

THE RELATIONSHIP BETWEEN RELOCATION AND ALTERATIONS IN MENTAL STATUS AMONG ELDERLY HOSPITALIZED PATIENTS

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Canada is increasingly becoming a country of older individuals. In 1981, almost 10% of the population was over 65 years of age as compared to 8.1% in 1971. It has been predicted that by the year 2001, the elderly will represent 11% of the total population (Statistics Canada, 1981). One consequence of an aging population is an increase in the number of elderly people admitted to acute care and chronic care institutions.

Confusion is a phenomenon that occurs often among the elderly when hospitalized in acute care settings (Foreman, 1986; Nagley, 1986; Williams, et al., 1985). Relocation may contribute to confusion in acute care settings; however, research supporting this relationship is limited (Adams, 1986; Burnette, 1986; Engle, 1986; Wolanin, 1983b). Furthermore, confusion in the elderly is often perceived as senility. The impact of relocation on mental status is therefore often not recognized by health care workers. The purpose of this study was to investigate the relationship between relocation to an acute care setting and alterations in mental status among elderly hospitalized patients. This study is a replication of research by Roslaniec and Fitzpatrick (1979) research.

Literature Review

Confusion is a nebulous term used by health care professionals to label phenomena that describe varying degrees of mental impairment. Disorientation, organic brain syndrome, clouded states, acute brain failure and *pseudo-senility are examples of terms that have been synonymously used to denote* confusion. Each definition represents an element of cognitive impairment; however, discrimination among these definitions is difficult because of the inconsistencies that have occurred with respect to their usage within operational definitions (Ahronheim, 1982; Black & Paddison, 1984; Burnside,

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1981; Chisholm, Deniston, Igrisan, & Barbus, 1982; Foreman, 1986; Lipowski, 1980; Nagley, 1986; Williams et al., 1979; Wolanin, 1983; Wolanin & Phillips, 1981).

Research that examines confusion is limited and documented incidence of confusional episodes among the elderly vary. Liston (1982) found that incidence rates varied from 10% to 50%. Gillick, Serrel and Gillick (1982) observed 429 general medical patients in order to determine whether certain syndromes were hospital induced. They reported that 29.5% ($n = 173$) of previously mentally alert patients over age 70 demonstrated some degree of confusion. In contrast, a daily prevalence rate from 0% to 13%, and averaging 5.5%, among patients over age 60 was reported by Chisholm et al. (1982).

Williams et al. (1979) investigated the phenomenon of confusion among elderly hospitalized patients who had sustained hip fractures ($N = 91$). Patients were studied on their first, third and fifth postoperative days in order to determine whether nursing activities were associated with the occurrence of acute confusional states as well as to determine the relationship between these activities and patients' postoperative mental status. Predictors of postoperative confusion were found to be: preoperative confusion either on admission day or during the preoperative period; the presence of postoperative urinary problems; limited mobility postoperatively; and the absence of clocks and televisions. Nursing activities that responded to patients' confusional states were: orientation measures, explanations about the environment and treatments, reassurance and restraining devices. These nursing care measures and environmental factors were positively associated with decreased levels of confusion.

Roslaniec and Fitzpatrick (1979) studied the relationship between alterations in mental status among 25 elderly medical patients and their relocation to an acute care setting. Their hypothesis that patients would experience significant changes in level of consciousness, orientation, attention or concentration, memory and higher cognitive functioning between day of admission and fourth day of hospitalization. A significant deterioration in level of consciousness, orientation and abstract reasoning was demonstrated between admission day and fourth day of hospitalization.

Engle (1985) extended the work of Roslaniec and Fitzpatrick in a nursing home setting. Elderly residents who were admitted primarily for rehabilitation following a hip fracture ($N = 57$) were interviewed on their first, fourth and seventh day following admission. Components of mental status were measured with the *Mental Status Examination* (Roslaniec & Fitzpatrick, 1979). Memory and higher cognitive functioning significantly improved ($p < .05$). These data contrasted with the Roslaniec and Fitzpatrick (1979) study where mental status scores decreased post-hospitalization.

Nagley (1986) used an experimental design to investigate whether selected nursing actions were effective in preventing acute confusional states in elderly hospitalized patients who were not confused pre-admission ($N = 60$). Sample criteria were 60 patients (30 control and 30 experimental subjects) over the age of 65 who could speak English, hear conversational speech, had sufficient vision to see the print on clocks and calendars and who had a medical diagnosis. All subjects had to score at least 4 on the *Short Portable Mental Status Questionnaire* (SPMSQ) on their admission day in order to exclude any individuals who were confused at that time. In addition, a tool designed by the investigator provided a narrative description of the subject and allowed the researchers to assess mental status on a scale that ranged from mentally alert to confused. The presence of confusion was measured on admission day and on the fourth hospital day. The experimental group ($n = 30$) received specific daily nursing interventions which included asking orienting questions about place, home and person once a shift, ensuring that patients had their sensory aids and placing clocks and calendars within patient's view. The effect of these nursing interventions on the patients' mental status scores were evaluated at the completion of each shift rotation. No significant differences in mental status scores were found between the groups. The generalizability of the study to patients with non-medical diagnoses is unknown. The inter-rater reliability scores for the investigator-designed instrument was high ($r = .98$). More information on the development of the instrument would, however, have added to its validity.

Conceptual Framework

The conceptual framework was derived from the 1979 Roslaniec and Fitzpatrick study which used a systems approach with information processing theory to demonstrate how the concepts of sensory alteration and schemata are integrated (Freedman, 1961; Suedfeld, 1969; Travers, 1970). Information about the environment is received in the form of sensory stimuli (input). This information is coded and organized (throughput) based on the concept of schemata. Schema is the integration of previous perceptions, memories and images that are used as references from which to locate further sensory stimuli. The information that is received and coded is used to choose behavioural responses (output).

Sensory alteration is "a situation in which reception or perception of stimuli is blocked or altered, or in which the environmental stimuli themselves are blocked or altered" (Chodil & Williams, 1970, p. 455). The exact causes of sensory alteration are unknown. Hospitalization affects the quality and quantity of sensory stimuli. Stimuli are increased and decreased through confinement, immobility or isolation. Individuals may not recognize new stimuli in an unfamiliar environment; as such, behaviour may become disorganized. Changes in behaviour may include alterations in level of consciousness,

attention/concentration, orientation, memory and higher cognitive functioning (Chodil & Williams, 1970; Downs, 1974; Jackson & Ellis, 1971; Roslaniec & Fitzpatrick, 1979; Zubek, 1969). Individuals experiencing sensory alterations can benefit from having stimuli organized for them by orientation to new environments. Sensory alteration can affect individuals of all ages. Elderly people may be more prone to the confusion associated with sensory alteration because of physiologic changes within their sensory apparatus (Wolanin & Phillips, 1981, p. 179).

Research Questions

1. Is there a relationship between hospitalized elderly patients' performances on tasks of attention or concentration on the first day of hospitalization and their performances on the third hospital day?

2. Is there a relationship between hospitalized elderly patients' levels of orientation on the first hospital day and their levels of orientation on the third hospital day?

3. Is there a relationship between hospitalized elderly patients' performances on memory tasks on the first hospital day and their performances on the third hospital day?

4. Is there a relationship between hospitalized elderly patients' performances on tasks of higher cognitive functioning on the first hospital day and their performances on the third hospital day?

5. Is there a relationship between alterations in mental status on the first and third day of hospitalization and age, sex and room allocation of elderly patients?

Method

Procedure

A non-probability, convenience sample of 18 elective admission patients was selected from two medical units of an acute care teaching hospital. Sample criteria were: 65 years and older; the ability to speak and write English; admitted with a medical diagnosis not requiring surgery within the first three hospital days; mentally and physically able to participate in the study as determined by the staff nurses' assessments and investigator's clinical assessments; and admitted from a noninstitutionalized home environment.

Data collection

A total of 35 patients were requested to participate in this study. Of these individuals, six were discharged prior to the third day and the results of their first interview were not included. Six individuals refused to participate - the

predominant reason being a high anxiety level and these individuals thought that participating in a research study would be a further stress. Three individuals were omitted when they went to surgery after their first interview. Finally, two individuals were assessed as being confused prior to their first interview thus not meeting the sample criteria.

Potential subjects were visited by the investigator during the evening of their admission day and individuals who met the selection criteria were asked to participate. The first mental status interview was conducted after informed consent was obtained. The investigator returned on the third hospital day to complete the final interview. This modification to the Roslaniec and Fitzpatrick (1979) study was implemented to accommodate for the early patient discharge rate within the sample setting.

Subject ages ranged between 65 and 85 years with a mean age of 72.2 years ($SD = 5.4$). Nine male and nine female subjects with medical diagnoses were admitted. Twelve individuals were admitted into a ward, and six individuals were admitted into a semi-private room.

Instrument

The Roslaniec and Fitzpatrick (1979) Mental Status Examination (MSE) was used to examine the incidence of confusion among hospitalized elderly patients. Inter-rater reliability coefficients of the MSE ranged from .96 to .99, using the Pearson coefficient. Content validity was supported by clinical mental assessment protocols and standardized tests in the literature (Roslaniec & Fitzpatrick, 1979).

Four constructs were measured in this study: attention or concentration, orientation, memory and higher cognitive functions (Table 1).

Attention was measured by a combination of scores obtained on the digit span test and the test of auditory vigilance. In the digit span test, a sequence of eight numbers was presented to the patient and subjects were asked to repeat the numbers until they were unable to complete a sequence. One point was given for each correctly answered group of numbers.

Concentration was measured by the test of auditory vigilance. Subjects were requested to identify a consistent letter among a series of letters. A score is obtained by subtracting the total errors of omission and commission from sixty.

Orientation was measured by asking the subject to respond to a series of questions related to person, place and time. One point was given for each correct response.

Table 1***MSE Components and Scale***

Components	Scale
<i>Attention/Concentration</i>	
Digit span test	0-8
Vigilance	0-60
<i>Orientation</i>	
Person	0-5
Place	0-4
Time	0-7
<i>Memory</i>	
Story recall test	0-20
Immediate recall	0-5
Long term memory	0-4
New learning ability	0-8
Delayed story recall test	0-20
<i>Higher Cognitive Functioning</i>	
Abstract reasoning	
Proverb interpretation	0-4
Similarities	0-3
Conceptual series completion	0-3
Calculations	
Verbal rote	0-4
Verbal complex	0-4
Written complex	0-4

Short-term memory, long-term memory, new learning ability and delayed recall were measured. Short-term memory was measured with a story recall test as well as a list of words that were to be repeated back to the investigator. Scores were based on the number of correct items repeated.

Long-term memory tests involved a series of questions that related to past events. One point was given for each correct response. The delayed recall test involved repeating the story recall test ten minutes after the initial reading and was scored in the same manner.

New learning ability was tested by hiding items in front of the subject and asking at the end of the interview where each item was located as well as the name of the item. One point for naming the item and one point for locating the item were given.

Higher cognitive functioning was measured with proverb interpretation, similarities, numerical reasoning and algebraic calculations. A scale describing different levels of proverb interpretation (abstract, semi-abstract, concrete) and a three-point scale describing the scoring for similarities were provided in order to promote consistent scoring. All scores were totalled for an overall score.

Demographic data included age, sex and room allocation. The variable age was measured to examine whether alterations in mental status was age dependent. Similarly, sex was recorded to identify differences in mental status relative to this variable. Finally room allocation was recorded since it is likely that interactions with other patients would alter the environment to which subjects were exposed.

Data analysis

These data were analysed using SPSS. Descriptive analyses included means and standard deviations. Paired *t*-tests ($p < .05$) were computed to compare each individual score on the MSE and the subcomponent of attention or concentration on day one and day three. The Wilcoxin signed-rank test was used to describe the subcomponent scores of orientation, memory and higher cognitive functions because of the narrow range of possible points within the subcomponent. Differences in MSE scores and the demographic variable of age were examined using Pearson correlation coefficients. Finally, significant relationships between MSE scores and the demographic variables of sex and room allocation were tested using *t*-tests.

Findings

Paired *t*-tests used to compare the results of each individual score of the MSE showed that there were no significant differences for attention or concentration and for orientation on Day 1 and Day 3 (Table 2). Within the higher cognitive functioning component there was a significant improvement only for the subcomponents of similarities ($p < .01$) and conceptual series ($p < .05$). The memory component of the MSE supported a significant difference with a *t*-value of -4.40. Improved memory scores resulted from the immediate story recall ($t = -4.54$; $df = 17$) and the delayed story recall test ($t = -2.24$; $df = 17$) (Table 3). Each successive story recall test resulted in an increase in this score. Finally, there were no significant differences between the variables of age, sex and room allocation and the MSE scores on day one to day three.

Table 2

Comparison of MSE Means for Elderly Hospitalized Patients on Day 1 and Day 3 (N = 18)

Component of MSE	Day 1		Day 3		t (df=17)
	Mean	Standard Deviation	Mean	Standard Deviation	
Attention/ concentration	63.78	1.96	62.94	3.04	1.25
Orientation	15.61	.60	15.56	.78	.29
Memory	23.44	10.33	30.00	13.90	-4.40*
Higher cognitive functioning	20.11	8.20	21.11	8.00	-1.53

*p < .05

Table 3

***Comparison of Selected Subcomponent Means of the MSE for Elderly Hospitalized Patients on Day 1 and Day 3:
Immediate Story Recall and Delayed Story Recall (N = 18)***

Subcomponent of MSE	Day 1		Day 3		t (df=17)
	Mean	Standard Deviation	Mean	Standard Deviation	
Memory					
Immediate story recall	3.39	4.0	8.0	5.81	-4.54**
Delayed story recall	7.33	5.74	9.33	7.07	-2.24**

*p < .05

**p < .01

Discussion

No significant deteriorations in mental status were identified in this study; this is consistent with the work of Engle (1985) and Nagley (1986). The first major finding of the study was related to the significant improvement in the participants' memory from Day 1 of their hospitalization to Day 3. This finding is consistent with the work of Roslaniec and Fitzpatrick (1979). They

suggested that memory may have improved as a result of the repetition of the same story for both interviews because the results on the other sub-components of memory tasks approached significance in the direction of a poorer performance. In this study, however, there was no evidence of a poorer performance in the other subcomponents of memory. The improvement on the story recall test scores may be related to the individuals' abilities to receive and code information when it was presented in serial repetition. Each successive time that the story was told, individuals were able to code, reorganize and recognize additional stimuli. Correct responses may have been increased through the schemata promoting additional opportunities for memory retrieval. To test this phenomenon further, different stories might be used for the two interviews (Roslaniec & Fitzpatrick, 1979). The results of this study however, support the idea that repetition may improve elderly patients' abilities to remember information that is presented to them.

A significant improvement in higher cognitive functioning (similarities, conceptual series) was also evident from Day 1 to Day 3 of the hospitalization experience, whereas, the other subcomponents remained consistent. This contrasts with the Roslaniec and Fitzpatrick (1979) results in which abstract reasoning decreased significantly over four hospital days. A plausible explanation for these improvements may be the nature of these items. Individuals may have had difficulty determining what data from within their schemata were immediately necessary to elicit appropriate responses. In addition, individuals may have thought about these items between interviews and this may have facilitated an accurate immediate recall from their schemata.

Attention or concentration remained constant; this is supported by the Roslaniec and Fitzpatrick (1979) study although they reported additional significant deteriorations within the subsection of orientation. Plausible explanations for the differences between the two studies could be related to a larger sample size ($N = 25$) and to the longer time period of four days over which their study occurred. In addition, their sample included medical and surgical patients admitted after midnight and before 5:30 p.m. In this study, only medical patients who were elective admissions were approached. Elective admissions would have had time to prepare themselves for the relocation into an acute care setting. Furthermore, all of these individuals had been previously hospitalized; this would allow them to integrate past memories and images into their schemata that could then have been used as reference points for this present hospital admission. Thus, one can speculate that surgery and/or emergency admissions could distort incoming sensory stimuli because these circumstances would introduce additional stressors into the new environment.

Implications for nursing practice

The MSE was found to be advantageous for clarifying the concept of confusion. This instrument is useful for measuring selected aspects of mental status among elderly hospitalized patients. It has a high inter-rater reliability and is easily administered, requiring approximately 15 minutes to complete; therefore it is feasible for use in the clinical setting during the initial nurse-patient interview. It can also provide health care professionals with a means of assessing confusion in elderly patients in order to plan effective nursing interventions tailored to patients' needs. This would also help to provide criteria to evaluate the nursing interventions. In addition, use of one standardized instrument would facilitate reliability and consistency in clinical assessment of confusion when patients are relocated to another unit or hospital (Engle, 1985). Reliable data provide a consistent base from which nursing actions could be developed to promote continuity of care.

The second implication focuses on patient teaching. In this study, a significant improvement in memory tasks was found when the story recall test was repeated. Nurses are responsible for providing information to patients, thus, they must select appropriate teaching strategies to facilitate learning for elderly hospitalized patients. If this trend is supported in future studies, teaching strategies that allow for repetition of material may be warranted.

Limitations

The results of this study may be generalized only to elderly patients who are electively hospitalized for a medical illness. All these patients had some time to prepare for their admission and were able to control their levels of anxiety about the stressors associated with their temporary relocation. The risk of confusional states among the individuals who were more anxious and who consequently refused to participate in this study is unknown. All sampled patients were also highly mobile and it is unknown if this variable would effect the results. The small sample size reduced the generalizability of these findings. Finally, the shorter time interval between interviews may have influenced the results.

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RÉSUMÉ

Relation entre la relocalisation et les modifications du statut mental chez les hospitalisés âgés

Dans cette étude nous avons voulu reprendre la recherche de Roslaniec et Fitzpatrick (1979) sur les changements du statut mental chez les patients âgés, qui concluait que la désorientation augmentait et que la mémoire s'améliorait durant quatre jours d'hospitalisation. Pour notre étude, l'échantillon consistait de dix-huit patients âgés entre 65 et 85 ans admis dans un centre de soins intensifs. Le statut mental de chaque individu a été évalué le jour même d'admission ainsi que le troisième jour d'hospitalisation, utilisant le MSE (1979), conçu pour évaluer le niveau d'attention-concentration, d'orientation, de mémoire et de fonctionnement cognitif poussé. Les variables démographiques âge, sexe et allocation de chambre ont été examinées. Les analyses de données utilisées étaient le test-t ($p < .05$) et le coefficient de corrélation produit-moment de Pearson ($p < .05$). Les éléments attention-concentration, orientation et fonctionnement cognitif poussé n'ont pas révélé de différences significatives entre le jour d'admission et le troisième jour d'hospitalisation. L'élément mémoire a révélé une différence significative, avec une valeur t de -4.40. Ces résultats pourraient influencer l'éducation des patients et contribuer à clarifier le phénomène de confusion.