, seven (70%) were delirious; of the 36 persons who used none of these drugs, six (17%) were delirious. When the nine variables were considered jointly, using stepwise logistic multiple regression, the strongest predictor of delirium was exposure to propanolol, scopolamine, and/or flurazepam before, during or after surgery.

The conclusions of the authors included a warning regarding use of anticholinergic drugs in elderly patients. Another caution was the early recognition and treatment of delirium, since they found a lack of improvement in function at six months in the delirious patients. This study lacked a family assessment of pre-hospital behavior in the admission cognitive assessment. The information could have been helpful in predicting the delirium.

The strengths of the Rogers et al. (1989) study included a comprehensive neuropsychiatric evaluation prior to surgery, a consistent schedule for follow-up after surgery, and a six month follow-up at home. The limitations of the study included the uniformly high level of function of all patients pre-operatively and the homogeneous nature of the group which makes the results

difficult to generalize.

Gustafson et al. (1988) studied elderly hip fracture patients. The descriptive study was designed to estimate the risk factors of delirium or acute confusion state (ACS). The convenience sample (n = 111) of consecutive patients was admitted for surgery for a femoral neck fracture. The patients were 65 years or older with a mean age of 79.3 years. Sixty-one percent (n = 68) of the patients were acutely confused on admission or developed delirium during their stay. The tools used in the study were a modified Organic Brain Syndrome (OBS) Scale and the DSM-III criteria for dementia and delirium. Thirty-three percent (n = 37) had developed delirium before surgery, and another 28% (n = 31) developed delirium postoperatively. Forty percent (n = 44) had delirium or confusional episodes for more than one week. The delirium was evenly distributed between men and women.

Spearman's correlation coefficient, X^2 test, and Student's t-test were used for the general description of the data. Variables showing statistically significant differences in the X^2 and t-tests were included in the multiple linear regression analysis for predictors of delirium. The best predictors (F = 7.23; R^2 = 0.29) for delirium were old age (p = .0014) and dementia (p = .0465). Other variables included in the model that approached

statistical significance were regular use of drugs with anticholinergic effect (p = .0851), depression (p = .0909) and previous stroke (p = .1139). The authors concluded that identifying the risk factors and mechanisms of delirium were important. Old age and dementia were noted in this study, as in earlier studies, to contribute significantly to delirium. In reporting the data collection methods, the authors briefly mentioned interviewing relatives or caregivers, if necessary. Neither a specific tool nor the specific data retrieved from the family were mentioned.

The strengths of the study included a 90-95% interrater agreement on the OBS Scale ratings, the medium size of the sample (n = 111), and the multiple assessments of the patients during the hospital stay. The primary limitation of the study was the high proportion of patients on anticholinergic drugs which would decrease the ability to generalize the findings.

Further work by Gustafson, Brannstrom, Berggren, et al. (1991) gave more insight into predictors for delirium. The intervention study was undertaken to investigate a geriatric-anesthesia intervention to reduce delirium in geriatric surgical patients. The intervention included early surgery, pre-operative assessment and thrombosis prophylaxis, oxygen therapy based on pre-operative arterial

blood gases, spinal anesthetic rather than general anesthetic and increased number of indepth assessments, post-operatively. In the convenience sample of 103 consecutive patients, each was admitted for a fractured femur neck. The patients were over 65. The patients were tested immediately after admission, observed daily and retested on days 1, 3, and 7 after surgery. The tool used was the modified Organic Brain Syndrome Scale (OBS). Delirium was defined using the DSM-III criteria. The control group was the sample from the previous study (Gustafson et al., 1988).

The results of the intervention study included a decreased incidence of delirium compared to the control group (47.6% vs. 61.3%, $p < .05$), a decreased number of patients with severe delirium disruptive to nursing care (6.8% vs 29.7%, $p < .0001$) and a decreased percentage of patients who were lucid on admission but confused for more than 7 days (9.1% vs. 28.1%, $p < .01$). The two groups were comparable in background variables (mean age 79.5 vs. 79.3; 28 men, 75 women vs. 28 men, 83 women). The variables that were significantly different at the $p < .05$ were age, sex, dementia, depression, cerebrovascular disease, cardiovascular disease, and drugs with anticholinergic effect. These variables were included in the logistic regression model.

Gustafson et al. (1988) supported that the best predictors for confusion were old age and dementia. Regular use of drugs with anticholinergic effect, depression and previous stroke were also associated with the development of delirium. In the intervention study (Gustafson, Brannstrom, Berggren et al., 1991), the best predictors of delirium were dementia (X^2 = 10.65, p = .0001) and male gender (X^2 = 8.85, p = .0003). Depression (X^2 = 2.34, p = .13), cardiovascular disease (X^2 = 1.88, p = .17), and age (X^2 = 1.17, p = .28) were also associated with delirium, though none reached statistical significance.

Both Gustafson et al. (1988) and Gustafson, Brannstrom, Berggren et al. (1991) showed that dementia, age and, perhaps, depression were factors that should be further investigated. Neither of the studies used a formal family assessment of pre-morbid cognitive behaviors, though the investigators briefly mentioned in the data collection section that medical and social data were obtained from the patients, their families and caregivers and the medical records. Neither the specific data collected nor the tool were mentioned.

The strengths of the study were the use of the previous study as a control for the intervention study, the sample size, use of the same investigators, and multiple

interviews with the patients. The limitations included the lack of randomization, changes made in the anesthesia protocol on the basis of information from the former study, and the use of one site for data collection.

In summary, the risk factors that recurred in the studies reviewed were depression (Foreman, 1989; Gustafson et al., 1988; Gustafson, Brannstrom, Berggren et al., 1991), old age (Gustafson et al., 1988; Gustafson, Brannstrom, Berggren et al., 1991; Williams et al., 1985), dementia (Francis et al., 1990; Gustafson et al., 1988; Gustafson, Brannstrom, Berggren et al., 1991; Williams et al., 1985), urgent admission (Bowman, 1992; Francis et al., 1990), dependence in activities of daily living (Francis et al., 1990; Williams et al., 1985) and use of anticholinergic drugs (Gustafson et al., 1988; Rogers et al., 1989). These studies indicated that delirium was a medical problem for the hospitalized elderly. Delirium could be caused by the incident that initiated hospitalization or by the hospitalization. An assessment that would identify the presence of risk factors for the development of delirium, could be the first step in prevention or early detection of delirium in hospitalized hip fracture patients.

A family assessment tool that focused on pre-hospital behaviors that from the literature may be indicative of

potential problems should include higher-order cognitive function, memory, depression, and dementia. This study was undertaken to test the predictive ability of selected scales of the Cognitive Behavior Rating Scales (CBRS) in elderly hip fracture patients. The particular areas of focus were higher-order cognitive function, memory, dementia, and depression since these were identified from other studies as possible predictors of delirium.

Conceptual Framework

The conceptual framework used to explore the phenomenon of delirium in the patient with a hip fracture in this study was Levine's Conservation Model (Levine, 1991). Levine developed a nursing framework that can be applied to the patient in the acute care setting. The goal in using the Conservation Principles to direct care is to maintain the unity and integrity of the person in an altered state of health. The model assumes that nurses and the patient work together with the patient in a dependent role. The hip fracture patient is in an altered state of health. The principles of the model will be explained in the following section. For each, a specific example will be given that relates the model to hip fracture patients.

Levine (1967) developed the model from the basic assumption that "conservation means `keeping together'" (p. 46). She states that nursing interventions must maintain a

proper balance between patient participation and safe limits. Balance is achieved when present needs are weighed against long term outcomes (Levine, 1967).

The conservation principles are based on "the unity and integrity of the individual" (Levine, 1967, p. 46). Levine further describes the principles as patterns of adaptation which the nurse learns to identify in each patient. By learning to understand and respond to the individual patterns, the nurse is able to organize patient-centered care (Levine, 1967).

Levine's four conservation principles are: the conservation of energy, the conservation of structural integrity, the conservation of personal integrity, and the conservation of social integrity. The principles provide a framework for the generation of specific nursing actions based on scientific theory (Levine, 1967).

Explaining the principle of conservation of energy, Levine (1991) states that while energy cannot be directly observed, the consequences of its exchange can be predicted, managed, and quantified. The sources of energy for the individual are finite, and therefore must be spent carefully. When caring for an elderly hip fracture patient, the nurse must be sensitive to the energy expense of each activity. Hirschfeld (1976) states that the nurse "acts as `banker' for the proper balancing of the patient's

energy accounts" (p. 1981). The conservation of energy is accomplished by giving attention to oxygenation, nutrition, fluid and electrolyte balance, as well as the impact of medications. Taylor (1989) states that nursing care must be designed to conserve and mobilize the patient's energy resources. The energy resources will meet the basic physiologic needs first, then healing needs, and eventually they will accumulate a reserve to regain personal and social integrity (Taylor, 1989). When dealing with a hospitalized elder with a hip-fracture, any excessive fatigue may lead to a decrease in cognitive function and/or delirium. The balance of rest, stress, nutrition, pain relief, proper medication and sleep must be achieved to avoid delirium. Constant reorientation and familiar objects from home may assist in maintaining cognitive function (Campbell, Williams, & Mlynarczyk, 1986).

"The conservation of structural integrity is concerned with the process of healing" (Levine, 1989, p. 332). When the body is injured, the acute inflammatory response with its intense activity is designed to localize and limit the effects of the injury. The healing process is the defense of wholeness. Conservation of structural integrity is defined by Levine as maintaining or restoring the structure of the body. Structural integrity is restored when the injured area is reintegrated into normal function (Levine,

1991). Restoring structural integrity for the hip fracture patient includes surgery, physical therapy, and pain management (Williams et al., 1985).

The conservation of personal integrity focuses on maintaining or restoring the patient's sense of identity, self-worth and autonomy (Levine, 1989, 1991). Each person as he/she matures assumes responsibility for his/her own decisions. Self-identity and self-respect are the foundations of a sense of personal integrity. Hospitalization for a hip fracture may compound and exaggerate the threat to personal integrity. The patient is thrust into a strange environment where there are no normal cues of daily living. People wander in and out of the room 24 hours a day. The patient is immobilized and in pain. Nursing care that respects the patient's space needs, privacy and participation in decision-making fosters the conservation of personal integrity. An elder with potential for delirium is particularly at risk for loss of personal integrity. The patient with no cognitive disturbance can maintain some autonomy regarding his/her care. The patient in a delirious state loses the ability to be autonomous, and becomes completely dependent (Bowman, 1992). Delirium can have long range as well as immediate effects on the patent's self-integrity and self-esteem. After an episode of delirium, the patient cannot remember

what took place. Therefore, the patient may experience anxiety and loss of self-esteem when told of his/her behavior during the delirious episode.

The final principle is the conservation of social integrity. Levine (1988, 1991) describes social integrity as the identity defined by one's family, community, cultural heritage, religious belief, and educational background or vocational choice. The individual's perception of wholeness is measured against relationships with others. Interactions with others are more important in times of stress. Social needs include allowing patients to interact with each other, as well as permitting family and friends access to the patient. The importance of familiar faces during the hospitalization has been documented (Campbell et al., 1986). The patient is more easily oriented when family/significant others are a part of the scene. Nursing care of the elderly hip fracture patient which does not consider the family, friends and community fails to consider the person as a whole.

Delirium within Levine's framework is defined as a multivariate, multidimensional phenomenon that occurs as a result of an actual or perceived alteration in the environment (Foreman, 1991). With this environmental alteration, conservation of energy fails. An adaptive process (in this case, delirium) then results which fails

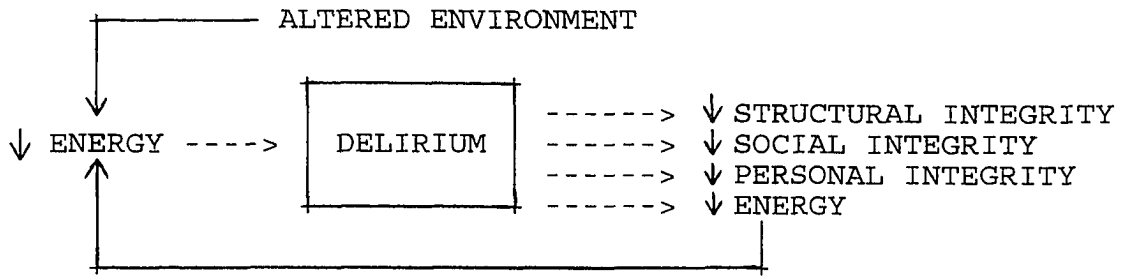

Figure 1. Conceptualization of delirium cycle using Levine's framework.

to maintain the integrity of the individual (Figure 1). The delirium further impacts the conservation of energy and conservation of structural integrity. Energy conservation is threatened due to high energy expenditures. Energy is wasted in the restlessness of the hyper-alert state and can be further depleted by sleep deprivation due to sleep-wake cycle disturbances. With energy being spent on hyperactivity and hallucinations, the energy left for cognitive tasks is minimized. Structural integrity is altered because delirium can change the internal environment so that healing does not occur. The internal changes can also decrease the normal neuronal function. The hip fracture patient may climb out of bed, pull out catheters, intravenous lines, or feeding tubes which further threatens structural integrity. Therapy is not as effective due to the patient's inability to participate which also threatens structural integrity.

Personal integrity and social integrity are also

affected. Personal integrity is compromised by loss of autonomy due to loss of self-identity. Retrieval of personal information and attention span for activities of daily living and rehabilitation work are altered. Social integrity is impaired by the inability to recognize friends and family. Conversations during a delirious episode are rarely meaningful. Utilizing Levine's Conservation Principles, one can evaluate the effects of cognitive dysfunction and focus the interventions toward maintaining wholeness and conserving integrity.

Levine's Model has been used in the past to study delirium in the hospitalized elderly patient (Foreman, 1989). Foreman used the Levine Conservation Principles to organize multiple variables in his study of confusional states. Conservation of energy included vital signs (temperature, heart rate, mean arterial pressure), serum albumin, glucose, creatinine, pH and leukocytes. Structural integrity conservation included serum sodium, potassium, calcium, blood urea nitrogen, hemoglobin and pO_2. Contained in the conservation of personal integrity were visual status, auditory status, medications, and orienting objects. Conservation of social integrity contained the presence of significant others and the nurse perception of confusion.

Multivariate analysis of variance (MANOVA) was used to

analyze the differences between confused and not confused subjects with respect to the variables. The overall MANOVA was significant (multivariate $F = 37.88$, $d.f. = 14.48$, $p < .0001$). The discriminant equation used to verify classification of confused versus not confused patients included lab results, blood pressure, nurse ratings of confusion, medications, orienting objects and interaction with significant others. The equation was significant ($X^2 = 137.61$, $d.f. = 13$, $p < .0001$). The findings indicated a 93% accuracy for correctly classifying patients as either confused or not confused.

Predicting the patients at high risk for delirium would allow for a focus of efforts on prevention of or at least early detection of delirium. By focusing on the preservation of wholeness, the nurse can support the elderly hip fracture patient to recuperate to the highest level of function. Implementation of the conservation principles facilitates the use of nursing interventions which would decrease the occurrence and/or the effects of delirium. Delirium is not the normal consequence of aging. Maintenance of normal cognitive function is paramount in attaining and maintaining the integrity and unity of the individual.

Definition of terms

Delirium within Levine's framework is defined as a

multivariant, multidimensional phenomenon that occurs as a result of an actual or perceived alteration in the environment (Foreman, 1991). The adaptive process is not effective and the integrity of the individual is not maintained (Levine, 1989). The ineffective adaptive process, delirium, is manifested by simultaneous disturbances in attention, thinking, consciousness, memory, perception, the sleep-wake cycle, psychomotor behavior, and orientation (American Psychiatric Association, 1987).

An elderly hip fracture patient is a person over 60 years with an alteration in structural integrity diagnosed as a fracture of the femoral head that causes hospitalization with or without surgical intervention.

The family assessment is the assessment done by a family member or care giver of the pre-morbid cognitive behaviors of the patient. The areas of focus used for the study were behaviors and signs related to higher cognitive function, memory, dementia and depression.

Hypotheses

The hypotheses proposed for this study were:
a) there is a relationship between pre-morbid behaviors consistent with dementia and the development of delirium.
b) there is a relationship between pre-morbid behaviors consistent with depression and the development of delirium;
c) there is a relationship between pre-morbid behaviors

consistent with impaired higher cognitive function and the development of delirium;

d) there is a relationship between pre-morbid behaviors consistent with impaired memory and the development of delirium.

CHAPTER THREE

METHODOLOGY

The research design for this study was descriptive and correlational. The purpose of the study was to examine the relationships of pre-hospital behavior of elderly hip-fracture patients to the development of in-hospital delirium. The analysis was done using data collected in a study to identify the incidence of delirium in elderly hip-fracture patients.

Sample

Subjects were patients admitted to a metropolitan teaching hospital during February through August 1993 who met the study criteria. These criteria were 1) initial diagnosis of an acute hip fracture, 2) an age of 60 years or greater, 3) ability to speak and understand English and 4) a willingness to participate in the study. Ineligible patients were 1) those who sustained a fracture during hospitalization, 2) multiple trauma patients with hip fracture, and 3) patients admitted to any nursing units except orthopedics. Forty-one subjects met the criteria and had complete family assessments of pre-morbid cognitive behavior.

The majority of patients functioned physically at a

high level. Sixty-eight percent (n = 28) stated they cared for themselves. Fifty-eight percent (n = 24) were admitted from a home or apartment. Medical diagnoses ranged from one comorbid condition to several with multiple systems involved. Age ranged from 62 to 94 years.

Instruments

The instruments used in the study were the Cognitive Behavior Rating Scale (CBRS) and the Confusion Assessment Method (CAM).

Cognitive Behavior Rating Scale. The instrument used for the family assessment was the Cognitive Behavior Rating Scales (CBRS) (Williams, 1987). The instrument assesses the subject's cognitive status as experienced by an appropriate significant other. The CBRS consists of 9 scales assessing 1) depression (24 items), 2) dementia (26 items), 3) apraxia (5 items), 4) disorientation (5 items), 5) agitation (6 items), 6) need for routine (7 items), 7) language deficits (10 items), 8) memory disorder (21 items), and 9) higher cognitive deficits (12 items). It is administered directly to a family member or someone knowledgeable about the subject's behavior. On the first 104 items, a Likert-type scale is used. The scale is as follows: Not at all like this person = 1; a little bit like this person = 2; moderately like this person = 3; quite a bit like this person = 4; very much like this

person = 5. The Likert-type scale used for the last 12 items asks if the person's ability in the area is: very low = 5; low = 4; average = 3; high = 2; very high = 1. The scoring is done by adding the scores of the items on each scale. The literature review suggested the use of the scales for depression, dementia, higher cognitive deficits and memory disorder.

According to Williams (1987), test-retest reliabilities for the scales range from .61 to .94. Alpha, as a measure of internal consistency, ranged from .78 to .92. The published coefficient alpha for the scales used in this study were: Higher Cognitive Deficits Scale (HCD), .84; Memory Disorder Scale (MD), .92; Depression Scale (DEP), .87; and the Dementia Scale (DEM), .85. According to the author, the CBRS consistently classified individuals into normal or demented classifications.

The higher cognitive deficits (HCD) scale centers on activities such as memory, language, abstract reasoning, and motor execution. Sample items from the scale include: "1) Has difficulty starting actions, 2) Has difficulty managing money, 3) Cannot sort out important from unimportant events" (Williams, 1987). The items require evaluation of global activities such as driving, managing money, and social judgment. The coefficient alpha calculated for the HCD scale was .91, in this study.

The memory disorder (MD) scale assesses the consequences of the inability to store and recall information related to special functions such as recalling phone numbers, remembering the names of friends, and remembering to turn off household appliances. Sample items include: "1) Gets lost in familiar places, 2) Loses the train of thought in conversation, and 3) Has difficulty remembering the names of friends" (Williams, 1987). The sample in this study was too homogeneous to accurately assess reliability for this scale. The coefficient alpha for the MD scale would not be greater than the .97 calculated on the present data. This is an upper level estimate due to the homogeneous sample.

The depression (DEP) scale allows evaluation of the degree to which depression contributes to the pattern of impairment. Some sample items are: "1) Is more alert in the morning, 2) Is losing weight, 3) Says other people would be better off if he or she were dead" (Williams, 1987). The focus is on depressive symptoms such as depressed mood, psychomotor retardation, and decreased motivation. The sample size in this study was too homogeneous on this dimension to accurately assess reliability for this scale. The coefficient alpha for the DEP scale would not be greater than the .93 calculated on the present data. This is an upper level estimate due to

the small sample size.

The dementia (DEM) scale queries areas such as night time wandering, suspiciousness, deterioration of personal habits, incontinence, loss of interest in hobbies, and decline in activities of daily living. Items from the dementia scale include: "1) Has tremors in arms or legs, 2) Accuses others of taking things, and 3) Sleeps in clothes" (Williams, 1987). The sample in this study was too homogeneous to accurately assess reliability for this scale. The coefficient alpha for the DEM scale would not be greater than the .93 calculated on the present data. This is an upper level estimate due to the homogeneous sample.

Confusion Assessment Method. The DSM-III criteria gave a more consistent base for the clinical diagnosis of delirium to determine its incidence and prevalence in the hospitalized patient than any earlier criteria (Johnson et al., 1990). The CAM used the Diagnostic and Statistical Manual of the American Psychiatric Association Revised (DSM-III-R) updated criteria, as a basis for the diagnosis of delirium (Inouye, vanDyck et al., 1990).

The CAM can be completed in approximately 5 minutes and consists of nine operationalized criteria from the DSM-III-R. Four of the nine criteria are used to determine the presence of delirium. These are: 1) acute onset and

fluctuating course; 2) inattention; 3) disorganized thinking, and 4) altered level of consciousness (Inouye, vanDyke et al., 1990). The CAM algorithm for diagnosis of delirium requires the presence of both the first and second criteria and either the third or fourth criterion.

The CAM uses the DSM-III-R criteria for delirium to systematically assess individuals and, therefore, has high face validity. The instrument demonstrated excellent inter-observer reliability with 100% agreement on diagnosis for 19 paired assessments and with agreement on the nine items at 88% or better (Inouye et al., 1990). The instrument was sensitive and specific. Comparisons with other assessments of mental status range from moderate to excellent. The kappa coefficient for the convergence with the Mini-Mental State Examination (MMSE) was .64 and for the Visual Analog Scale for Confusion was .82 (Inouye et al., 1990). The CAM was developed specifically for the nonpsychiatrically trained clinician to identify delirium quickly and accurately in both the clinical and research settings. Reliability and validity of the CAM were not reassessed in this study.

Procedures

In this study, patients were admitted to the emergency room where an information/consent letter (Appendix) was presented to the patient and family and refusal to

participate was honored. The initial assessment included the Cognitive Behavior Rating Scale (CBRS) and the Confusion Assessment Method (CAM). Information packets were placed in the emergency room and orthopedic unit for easy access by the nursing staff. If the study information could not be obtained or completed in the emergency room, the orthopedic staff was notified and continued to collect the data. All packets were coded for confidentiality. These packets remained with patients' charts during the hospital stay and observations were recorded each shift.

The nursing staff was oriented to the data collection procedure by use of a self-learning packet. Each nurse who desired to participate in the study read the packet of information before attending an inservice by one of the research committee members. The packet was to be a personal reference source to use during the data collection period. Several copies were available on the unit for ready reference. Assessment was done only by those nurses who had completed the self-learning module and attended the informational sessions.

At the time of inservice, committee members explained the study, answered questions, and reinforced documentation procedures for the CAM. A short video of vignettes enacting symptoms of delirium was presented to familiarize the staff with possible live situations. The video was

available on the unit for review. After the initial training, no additional practice with the instrument was implemented. Two issues resulted from this. Inter-rater reliability of the CAM was not established for this study. A second issue was that because of the length of time between training and subject recruitment, definitions of CAM items were difficult to remember. A definition list was placed inside each collection packet's front page for easy reference. Due to the large number of nurse data collectors, accurate data collection and compliance with all observations was not guaranteed.

Data were collected each shift by the primary nurse if he/she had completed the inservice process or by an assigned nurse who had completed the inservice. The staff were cautioned to record accurate observations to keep the experimenter effects to a minimum. As time continued nurses became familiar with the observed delirium symptoms and more accurate diagnosis may have been made. When changes in cognition were noted, a research committee member was notified who validated the delirious state. The physician on the research committee informed the subject's physician of the delirium.

Some data were lost when the patients transferred to another unit. A staff nurse on the receiving unit was oriented to continue collecting data. A chart audit was

completed on the five patients who were transferred prior to the orientation of the off unit nurse. The retrieved information was added to the data collection records (none of the 5 subjects became delirious).

The CAM was the tool used to determine delirium. The diagnosis was confirmed by the physician on the research committee. The results of the CAM divided the sample into two groups - delirious and non-delirious. The data from the CBRS were analyzed to determine relationships between the CBRS scores and the development of delirium.

CHAPTER FOUR

DATA ANALYSIS

The descriptive statistics and statistical tests of the hypotheses will be reported in this chapter.

Descriptive Statistics

The description of the sample by age, length of stay, sex, admission living arrangements and discharge living arrangements are included in Tables 1 and 2. The subjects are divided between the delirious (n = 5) and the non-delirious (n = 36) groups as determined by the CAM.

Table 1

Sample Characteristics According to Group Membership

Characteristic	Group	
	Delirious (n = 5)	Non-Delirious (n = 36)
	Mean (s.d.)	Mean (s.d)
Age	85 (10.2)	79.8 (8.6)
Length of Stay (in days)	8.2 (3.35)	6.9 (2.76)

Student's t-tests were completed on the two descriptors, age and length of stay. There was no statistically significant difference between the two groups. The sex, admission living arrangements, and

discharge living arrangements showed no significant relationship with delirium when analyzed using the Fisher's Exact test. Initially, the admission and discharge living arrangements data were tested as listed in Table 2, however the sample was too small for the Chi-Square. The data were then collapsed into two categories, independent and dependent living. These results were also not statistically significant.

Table 2

Other Sample Characteristics According to Group Membership

	Group	
Characteristic	Delirious (*n* = 5)	Non-Delirious (*n* = 36)
Sex	n (%)	n (%)
Male	2 (40)	3 (8.3)
Female	3 (60)	33 (91.7)
Admission Living Arrangements		
Home/Apt.	2 (40)	22 (61.1)
Assisted Living	1 (20)	8 (22.2)
Extended Care Facility	2 (40)	6 (13.9)
Other	---	1 (2.8)
Discharge Living Arrangements		
Home	---	5 (13.9)
Extended Care Facility	1 (20)	9 (25)
Rehabilitation Facility	4 (80)	22 (61.1)

Tests of the Research Hypotheses

The hypotheses proposed for this study were: a) there is a relationship between pre-morbid behaviors consistent with dementia and the development of delirium, b) there is a relationship between pre-morbid behaviors consistent with depression and the development of delirium, c) there is a relationship between pre-morbid behaviors consistent with impaired higher cognitive function and the development of delirium, d) there is a relationship between pre-morbid behaviors consistent with impaired memory and the development of delirium. The study was undertaken to determine the usefulness of the family assessment of cognitive behaviors using the CBRS in predicting delirium. Student's *t*-tests were performed on the data comparing the scores on the four scales of the CBRS (DEP, HCD, MD and DEM) of the delirious and non-delirious patients. The *t*-tests showed no significant difference between the two groups on any of the four scales (Table 3).

The first research hypothesis tested was there is a relationship between the family assessment of pre-morbid behaviors consistent with dementia as assessed on the CBRS scale and the development of delirium. The delirious group's mean raw score on the dementia scale was 36.8 and the non-delirious group's mean raw score was 37.2. The higher score indicates behaviors that are consistent with

Table 3

T-Values of Delirious and Non-delirious Groups for Tested CBRS Scales

Scale	*t* value	Degrees of Freedom	2 -tail probability
Depression	.44	39	.664
Higher Cognitive Deficits	-.22	39	.824
Memory Disorder	.77	39	.453
Dementia	.05	39	.963

dementia. The data did not support that the family assessment of behaviors consistent with pre-morbid dementia using the CBRS was predictive of delirium.

The second research hypothesis stated there is a relationship between the family assessment of pre-morbid behaviors consistent with depression as assessed by the CBRS score on the depression scale and the development of delirium. The delirious group's mean raw score was 28 and the non-delirious group's mean raw score was 32.1. The higher scores indicate assessed behaviors that are consistent with depression. The study data of behaviors consistent with depression did not support the predictive ability of the CBRS for delirium.

The third research hypothesis stated there is a relationship between the family assessment of behaviors consistent with impaired higher cognitive function as

assessed by the CBRS score on the higher cognitive deficits scale and the development of delirium. The delirious group's mean raw scores on the higher cognitive disorder scale was 24.6 and the non-delirious group's mean raw score was 23.4. The higher scores indicate behaviors consistent with higher cognitive deficits. The study data did not support using premorbid behaviors consistent with higher cognitive deficits as a predictor of delirium.

The fourth hypothesis tested stated there is a relationship between the family assessment of behaviors consistent with impaired memory as evidenced by the CBRS score on the memory disorder scale and the development of delirium. The delirious group's mean raw score on the memory disorder scale was 32.2 and the non-delirious group's mean raw score was 35.6. The higher scores are indicative of memory disorder. The data from the family assessment of behaviors consistent with impaired memory did not support prediction of delirium using the CBRS.

Correlations were performed on the four scales of the CBRS. The results indicated that the scales were all highly correlated (Table 4).

To summarize, none of the hypotheses were supported by the data. The data did not support that the family assessment tool, the CBRS, that tested the pre-morbid cognitive behaviors associated with dementia, depression,

Table 4

Correlations Between CBRS Scales

	DEP	HCD	MD	DEM
DEP	1.000	.786	.830	.853
HCD		1.000	.8395	.8699
MD			1.000	.9059
DEM				1.000

Note: Based on 41 subjects with $p = < .000$.

higher cognitive deficits and memory disorder was helpful in predicting who would become delirious during hospitalization for hip fracture.

CHAPTER 5

CONCLUSION

Discussion

Methods of predicting the patients at high risk for delirium would enable the nurse to focus efforts on prevention of, or at least early detection of, delirium. By focusing on the preservation of wholeness, the nurse can help the elderly hip fracture patient recuperate to the highest level of function. Implementation of the conservation principles facilitates the use of nursing interventions that would decrease the occurrence and/or the effects of delirium.

The data in this study were analyzed to determine if the family assessment of pre-morbid cognitive behavior could be used to predict the delirious patient. The assessment was thought to have potential to be used as a screening device to predict high risk patients. The data did not support the use of the CBRS tool to predict delirium.

Delirium within Levine's framework is defined as a multivariate, multidimensional phenomenon that occurs as a result of an actual or perceived alteration in the environment (Foreman, 1991). Delirium is an adaptive

process in response to an acute experience. There may be no way to predict it since by DSM-III-R (1987) definition, delirium is an acute and fluctuating disorder of attention and cognition. The mechanism of delirium is not completely understood. Increased knowledge of the physiology may lead to better understanding of the phenomenon.

Delirium is manifested by restlessness, hyperactivity, hypoactivity, and/or perceptual disturbances such as auditory and visual hallucinations. The symptoms develop rapidly over a period of an hour to days, and tend to fluctuate diurnally. These manifestations alter the conservation state. As stated earlier, the energy being spent on hyperactivity and hallucinations, depletes energy needed for cognitive tasks, healing, and rehabilitation. Maintenance of normal cognitive function is paramount in attaining and maintaining the integrity and unity of the individual.

Perhaps, "who is at high risk to become delirious?" is not the right question to ask. The question should be "how is delirium diagnosed earlier?" so as to minimize complications and decrease the length of hospital stays. The family assessment of cognitive behaviors may be more useful to identify existing cognitive dysfunction that may be disruptive during hospitalization.

Limitations

Assessment. Staff nurses who routinely work with elderly hip-fracture patients thought the incidence of delirium was higher. The consistency and frequency of assessments could have acted as an intervention which decreased the incidence of delirium. Consistently reorienting patients every shift could have been sufficient intervention to decrease the incidence of delirium. The change in practice due to the study, assisted the staff in recognizing delirium. Their ability to objectively assess delirium using the CAM increased the validity of the assessments over time.

Instrument. The Cognitive Behavior Rating Scales which were done by the family, may not have been accurate. The family member or caregiver may not have been aware of how to assess the items in the scales. The behaviors can be difficult to assess because they are worded similarly. For instance, on the depression scale, a behavior to assess is "has crying spells." On the dementia scale a behavior is "his or her mood changes quickly." The family member could mark both as "very much like this person," even if the person only has crying spells. The family member could perceive the crying as a mood change. Other examples are: "cannot sort out important from unimportant events" from the higher cognitive deficits scale and "details of recent

and remote memories are missing" from the memory disorder scale; "has a short attention span" from the dementia scale and "does not return objects to their usual places" on the memory disorder scale; and "is losing weight" from the depression scale and "forgets meals" from the memory disorder scale. Each of the examples could be perceived by the family as "very like this person," even if only one is true, because of the potential ambiguity of the statements.

The tool measures behavior, not actual cognitive function. The family does not know for certain what the cognitive function of the loved one is, only the behaviors. The scales tested similar behaviors as indicated by the high correlations between the scales (Table 4). The CBRS could be useful to identify cognitive dysfunction, but may not be useful for predicting delirium.

Using the family assessment could be a limitation due to the stress the family member was feeling at the time. Answering the questions immediately after finding out that the loved one has fractured a hip could have been too stressful.

Sample. Another limitation to the study was the size of the sample (n = 41), especially the small delirious group (n = 5). A study with a larger sample could possibly show some statistical significance. The homogeneity of the sample was also considered a limitation. They were

homogeneous on cognitive function for the most part. The patients in the sample were also all hip-fracture patients and one site was used for data collection. These factors decrease the ability to generalize the findings.

Data collection procedures. A limitation of the study related to the data collection was the use of several different staff members to assess the patients. It is possible that the assessments were not consistent. To assist with consistency, a list of terms with definitions was inserted into the work folders. At the beginning of the study, there was a significant length of time between the education and the first patients being entered into the study. The time lapse could have decreased the initial consistency of the evaluations.

Implications for Nursing Practice

Evans, Kenny, and Rizzuto (1993) state that pre-operative mental status assessment of elderly patients is imperative to be able to differentiate delirium from dementia in the post-operative period. They advocate assessing more than just orientation to time, place, and person. The examination should have items that identify disorders of attention, disorganized thinking, and impairments in memory.

The CAM or Mini Mental State Exam (MMSE) (Folstein, Folstein, & McHugh, 1975) are two tools that measure the

areas mentioned. Both tools are easy to use and provide objective data on the cognitive status of the patient. The tools should be part of the nursing assessment at least every shift. A flow sheet could be utilized to track changes to facilitate early identification of delirium.

Using the family as a source of data is valuable; however, this input might be better obtained by other methods, such as family interviews that could be tailored to the particular situation. The family as partners with the patient and health care team could also be valuable. Exploring the partnership concept could have significant impact on home and community care.

Recommendations for Further Study

Further studies should have a larger sample size with a more heterogeneous population. Studying diverse medical and surgical patient groups could also prove beneficial. Other considerations for further investigation are the use of other scales in the CBRS, and the use of fewer interviewers and potentially more accurate assessments of the patients.

Summary

The elderly are the fastest growing segment of our society. It is this age group that accounts for 39% of the total acute hospital day bed census (Dubin, 1992). By the year 2000, the elderly are expected to occupy 50% of all

hospital beds (Hague & Moody, 1993). Because they will be the focus of care, more needs to be learned about how hospitalization and surgery impact the elderly so as to prevent delirium.

Patients who develop delirium can have more complications than their non-delirious cohorts (Berggren et al., 1987; Gustafson et al., 1988). Prevention or early detection and treatment of delirium is vital (Rasin, 1990; Sullivan et al., 1991). If treated early, the delirium has less chance of affecting the patient's quality of life.

Family members or significant others familiar with the patient's normal day-to-day behaviors are a rich source of assessment data. Identification and examination of the relationships between pre-morbid cognitive behaviors and the development of delirium could prove valuable. The CBRS is not the only tool that assesses cognitive behavior. Any systematic method of assessing the pre-morbid cognitive behavior of the patient would be helpful.

Nurses can play a significant role in identifying early delirium. They need to be able to readily identify the behaviors indicative of delirium. Additional exploration of delirium will result in a greater knowledge regarding the phenomenon and enable nurses to contribute to prevention or early diagnosis of this serious health problem.

APPENDIX

APPENDIX

Subject Information Letter

Dear Patient and Family:

The staff of 7 North are monitoring adjustment to hospitalization of elderly patients with hip fractures and examining ways to improve care for these injuries. All persons who are 60 years old or older and who are admitted to our unit with hip fractures will benefit from this approach to their care.

You will be helping the staff to identify early problems so that they can be treated appropriately. The benefit to you is that your hospitalization will be monitored by staff more closely. The staff will obtain information from you, your family and medical records. This information includes your age, sex, marital status, prescription drug history, and any previous history of depression.

As is routine with the Medical Record, every effort will be made to maintain your confidentiality. All collection data forms will be coded with a number and your name will never appear. All results and articles will be done in a group format. No individual data will be presented.

The initial assessment will begin in the Emergency Care Center or upon your arrival to the orthopaedic unit. Reassessments will be made every eight hours until time of discharge. An appropriate family member or someone knowledgeable about your behavior will also be asked to participate.

If you or your family have any questions or concerns, please feel free to ask your nurse.

Sincerely,

[redacted]

Ron Duemler, M.D.
Director of the Office of Clinical Investigation
774-6748

RSD/ec
OCIltr

LIST OF REFERENCES

LIST OF REFERENCES

Adams, F. (1988). Emergency intravenous sedation of the delirious, medically ill patient. Journal of Clinical Psychiatry, 49 (Suppl), 22-26.

American Psychiatric Association. (1987). Diagnostic and Statistical Manual of Mental Disorders, 3rd Edition, revised. Washington, D.C.: American Psychiatric Assoc.

Berggren, D., Gustafson, Y., Eriksson, B., Bucht, G., Hansson, L., Reitz, S. & Winblad, B. (1987). Postoperative confusion after anesthesia in elderly patients with femoral neck fractures. Anesthesia Analogs, 66, 497-504.

Bowman, A. M. (1992). The relationship of anxiety to development of postoperative delirium. Journal of Gerontological Nursing, 18, 24-30.

Brannstrom, B., Gustafson, Y. Norberg, A., & Winblad, B. (1989). Problems of basic nursing care in acutely confused and non-confused hip fracture patients. Scandinavian Journal of Caring Science, 3, 27-34.

Campbell, E. B., Williams, M. A., & Mlynarczyk, S. M. (1986, February). After the fall - Confusion. American Journal of Nursing, 151-154.

Crippen, D., & Ermakov, S., (1992). Stress, agitation, and brain failure in critical care medicine. Critical Care Nursing Quarterly, 15, 52-74.

Dubin, S. (1992). The physiologic changes of aging. Orthopaedic Nursing, 11(3), 45-50.

Evans, C. A., Kenny, P. J., & Rizzuto, C. (1993). Caring for the confused geriatric surgical patient. Geriatric Nursing, 14, 237-241.

Folstein, M. F., Folstein, S. E., & McHugh, P. R. (1975). "Mini-mental state": A practical method for grading the cognitive state of patients for the clinician. Journal of Psychiatric Residency, 12, 189-198.

Foreman, M. D. (1989). Confusion in the hospitalized elderly: Incidence, onset, and associated factors. Research in Nursing and Health, 12, 21-29.

Foreman, M. D. (1991). Conserving cognitive integrity of the hospitalized elderly. In K. M. Schaefer, J.B. Pond, M. E. Levine, & J. Fawcett (Eds.), Levine's Conservation Model. Philadelphia: F. A. Davis.

Francis, J. (1992). Delirium in older patients. JAGS, 40, 829-838.

Francis, J., Martin, D., & Kapoor, W. N. (1990). A prospective study of delirium in hospitalized elderly. Journal of the American Medical Association, 263, 1097-1101.

Gustafson, Y., Berggren, D., Brannstrom, B., Bucht, G., Norberg, A., Hansson, L-I., Winblad, B. (1988). Acute confusional states in elderly patients treated for femoral neck fracture. Journal of the American Gerontological Society, 36, 525-530.

Gustafson, Y., Brannstrom, B., Berggren, D., Ragnarsson, J. I., Sigaard, J., Bucht, G., Reiz, S., Norberg, A., & Winblad, B. (1991). A geriatric-anesthesia program to reduce acute confusional states in elderly patients treated for femoral neck fractures. Journal of the American Gerontological Society, 39, 655-662.

Gustafson, Y., Brannstrom, B., Norberg, A., Bucht, G., & Winblad, B. (1991). Underdiagnosis and poor documentation of acute confusional states in elderly hip fracture patients. Journal of the American Gerontological Society, 39, 760-765.

Hague, S. B. & Moody, L. E. (1993). A study of the public's knowledge regarding advance directives. Nursing Economic$, 11, 303-307.

Hirschfeld, M. J. (1976, December). The cognitively impaired older adult. American Journal of Nursing, 1981-1984.

Inouye, S. K., van Dyke, C. H., Alesse, C. A., Balkin, S., Siegal, A. P., & Horwitz, R. I. (1990). Clarifying confusion: The confusion assessment method. A new method for detection of delirium. Annals of Internal Medicine, 113, 941-948.

Inouye, S. K., Viscoli, C. M., Horwitz, R. I., Hurst, L. D., & Tinetti, M. E. (1993). A predictive model for delirium in hospitalized elderly medical patients based on admission characteristics. Annals of Internal Medicine, 119, 474-481.

Johnson, J. C., Gottlieb, G. L., Sullivan, E., Wanich, C., Kinosian, B., Forciea, M. A., Sims, R., & Hogue, C. (1990). Using DSM-III criteria to diagnose delirium in elderly general medical patients. Journal of Gerontology, Medical Sciences, 45, M113-M119.

Levine, M. E. (1991). The conservation principles: A model for health. In K.M. Schaefer & J.B. Pond (Eds.), Levine's Conservation Model: A Framework for Nursing Practice. (pp. 1-12). Philadelphia: F.A. Davis Co.

Levine, M. E. (1989). The conservation principles of nursing: Twenty years later. In J. Riehl-Sisca (Ed.), Conceptual Models for Nursing Practice (3rd ed.) (pp. 325-337). Norwalk, CN: Appleton & Lange.

Levine, M. E. (1967). The four conservation principles of nursing. Nursing Forum, 6, 45-60.

Lipowski, Z. J. (1987). Delirium (Acute confusional states). Journal of the American Medical Association, 258, 1789-1792.

Rasin, J. H. (1990). Confusion. Nursing Clinics of North America, 25, 909-918.

Rogers, M. P., Liang, M. H., Daltroy, L. H., Eaton, H., Peteet, J., Wright, E., & Albert, M. (1989). Delirium after elective orthopedic surgery: Risk factors and natural history. International Journal of Psychiatry in Medicine, 19, 109-121.

Sullivan, E. M., Wanich, C. K. & Kurlowicz, L. H. (1991). Nursing assessment, management of delirium in the elderly. Association of Operating Room Nurses Journal, 53, 820-828.

Taylor, J. W. (1989). Levine's conservation principles: Using the model for nursing diagnosis in a neurological setting. In J. Riehl-Sisca (Ed.), Conceptual Models for Nursing Practice (3rd ed.) (pp. 349-358). Norwalk, CN: Appleton & Lange.

Tess, M. M. (1991). Acute confusional states in critically ill patients: A review. Journal of Neuroscience Nursing, 23, 398-402.

Williams, J. M. (1987). Cognitive Behavior Rating Scales: Manual Research Edition. U.S.A.: Psychological Assessment Resources, Inc.

Williams, M. A., Campbell, E. B., Raynor, Jr., W. J., Musholt, M. A., Mlynarczyk, S. M., & Crane, L. F. (1985). Predictors of acute confusional states in hospitalized elderly patients. Research in Nursing and Health, 8, 31-40.