

**THE EXPERIENCE OF ACUTE CONFUSION IN
OLDER WOMEN WITH HIP FRACTURE**

BY

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for the Degree of**

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The Experience of Acute Confusion in Older Women with Hip Fracture

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Daryl Brooks

**A Thesis/Practicum submitted to the Faculty of Graduate Studies of The University
of Manitoba in partial fulfillment of the requirements of the degree
of
Master of Nursing**

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ABSTRACT

Acute confusion (also known as delirium) occurs frequently in the hospitalized elderly, jeopardizing health outcomes. Hip-fractured patients represent a significant and vulnerable group, and women comprise the majority of this population. Despite a developing research base, acute confusion remains poorly understood, and few studies have examined the experience of acute confusion from the perspective of the sufferer.

This study used the four perspectives of the Human Response to Illness Model (Physiologic, Pathophysiologic, Behavioral, and Experiential) to explore the response of acute confusion in a group of five cognitively intact elderly hip-fractured women. The impact of person factors and environmental factors on the participants' responses was also considered. A case oriented, qualitative approach guided the study. Data was collected through participant observation and semi-structured interview.

Three of the five participants developed acute confusion. The experiences of the two unaffected women were used for comparison and contrast.

Despite the selection of a "homogenous" study population, findings illustrate the diverse and unique cognitive and behavioral responses of each individual to the hip-fracture experience. No single physiologic/pathophysiologic event could account for cognitive decline, and person factors and environmental factors impacted differently on each participant. Behavioral manifestations common to those with acute confusion included disengagement, disorganization, and disinhibition. Self report revealed feelings of fear and embarrassment.

The study provides insights for practice, education and research. A repeated application of the study methodology using a larger population is recommended.

DEDICATIONS AND ACKNOWLEDGMENTS

This work is dedicated to...

... the five participants (and their families), who so willingly allowed me into their lives

... my husband Allan, who has always believed

... my children Julia, Caitlin, Emma and Sean, who are my inspiration

... my parents and sisters, who provide unswerving devotion and support.

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CHAPTER I

STATEMENT OF THE PROBLEM

Introduction

Acute confusion (also known as "delirium") occurs frequently in the aged population as a response to illness and/or injury. Hip fractured patients represent a significant and vulnerable group. This study uses the Human Response to Illness Model (HRI) to explore the experience of acute confusion in elderly women admitted with traumatic hip fracture. In this chapter, the background and significance of the problem are outlined and the conceptual framework described. The questions guiding the study are provided and pertinent definitions presented.

Significance of the Problem

Reports of the incidence of acute confusion in the hospitalized elderly range between 22-80%, with advancing age a significant predictor (Foreman, 1990; Gustafson et al., 1988; Levkoff et al., 1992). Many different subgroups of the elderly population are affected, and a wide range of etiologies have been isolated. These include metabolic derangements, cardiovascular and circulatory disorders, traumatic head injury, and surgical procedures such as cardiac bypass surgery. Among the affected groups, patients who have sustained traumatic fractures are important, in part because the etiologic basis for their confusion remains a source of conjecture (Rockwood, 1989).

In a landmark study, Williams et al. (1985a) found that over 50% of elderly, cognitively intact patients with hip fractures suffered acute confusion in the first 5 days of hospitalization. Clinical observations support this research. As one nurse commented,

"I'm surprised when these patients *do not* become confused!".

Demographic predictions indicate that our elderly population is rapidly increasing. The most senior of our elderly (ie. those over 80) constitute a segment of this population that is showing particular growth. In 1996, the cohort was comprised of 627,000 members. This number will rise substantially in the next twenty years as life expectancies increase (Foote, 1996), and women will comprise the core of this group. Myers et al. (1991) report that women are 2-3 times more likely to sustain a hip fracture, with the incidence among those over 50 doubling approximately every five years. By the year 2006, it is estimated that there will be 22,922 cases of hip fracture in the Canadian female population annually (Martin, Silverthorn, Houston & Roos, 1991). Thus, elderly hip-fractured women are an important target group in the study of acute confusion. Their importance is accentuated when the outcomes of acute confusion in the elderly are considered.

Consequences of acute confusion in the hospitalized elderly include increased morbidity, mortality, and length of hospital stay (Cole & Primeau, 1993; Francis, Martin & Kapoor, 1990; Inouye, Viscoli, Horwitz, Hurst & Tinetti, 1993; Levkoff, et al., 1992; Lyness, 1990; White, Fischer & Laurin, 1987), increased rates of nursing home placement on discharge (Frances & Kapoor, 1992; Gustafson et al. 1988; Inouye & Charpentier, 1996; Levkoff et al., 1992), and increased intensity of nursing care (Williams et al., 1985b). Affected patients are unable to perform basic self care, are predisposed to self injury due to removal of dressings, IV lines and catheters, and are more likely to fall (Jacobson, 1997). In the orthopedic subgroup, increased risk of urinary problems,

infection, skin breakdown and functional decline have also been documented (Gustafson et al., 1988; Rogers et al., 1989; Williams et al., 1985a). The frequent application of physical restraints in the acutely confused elderly further exacerbate functional decline, and increase risk of complications (Sullivan-Marx, 1994).

Thus, the problem of acute confusion in the elderly hospitalized population is significant from both a human and economic perspective. Evidence that acute confusion is under recognized and undertreated (Eden & Foreman, 1996; Frances & Kapoor, 1992; McCartney & Palmateer, 1985; Palmateer & McCartney, 1985), and that the disorder frequently results in prolonged cognitive impairment (Levkoff et al., 1992) provides further impetus for study. Nurses are ideally positioned to participate in research that illuminates this difficult and important topic.

Background

Acute confusion is variously known as delirium, transient cognitive impairment, sensory-perceptual alteration, and a host of other related terms. Accounts of the disorder can be traced as far back as 2500 years to the writings of Hippocrates (Lipowski, 1990). Within the nursing literature, descriptions of the acutely confused patient can be found as early as 1908, when Emma Hawley described the acutely confused patient as one who:

Talks loudly, wildly and incoherently. He does not sleep and can scarcely be induced to do so. He tries almost incessantly to rearrange the bed-clothes, especially to pull them out from the foot of the bed or put them on the floor, and at any minute he may get out of the bed if not restrained (p.758).

Despite this long history, knowledge of the condition remains incomplete.

Foreman (1993) suggests that until the mid-1980s acute confusion in the elderly population was generally ignored and overlooked, attributable in part to a lack of interest in this cohort..."Elderly patients have at times been perceived as uninteresting, unimportant, unworthy and beyond help" (p.3).

Research on the topic has expanded in the last decade, but continues to be hampered by the complex, shifting, and multifaceted nature of the phenomenon, inconsistent theoretical and operational definitions, a diverse population, and multiple etiologies that are likely cumulative in their effect (Foreman, 1993; Inouye, 1994; Trzepacz, 1994). Some authors hypothesize that the diverse characteristics manifested in acute confusion represent more than a single distinct disorder, with a correspondingly distinct pathogenesis (Mori and Yamadori, 1987; Treloar and MacDonald, 1997). Thus, to date, core characteristics of the phenomenon are still controversial and unvalidated, and its natural history within the various affected subgroups largely undocumented.

Foreman (1990) studied the features of acute confusion in an attempt to isolate a pattern of cognitive deficits and psychomotor behaviors representative of the phenomenon. He commented that "overall findings indicate that more is known about what an acute confusional state is not than about what it is." While some of the more traditionally accepted cognitive and behavioral dimensions of acute confusion were supported by his findings, these dimensions represented only a minor portion of the variance (ie. approximately 30%). Thus, essential elements of the phenomenon remain elusive.

In Foreman's (1990) analysis of the study outcomes, he hypothesizes that one explanation might relate to the fact that the "powerfully subjective cognitive state is conceptualized from an outsider's perspective... This outsider looking in may serve to distort reality and knowledge of the topic" (p.12). In sum, Foreman's work, as well as subsequent research on the natural history of acute confusion and its etiology(ies) points to a phenomenon whose whole is greater than the sum of its parts. His insight supports a holistic approach to research of acute confusion, an approach in which the experiential aspect of the phenomenon is central to the investigation.

Purpose and Objectives

This case-oriented study, primarily qualitative in nature, examines the experience of acute confusion in 3-5 elderly women who have recently sustained a traumatic hip fracture.

The elderly, female cohort has been selected for a number of reasons. The incidence of hip fracture in elderly women is high, as is the rate of associated acute confusion. Moreover, the etiology of acute confusion in this group has not been illuminated by previous studies. The needs of the elderly female cohort have been overlooked by researchers and women's groups alike, and it is this group that will form a growing proportion of the acute care population in coming years. Once hospitalized, elderly women are often powerless to effect their future. This study attempts to give voice to a large and overlooked group on a topic of significance to both the participants, their families and health care providers.

The study's design is intended to reveal the phenomenon of acute confusion in its

fullest context. Its qualitative approach is intended to help reveal variables of clinical significance for the individual participants that may be lost in the aggregated data of quantitative studies (Inouye et al. 1993; Williams et al., 1985b). The study is guided by the following questions:

- 1) What is the experience of acute confusion in older women with hip fracture?
- 2) What person factors and/or environmental factors contribute to the response of acute confusion in these women?
- 3) What are the clinical characteristics of acute confusion in this group?

To answer these questions, the study uses an expanded version of the Human Response to Illness Model (Heitkemper & Shaver, 1989) to research and explore the nature of acute confusion.

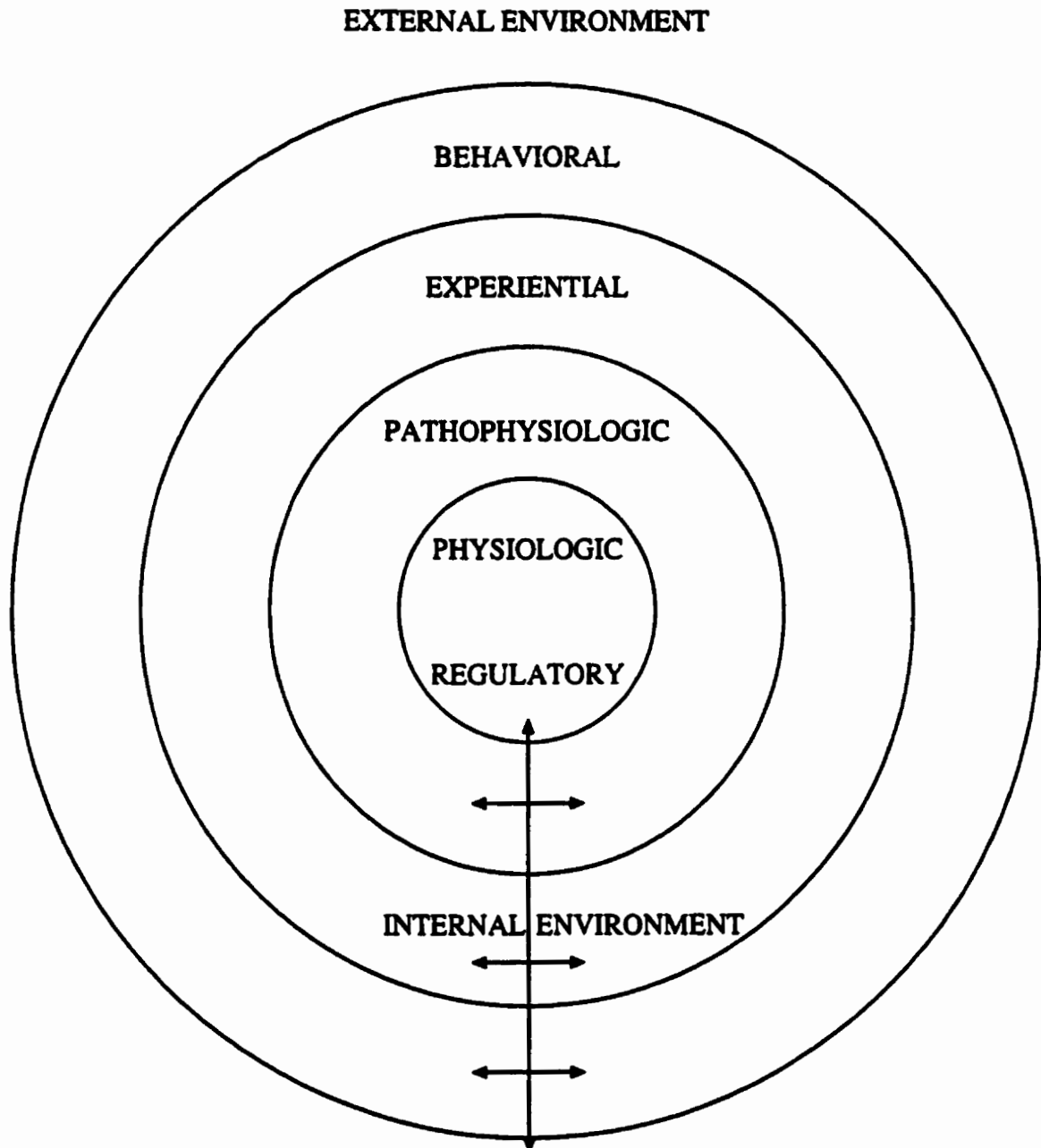
Conceptual Framework

The Human Response to Illness Model (HRI) was selected to provide a framework for this study for two main reasons. First, the framework provides a view which is consistent with the belief that the human health and illness experience is comprised of complex interactions between psychosocial and biological phenomena (Thorne, Kirkham, MacDonald-Emes, 1997). Second, the HRI is a broad and loosely organized model, with few explicit assumptions and propositions about the interaction of key concepts to restrict the interpretation of data. In the context of a qualitative design such as this, the model will serve as a beginning point rather than an organizing structure for what is found in the inquiry, and may be challenged as analysis proceeds (Thorne et al., 1997).

The HRI (Mitchell, Galluci & Fought, 1991) was designed as a broad framework within which to view all human responses to illness. It specifies four interrelated and interacting perspectives to the human response- physiologic, pathophysiologic, experiential, and behavioral. The multiple perspectives are ideally suited to examine acute confusion, a complex and multifaceted phenomenon encompassing physiologic (and pathophysiologic), behavioral, and experiential elements. The four perspectives and their relationships are conceptualized in Figure 1.

The authors use Webster's New Collegiate Dictionary (1977) to define the term "perspective" as a "mental view or prospect; the interrelations in which a subject or its parts are viewed...the technique of adjusting the apparent sources...into a natural-seeming and integrated whole". Thus, a perspective is a "vehicle by which we can classify and integrate specific phenomenon into a larger whole" (p.155). The HRI suggests the four perspectives as a way to create a whole image, in this case, of acute confusion. The model does not prescribe the way in which the perspectives interact. The interplay between perspectives may emerge as the study evolves.

Human Response to Illness Model



Relationships of the four perspectives on human responses to the internal and external environment. The arrows indicate that responses within each perspective are capable of transmitting and receiving information from all other perspectives. The behavioral responses are the ones that allow humans to communicate other responses to the external environment, including other human beings.

Physiologic Perspective

The physiologic perspective is based on the concept of usual biologic functioning. In the study of acute confusion, this encompasses a review and understanding of the biologic components of nerve impulse transmission, as well as the interpretation of sensory input and the formulation of normal thought processes (ie. cognition). The successful functioning of these systems rely on their physical intactness, and the integrity of body chemistry, fluid balance and nutrition.

While the physiologic perspective encourages us to consider the elements of cognition using both theoretical knowledge and practical knowledge of the individual, there are limited ways in which to directly examine the physiologic integrity and functioning of the relevant body systems. The electroencephalogram (EEG) measures brain activity and computed axial tomography (CAT) and magnetic resonance imaging (MRI) demonstrate the intactness of the brain and spinal cord structures. Unfortunately, the EEG, CAT scan and the MRI are rarely conducted on the population in this study. There are, however, more indirect measures of physiologic function which may impact on the effectiveness of cognitive processes, measures commonly available through direct patient assessment or chart review. These include measures of blood chemistry and composition, vital signs, as well as oxygen saturation.

Pathophysiologic Perspective

The pathophysiologic perspective explores the pathophysiology that underlies disordered biologic functioning, in this case the breakdown of normal thought processes. In the context of acute confusion, two broad areas are examined- cerebral insufficiency

and the imbalance of neurotransmitters. The same problems of measurement discussed within the physiologic perspective are pertinent here- the primary evidence of pathophysiologic function is behavioral, although the measures described earlier (eg. blood composition and oxygenation) may help to understand the nature of the pathophysiologic processes affecting cognitive function.

Experiential Perspective

The experiential perspective of the model focusses on introspection, personal experience, and the "derivation of shared meaning" (p. 156), as revealed through self report. An understanding of the experience of acute confusion, described by Foreman (1990) as " an essentially experiential phenomena" may shed light on the nature and the dynamics of a condition that remains poorly understood. Self report, attained through both formal and informal interview, forms the crux of this study.

Behavioral Perspective

The behavioral perspective includes the directly observable motor and verbal behaviors manifested by the individual experiencing the response. To date, this is the perspective through which the phenomenon of acute confusion has largely been constructed and measured. Observation and documentation of patient behavior is a key component of this study. The primary "measure" of acute confusion will be the NEECHAM Confusion Assessment Tool, which is described in detail in the review of the literature.

The four perspectives outlined by Mitchell, Galluci and Fought (1991) provide a framework for a holistic appraisal of the phenomenon of acute confusion. This

understanding can be extended further by using the more elaborate version of the HRI proposed by Heitkemper and Shaver (1989).

Extending the Model

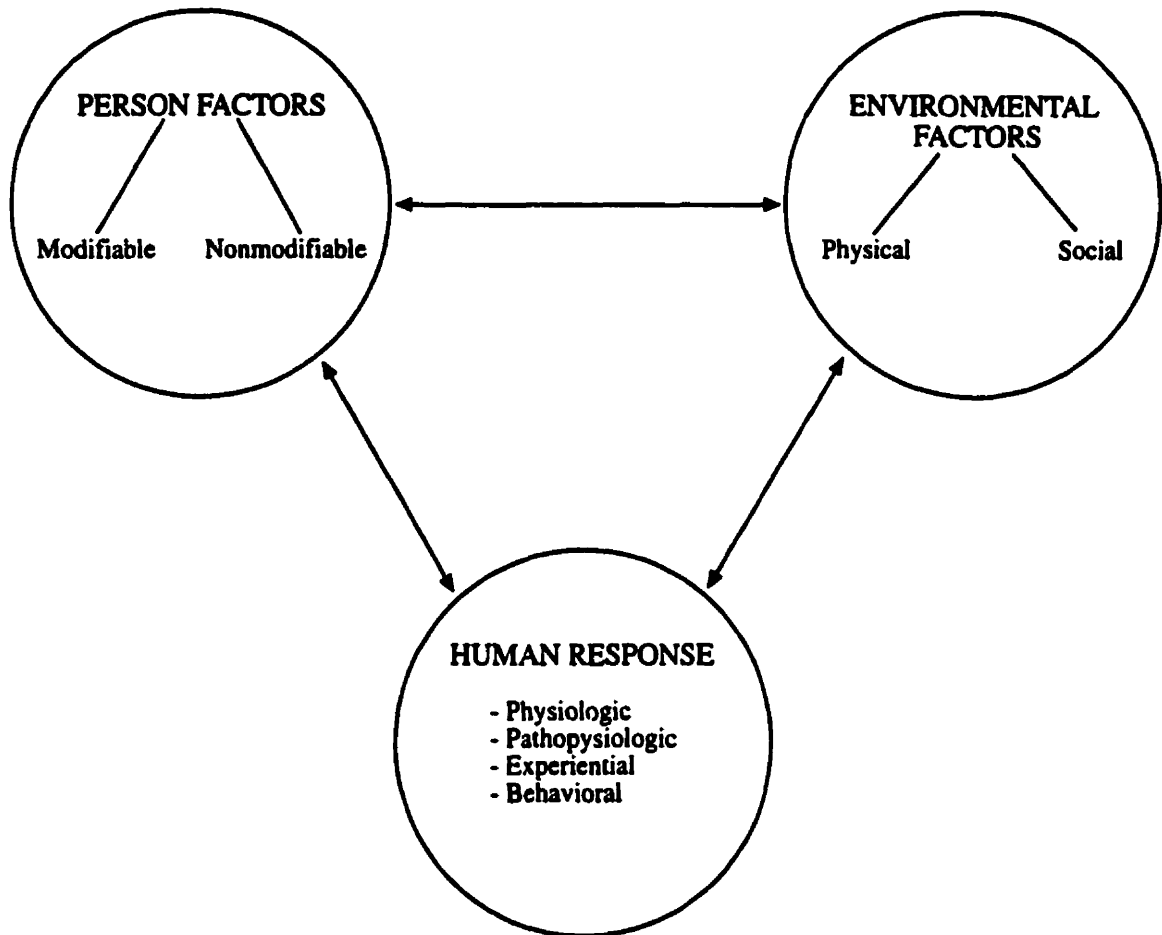
Heitkemper and Shaver's (1989) version of the HRI proposes that the four elements of the human response are acted upon more broadly by "person factors" and "environmental factors", to determine individual risk for unhealthy states. The relationships between these variables are depicted in Figure 2 (modified from Heitkemper and Shaver, 1989, p. 146).

(note: Given the proposed interrelationships among the different elements of the model, person factors and environmental factors may influence not only the onset of acute confusion but also the experience of acute confusion by the sufferer. This supposition has not been addressed in the literature to date).

Person Factors

As illustrated in Figure 2, person factors are seen to influence individual vulnerability to a specific response. Person factors include both non-modifiable and modifiable factors that the individual brings to the situation. In the context of this study, nonmodifiable factors include age, gender, preexisting dementia, and prehospitization activity levels. Modifiable factors include impaired vision and hearing, physiologic instability (eg. severity of illness/comorbidity, hydration and nutritional status), medication, immobility, pain, as well as stress, anxiety, and coping mechanisms. Each of these factors will be assessed through history taking, chart review and/or direct observation.

Extended Version of the Human Response Model



Environmental Factors

Environmental factors also act on the individual's response to illness.

Environmental factors include the subcategories of the physical environment and the social environment. Inouye (1996) uses the term "precipitating factors" to encapsulate the events or stressors that the elderly patient experiences with admission to hospital.

Factors of the external physical environment include the loss of orienting cues caused by relocation to an unfamiliar and threatening environment and the change in auditory and visual stimuli inherent to the hospital environment. The changing social environment of the patient includes the introduction of a multitude of unfamiliar caregivers, and the depersonalization often associated with this experience, as well as the presence of supportive friends and family.

Data will be collected on all of these aspects of the patient experience through direct observation, interview of the patient and/or significant others, as well as chart review.

To summarize, the HRI as elaborated on by Heitkemper and Shaver (1989), will be used to guide the exploration of acute confusion. While the model remains untested in the literature, the elements of the model provide a good "fit" with the concept under investigation. Consideration of the four interacting perspectives of human response, and the contributions of personal and environmental factors made explicit by the extended model, will help provide a more complete examination of the complexities of acute confusion. Careful examination of each dimension of the framework will help to expose gaps in the existing knowledge base and identify directions for both research and practice.

Definition of Terms

As stated earlier, acute confusion is known in the literature by a number of names. It is commonly referred to in the medical literature as delirium, and a definition of delirium is found within the DSM IV (1994). There is some dispute among authors as to the exact meaning of different terminologies, and whether each term represents the same phenomenon, or a different physiologic entity. A thorough overview of these issues is presented as introduction to the literature review.

Throughout this study, the terms acute confusion and delirium will be used synonymously, intended to represent a phenomenon with the following features; 1) abrupt onset of altered consciousness 2) changes in cognition that are transient and fluctuating 3) behavioral manifestations which may include reduced attention, sleep disruption, perceptual disturbance, and altered level of activity and responsiveness. In general, the term acute confusion will be the preferred term, selected because it reflects a nursing focus, and is less stringent in its diagnostic requirements than the criteria outlined in the DSM IV. The term delirium will appear in discussion when the authors of reported studies have used delirium as their defining term, and when data has been reported by the authors in this context.

Acute confusion will be operationally defined for the purposes of data gathering using the NEECHAM Confusion Scale (Neelon & Champagne, 1989). A copy of the scale is found in Appendix A. This scale is described in the review of the literature and the methodology, and distinguishes those with moderate to severe confusion and mild or early confusion from those at risk for confusion or not confused.

Conclusion

Acute confusion is a phenomenon of great significance within the elderly hospitalized population. It's complex and multifaceted nature and the diversity of affected populations have slowed research, and limited the applicability of research data. This study is intended to extend our knowledge of acute confusion by examining the experience of elderly women who have sustained traumatic hip fracture. The HRI Model serves as a framework to begin this exploration.

CHAPTER II

REVIEW OF THE LITERATURE

Introduction

Review of the literature on acute confusion indicated a research base in its infancy, slowed by the complex and multifaceted nature of the phenomenon, inconsistent theoretical and operational definitions of acute confusion, a diverse population, and the need for holistic (ie. multiple) approaches to assessment and intervention (Cronin-Stubbs, 1996, 1997; Foreman, 1993; Inouye, 1994; Trzepacz, 1994). The literature is largely theoretical and descriptive. Experimental and quasi-experimental studies are often weakened by small sample size, and generalizable only to similar populations.

Review of the literature on acute confusion is prefaced by an overview of the semantic and conceptual issues surrounding the phenomenon. The review that follows uses the HRI Model as an organizational framework and includes sections on the physiologic, pathophysiologic, behavioral and the experiential perspectives of acute confusion, as well as an exploration of the impact of person and environmental factors on individual response.

Acute Confusion - Conceptual Challenges

Research on the topic of acute confusion has been hampered by inconsistent terminology and dispute over the essential characteristics of the phenomenon (Foreman, 1993; Francis & Kapoor, 1990; Lipowski, 1990; Rasin, 1990; Wilson, 1993). Foreman's 1993 review of the literature on acute confusion isolated more than 30 terms that have been used to label a range of behaviors with remarkably similar features (Appendix B).

Terminologies reflect the temporal nature of the experience (eg. "acute brain failure", "transient cognitive impairment", "reversible dementia"), the pathogenesis of the phenomena (eg. "organic brain syndrome", "toxic delirious reaction", "metabolic encephalopathy"), the situational elements of the disorder (eg. "intensive care unit psychosis"; postcardiotomy delirium), and the suspected underlying pathophysiology (eg. "acute cerebral insufficiency"). In addition, a nursing diagnostic category, "sensory-perceptual alteration", has been developed to address a similar array of behaviors (Wilson, 1993).

From this melange of diagnostic labels, three terms are cited most frequently - "acute confusion", used more often but not exclusively in the nursing literature, "delirium", a medical diagnosis which appears in the DSM-IV(1994), and "acute confusional state", often used in the psychiatric literature in tandem with delirium. While there is some debate over the merits of each diagnostic label (Lipowski, 1990), Foreman (1993) concludes that generally terms are used interchangeably and treated as synonymous. Some researchers (Inouye, 1994; Mori & Yamadori, 1987; Macdonald & Treloar, 1997; Vermeersch, 1991), however, have not excluded the possibility that subtle variations in the phenomena exist, and suggest the need for further data and interpretation.

In the following section the semantic problems surrounding the concept of acute confusion are discussed and the relationship between acute confusion and delirium is explored. A tentative working definition of acute confusion is provided that will serve as a basis for this study.

The Semantic Muddle (Lipowski,1990)

Lipowski (1990) states that "confusion" is a vague, overworked term that is "inconsistently defined and highly ambiguous" (p.42). He is not alone in this criticism. Some authors reject the synonymous use of the terms delirium and confusion. Wilden (1994), for example, states that " delirium is not confusion. Confusion is a broad, non-specific term that is used to describe any deficit in cognitive functioning. In clinical practice, confusion often becomes a catchall phrase that masks the need for further assessment" (p.27). Her stance is supported, in part, by studies which suggest that the term confusion has no common, clearly defined meaning to caregivers.

In the early nursing literature, Wolanin and Phillips (1981), studied the use of the term confusion by nurses and physicians. Two observations are pertinent to this discussion. First, the authors noted that nurse's and doctor's labelling of confused patients often derived from the impact the behavior created on their caregiving (eg. physicians observed that patients were "poor historians"; nurses described patients as "noisy", "difficult to manage") . Second, the authors observed "a certain amount of imprecision in the use of the term" (p.5), reflecting the large array of diverse behaviors associated with confusion that were identified by the health care providers. These behaviors were classified into two general categories, "cognitive inaccessibility" (eg. "mixed up, unaware of surroundings", "does not do as requested") and "social inaccessibility" (eg. "uncooperative", "hostile", "difficult to manage").

Simpson (1984) asked 274 nurses and physicians in a large teaching hospital to select behaviors indicative of confusion from a list of common behaviors. His results

showed little agreement as to the signs and symptoms considered essential to the definition of confusion. Many described confusion as disorientation; some associated the disorientation with memory loss while others did not. Simpson's analysis indicated that the variation (in understanding) was "so marked, with no one meaning of the word being more widely accepted than any others, that the meaning is presently ambiguous" (p.442). A study by Brady (1987) reported that disorientation to time, place and people was the most frequently used characteristic identified with confusion.

Rasin (1990) sites evidence of additional semantic variation; Dodds (1978), developed a cognitive assessment tool which established the concepts of disorientation and confusion as distinct entities, placing orientation, confusion, disorientation and delirium on a continuum of cognitive functioning. Wilson (1993), arguing in defense of the nursing diagnosis "sensory perceptual alteration", described confusion as simply a characteristic of impaired cognition. Most recently, Simon, Jewell & Brokel (1997) listed confusion as a precursor to delirium.

In short, there is evidence in the literature to indicate interpretive problems with the term confusion.

Origins of the Problem

It may be that some of the inconsistencies in the use of the term confusion are the result of its frequent and recurring use in common speech. The term confusion derives from the Latin "confundere"; "con" meaning together, and "fundere" meaning "to pour" (Random House Webster's Electronic Dictionary and Thesaurus, 1991). Dictionaries provide similar definitions of the word confusion, all consistent with the following

meanings...1) the state of being confused; 2) disorder, upheaval, tumult, chaos; 3) lack of clearness or distinctness; 4) perplexity, bewilderment; 5) a disturbed mental state; 6) disorientation (Random House Webster's Electronic Dictionary and Thesaurus, 1991). Synonyms include bewilderment, stupefaction, bafflement, perplexity, puzzlement, disconcertment, disarray, disorganization, muddle, tumult, and jumble. (Word Perfect Thesaurus, 1993). In "lay" terms, confusion represents a subjective experience of mental disorganization which ranges from perplexity to disorientation to chaos, varying in both quality and intensity.

It is important to note that when common terms, such as confusion, are taken on by professional groups, the meaning may be molded by the knowledge, values and activities of the group (Rodgers, 1993; Chinn, 1991). However, the definition provided in Mosby's Medical, Nursing and Allied Health Dictionary (1994), was not distinct from its generic counterpart. Confusion was defined as "a mental state characterized by disorientation regarding time, place or person, causing bewilderment, perplexity, lack of orderly thought, and inability to choose or act decisively and perform the activities of daily living" (p. 379).

Wolanin and Phillips' (1981) definition created a clearer distinction. They defined confusion as "a condition characterized by the client's disorientation to time and place, incongruous conceptual boundaries, paranormal awareness, and seemingly inappropriate verbal statements that indicate memory defects" (p.8).

Nagley (1986) stated that confusion is a label to indicate varying degrees of mental impairment, and is attached to individuals who demonstrate deficits in one or

more of the following areas: memory, concentration, attention, orientation, comprehension, compliance, mood, and interpretation of the environment.

The definitions supplied by Wolanin and Phillips (1981) and Nagley (1986) didnot differentiate between acute and chronic forms of confusion, focussing instead on the broader concept. However, modifiers such as "acute" and "chronic" helped to distinguish between common and professional use of the term, and provided a more defined image of the phenomenon under investigation.

Definitions of Acute Confusion

The term "acute" was defined by Mosby's Medical, Nursing, and Allied Health Dictionary (1994) as "beginning abruptly with marked intensity or sharpness, then subsiding after a relatively short period of time; sharp or severe" (p.26). Thus, by extension, acute confusion is distinguished by the relatively abrupt onset and brief duration of symptoms.

A review of the health related literature isolated a number of definitions of acute confusion provided by prominent nurse researchers of the topic. These are outlined in Table 1. Note that a definition and description of the NANDA diagnosis "sensory perceptual alteration" is also included to allow for comparison of features.

Table 1

Overview of Definitions of Acute Confusion

Authors	Definitions of acute confusion
Williams, et al., 1985	- a disturbance in mental processes incorporating impaired memory, thinking, attention, and orientation. There can be misperceptions... hypo or hyperactivity... and emotional changes.
Foreman, 1991	- a transient state of cognitive impairment manifested by simultaneous disturbances of consciousness, attention, perception, memory, thinking, orientation, and psychomotor behavior that develops abruptly and fluctuates diurnally, with the primary deficit, one of attention.
Neelon and Champagne, 1992	- a disturbance in information processing resulting from a reversible, diffuse impairment of higher cortical functioning, including the loss of attention and alertness. It is characterized by its rapid onset...fluctuating manifestations, abrupt deterioration of present mental status and its potential for reversibility.
Miller, 1996	- a global cerebral disorder that involves a disturbance of consciousness and a change in cognition which develops over a short period of time and fluctuates in intensity and characteristics... with problems of attention, arousal, memory, orientation, sleep disturbances, language or perception.
Wilson, 1993 (sensory-perceptual alteration)	- a sudden, temporary adverse behavioral response to a change in normally encountered stimuli... manifested by a temporary, abrupt onset of altered consciousness, cognition, perception, affect, psychomotor behavior and sleep.

These meanings create a more clearly defined concept, one that shares many similar characteristics with the concept of delirium.

Delirium

The term "delirium" is derived from the Latin "delirire", which translates literally as "to go out of the furrow" (Random House Webster's Electronic Dictionary and Thesaurus, 1991). The Old English verb "dilire" (now obsolete) stemmed from the Latin, meaning "to go wrong; to go astray from reason; to rave; to wander in mind; to be mad" (Lipowski,1990).

Current definitions of delirium are twofold; 1) a temporary disturbance of consciousness characterized by restlessness, excitement, delusions or hallucinations; 2) a state of violent excitement or emotion. Synonyms have included fever, frenzy, furor, passion, ecstasy, insanity and madness (Word Perfect Thesaurus, 1993).

In the medical and nursing communities, delirium has been more specifically defined as "a transient organic mental syndrome of acute onset, characterized by global impairment of cognitive functions, a reduced level of consciousness, attentional abnormalities, increased or decreased psychomotor activity, and a disordered sleep-wake cycle" (Lipowski, 1990, p.41). Two main variants of delirium have been delineated- hypoactive and hyperactive- and there are growing efforts to highlight the "quiet" form of the disorder, whose manifestations are frequently overlooked (Neelon & Champagne, 1992; Inouye, 1994).

In the last decade, delirium has been classified as a distinct diagnostic category by the American Psychiatric Association (1994) and the World Health Organization (1992). The DSM-IV diagnostic criteria for delirium is listed in Table 2.

Table 2

DSM-IV diagnostic criteria for delirium due to a general medical condition
A. Disturbance of consciousness (ie. reduced clarity of awareness of the environment) with reduced ability to focus, sustain, or shift attention.
B. A change in cognition (such as memory deficit, disorientation, language disturbance) or the development of a perceptual disturbance that is not better accounted for by a preexisting, established, or evolving dementia.
C. The disturbance develops over a short period of time (usually hours to days) and tends to fluctuate during the course of the day.
D. There is evidence from the history, physical examination, or laboratory findings that the disturbance is caused by the direct physiological consequences of a general medical condition.

As indicated by criteria "D", a diagnosis of delirium requires the identification of a specific physiologic cause to fulfill delirium characteristics.

To conclude this review of terms, the researcher attempted to distinguish acute confusion from another commonly used term, dementia.

Relationship Between Acute Confusion and Dementia

The relationship between dementia (a chronic and progressive cognitive disorder) and acute confusion is an important one. In both, cognitive dysfunction underlies the observed behavioral changes (Neelon & Champagne, 1992), although pathogenesis differs. Both share overlapping features. In addition, the conditions may occur simultaneously (Kozak-Campbell & Hughes, 1996).

Dementia has been identified in a number of studies as an important predictor of acute confusion (Inouye, 1994; Francis & Kapoor, 1992). To further complicate the relationship between the two phenomena, acute confusion has recently been implicated in long-term cognitive changes in some individuals (Levkoff et al., 1992).

Several authors have addressed the distinctions between dementia and acute confusion (Kozak-Cambell and Hughes, 1996; Lipowski, 1990; Matthiesen, Sivertson, Foreman & Cronin-Stubbs, 1994). They point to confusion's abrupt onset, rapid progression of symptoms, and fluctuating nature as key distinguishing features. These and other characteristics are compared in Table 3, synthesized from those offered by Lipowski (1987), Kozak-Campbell and Hughes (1996), and Foreman and Grabowski (1992).

Table 3

Comparison of Behavioral Characteristics of Acute Confusion and Dementia

FEATURE	ACUTE CONFUSION	DEMENTIA
Onset	-acute, often at twilight	-chronic, insidious
Course	-short, diurnal fluctuation with lucid intervals; worse in dark, on awakening	-stable, although symptoms progressive over time
Progression	-abrupt	-slow but even
Duration	-hours, days, weeks; rarely more than a month	-months/years
Alertness	-ranges from abnormally low (lethargy) to high (hypervigilant)	-usually normal
Attention	-lacks direction, selectivity; distractible	-generally unaffected
Orientation	-often impaired to time, place; may mistake unknown people for significant others	-often impaired
Memory	-immediate and recent impaired	-recent and remote impaired
Thinking	-disorganized	-impoverished
Speech	-fragmented, incoherent, rambling, irrelevant	-difficulty finding words
Psychomotor Behavior	-may be agitated, lethargic or both	-generally normal
Sleep-wake Cycle	-reversed	-sleep fragmented

As indicated in Table 3, short duration has also been considered a key and

distinguishing feature of acute confusion (Foreman & Grabowski, 1992). However, this assertion has been challenged by recent studies (Levkoff, et al.,1992; Treloar and Macdonald,1997). Levkoff, et al. examined 325 medical and surgical patients with acute confusion, noting that only 20% resolved all new symptoms within three to six months. Treloar and Macdonald, in researching cognitive outcomes of delirious patients, found resolution of symptoms in only a discrete subgroup of the patients under investigation (ie. the "quietly confused"). Whether these results apply to all groups of acutely confused patients is speculative, and further study is warranted.

This study began with the assumption that acute confusion and dementia were distinct entities.

The Concept of Acute Confusion

Review of the defining characteristics of acute confusion, delirium, and sensory-perceptual alteration revealed a number of shared characteristics. Definitional features that emerged from a comparison of descriptors included: abrupt onset of altered consciousness, changes in cognition and/or psychomotor behavior that are transient and fluctuating, with one or more of the following manifestations - reduced attention, sleep disruption, perceptual disturbance, altered activity level and responsiveness. As discussed earlier, the NEECHAM Assessment Tool incorporated many of the outlined characteristics of acute confusion, and was used to operationalize the term.

It is important to note that while the definition of delirium specifies a well defined physiologic etiology, this requirement is absent from the criteria for acute confusion. This is consistent with nursings' belief in a more holistic approach to human response during

illness, and supported by research that suggests multiple, cumulative, and interacting causative factors that are physiologic, psychologic and environmental in origin (Neelon and Champagne, 1992; Inouye, 1994).

Thus, the term acute confusion, while not without semantic difficulties, was selected to represent the phenomena under study. It is a more inclusive term which accommodates patients diagnosed with delirium as well as those who do not meet the full diagnostic requirements for the disorder. The term "requires no translation for bedside practitioners (Foreman, 1993), and likely represents more closely what is observed by nurses...a syndrome versus a single disease entity (Vermeersch, 1991).

Review of the Literature: Physiologic Perspective

Introduction

As directed by the HRI, the physiologic perspective is based on the concept of usual biologic functioning. In the study of acute confusion, this led to an examination of normal cognitive or thought processes, elements of cognition, and their underlying anatomy and physiology.

Normal thought processes have been defined by Glick (1993, p.715) as "multiple, simultaneous cognitive, and affective neural operations that function in analyzing and synthesizing new and stored information toward the purposes and processes of human life". The neurophysiologic and neurochemical mechanisms underlying these operations are not fully understood. However, a beginning insight into normal thought processes required knowledge of nerve cell structure and function, nerve impulse transmission, and the central processes that occur within the brain (Sherwood, 1993).

Neuronal Structure and Function

The brain is comprised of more than 20 billion nerve cells ("neurons"). Each neuron functions as both an individual unit and as a member of a vast consortium or network.

The neuron conforms to other cells in many of its features. Its cell body is enclosed in a semipermeable plasma membrane, and includes a nucleus (carrying DNA), ribosomes, lysosomes, and mitochondria to regulate respiratory metabolism and produce energy in the form of adenosine triphosphate (ATP).

The nerve cell is unique, however in several important ways, two of which are described here. First, its plasma membrane is regionally specialized to form the axons, dendrites and synapses required for the transmission of nerve impulses. Second, the neuron is distinctive in its obligate need for both glucose and oxygen. The nerve cell is unable to store the oxygen or glycogen required to sustain aerobic metabolism. This form of metabolism, which involves the citric acid cycle and the electron transport chain, is far more efficient in the production of ATP than its anaerobic counterpart, and is essential to meet the disproportionately high energy requirements of the brain.

The neuron, and the brain in particular, is highly reliant on circulating oxygen and glucose (delivered via cerebral blood flow), for the uninterrupted production of energy required for cellular activities. These activities include the production of proteins, neurotransmitters, enzymes, and the maintenance of the sodium-potassium pump (Lipowski, 1990; Vogel, 1996). Thus, cerebral function, cerebral blood flow, and energy metabolism are considered to be closely linked (Lipowski, 1990).

Neuronal Pathways

There are three types of neurons existing within the CNS. These are the afferent or sensory neurons, the efferent or motor neurons, and the interneurons. Sensory neurons are required to bring information to the brain, acquired through vision, hearing, touch and taste. Research suggests that without accurate sensory information, thought processes may be impaired (Inouye et al., 1993). Efferent or motor neurons are required to effect a response to processed stimuli. An alteration in nerve transmission along efferent nerves may be observed by increases or decreases in psychomotor responses. Interneurons lie entirely within the CNS and are important in the integration of peripheral responses to peripheral information. Interconnections between the interneurons are responsible for complex thought, memory, judgement, and reasoning.

Trzepacz (1996) describes three parallel, discrete pathways of interneurons connecting the thalamus, prefrontal cortex and basal ganglia that mediate "higher" thought processes, personality, mood and motivation. These pathways are distinct from one another, although running parallel routes, and stimulation of each is speculated to produce different types of behavioral responses.

Nerve Impulse Transmission

Nerve impulse transmission occurs in two ways- electrical and chemical. Electrical transmission relies on the "excitability" of the cell; that is, the ability of the cell membrane to undergo rapid transient changes in polarization or "membrane potential". Membrane potential is created by the nonuniform distribution of electrolytes (primarily sodium and potassium) on either side of the cell's semipermeable membrane.

At rest, electrolyte distribution is maintained by passive diffusion and by an active transport system- the sodium potassium pump. With initiation of an "action potential", there is a brief rapid reversal of membrane potential, creating depolarization, hyperpolarization and repolarization at a specific point along the nerve. This potential is self propagated along the length of the nerve until a synapse is reached. A "refractory period", in which the plasma membrane is unable or less able to respond to an additional stimulus ensures unidirectional transmission of the electrical impulse, and limits the number of action potentials that can be transmitted in a specific time frame. Thus, effective transmission of electrical nerve impulses requires a "normal" concentration of electrolytes as well as a functioning sodium-potassium pump.

Once the nerve impulse reaches a "synapse" (the space and/or junction between two neurons), chemical transmission of the impulse occurs. An action potential causes the release of chemical transmitters or "neurotransmitters" from synaptic vesicles. Neurotransmitters then diffuse across the synaptic cleft and bind with specific protein receptor sites on the adjacent neuron, causing either excitation or inhibition of the postsynaptic membrane. If excitatory impulses are adequate to create an action potential in the adjacent neuron, transmission of the impulse will continue.

Chemical transmitters are ultimately inactivated by the release of enzymes from the initiating neuron or actively taken back up into the axon terminal. Thus, the efficiency with which the transmitter is removed from the synaptic cleft determines the length of the refractory period in which new impulses cannot be transmitted.

Neurotransmitters

There are many different neurotransmitters involved in nerve impulse transmission (Bissette, 1996). These include acetylcholine (ACh), dopamine, serotonin, norepinephrine (NE) and gamma aminobutyric acid (GABA), amongst others. The postsynaptic effects (ie. excitatory or inhibitory) of each neurotransmitter results from the combination of the specific transmitter with a specific receptor site. For example, ACh is *primarily* an excitatory neurotransmitter, and GABA is *primarily* an inhibitory neurotransmitter, while NE (the chief neurotransmitter of the sympathetic nervous system) may produce either excitation or inhibition, depending on its receptor site.

Research has identified some of the different neuronal pathways or circuits within the brain, and the neurotransmitters they use. For example, within the three thalamo-frontal-subcortical circuits described earlier, two of these are excitatory, using glutamate as the neurotransmitter, and one is inhibitory, using GABA as the neurotransmitter. However, to emphasize the complexity of this topic, interneurons at the basal ganglia may use other neurotransmitters such as acetylcholine, dopamine or serotonin to regulate and modify activity of these circuits (Trzepacz, 1996).

Thus, the structural and functional complexity of neurons as independent structures and as part of a vast network within the brain and spinal cord is enormous. It is clear that adequate production of neurotransmitters, and the efficiency of systems involved in the reuptake and/or degradation of neurotransmitters after release, are crucial elements of successful neuronal transmissions.

Anatomic Correlates of Specific Thought Processes

The execution of thought processes is contingent on the integrity of sensory and perceptual systems, skills in attending, information retrieval, and skill in the use of language and spatial concepts (Glick, 1993).

Albert and Moss (1996) suggest that thought processes can be discussed within a number of different domains, which include attention, memory, executive function, visuospatial processing and general intelligence. Glick (1993) would add wakefulness and consciousness to this list, and suggests that mental operations are interdependent and hierarchical in their function. Three aspects of cognitive function and their anatomic correlates are addressed here- attending, memory and executive function.

Attention

Attention is fundamental to all "higher" functions of thought. Skills in attending are required to capture and assimilate sensory input, and to focus on a specific stimuli without the distraction of extraneous stimulation. The process of attending is a function of the interaction between the reticular activating system (RAS), the prefrontal cortex, the thalamus and the limbic system.

The RAS stimulates arousal of the brain in response to afferent sensory input. It is presumed that arousal is a precondition for attentional functions. The thalamus provides a gating function, possibly limiting the flow of incoming information from the brainstem to the cortex. The thalamus is part of the thalamo-frontal -cortical circuits described earlier and regulates activity of the cerebral and limbic cortices.

The prefrontal area of the cortex is considered crucial to the process of attending, and governs the voluntary effort required to concentrate and/or to switch mental sets

(Trzepacz, 1994). As part of the cerebral cortex, the prefrontal cortex would be one of the first areas of the brain to succumb to generalized hypoxic changes.

The limbic system, a complex interacting network of forebrain structures, is responsible for providing the emotional component (eg. anxiety, desire) of attention.

Memory

Memory is the capacity to retain and store sensory information and experience for later use in problem-solving. It is a complex area of study, and theoretical approaches to memory formation and storage are numerous and varied (Craik & Jennings, 1997). For this reason, the literature on this topic is difficult to synthesize.

Attention is a crucial element of memory formation. Processing of incoming stimuli and its encoding to form memory traces cannot occur without selective attention and mental rehearsal. When these two elements are absent, information is lost and learning is not possible.

The regions of the brain that are most likely involved in memory processes include the temporal lobes and the limbic system.

Executive Functions

The complex set of abilities referred to as executive functions include the concurrent manipulation of information, concept formation and cue-directed behavior (Albert & Moss, 1996). The ability to switch mental sets, to reason, to use abstraction, and to make judgements are also subsumed by this concept. All of these functions are affected during acute confusion.

The prefrontal cortex has a significant role in these executive functions. This is

due to its extensive interconnections with the cortical association areas, the limbic cortex, and the ascending brainstem neurotransmitter pathways. Trzepacz (1996) notes that the prefrontal cortex may be the only brain area where intellect and emotions can interact. This portion of the brain has the ability to send messages from the cortex to important ascending neurotransmitter pathways, thus regulating neurotransmitter input. Thus, the prefrontal cortex likely plays an important role in the development of acute confusion.

Summary

Literature on the physiologic perspective of acute confusion highlights the complexity of the anatomic, neurophysiologic and neurochemical mechanisms underlying normal thought processes (ie. cognition). At a most fundamental level, the literature emphasizes the importance of an intact neuronal structure adequately perfused to meet metabolic demand. There is a beginning literature identifying an array of neurotransmitters, their action and interactions within the central nervous system. The important role of neurotransmitters in supporting cognitive processes is clear, however, at this stage in our research it seems that more is unknown about the intricacies of neurotransmitters and their systems than is known.

In sum, the physiologic processes underlying thought are complex. This complexity has created problems in determining the pathophysiologic processes underlying acute confusion. The pathophysiologic perspective is explored next.

Review of the Literature: Pathophysiologic Perspective

Introduction

Knowledge of the pathophysiology of acute confusion remains largely speculative, hampered by multiple etiologies and manifestations (Trzepacz, 1994), (until recently) inadequate technologies for human investigation, subjects that are incapable of cooperation (Jacobson, 1997), and a scientific community uncommitted to the investigation of a phenomenon largely associated with the aged population (Lipowski, 1990). However, given the multiple, (likely) cumulative, and diverse factors leading to acute confusion, it is currently believed that no single pathophysiologic mechanism underlies its varied manifestations (Lipowski, 1990; Neelon & Champagne, 1992; Trzepacz, 1994).

There have been a number of hypotheses generated to explain the pathophysiology of acute confusion. These focus on changes in cerebral oxidative metabolism (Engel and Romano, 1959), alterations in production of neurotransmitters such as acetylcholine (Blass & Plum, 1983; Tune, 1991) and dopamine (Trzepacz, 1996), and abnormalities in synaptic transmission (Lipowski, 1990), all leading to a reduction in nerve transmission and subsequent breakdown in thought processes.

Brain lesion and functional imaging studies (eg. Koponen, Leevi, Stenback, et al., 1989) suggest that the regions most affected in acute confusion include the prefrontal cortex, the right cerebral hemisphere, the basal ganglia, and the subcortical nuclei of the

thalamus (Trzepacz, 1994), all areas supporting the executive functions associated with behavior and thought.

Cerebral Insufficiency

Romano and Engel's (1959) conceptualization of delirium as a "syndrome of cerebral insufficiency" continues to be widely cited in the literature. Based on clinical and experimental findings, the authors postulated that a reduction of cerebral metabolism was the mechanism common to all cases of delirium. This hypothesis was supported by observed correlations between progressive cognitive decline and a slowing of EEG activity (a measure of the electrical activity in the brain) that could be reversed with certain experimental interventions. These interventions included administration of oxygen to hypoxic patients, glucose to hypoglycemic patients, and blood to anemic patients. A more recent study by Jacobsen, Leuchter and Walter (1993) confirmed these observations, noting that degree of EEG slowing correlated with severity of cognitive defects.

Cerebral insufficiency could involve several factors. These include a deficient supply of substrates to the brain (ie. glucose and oxygen), damage to enzyme systems necessary for proper utilization of substrates, disruption of synaptic transmission, and/or damage to cell membranes (Lipowski, 1990).

Jacobson (1997) suggests that cerebral insufficiency could be viewed as a mismatch between metabolic supply and demand explaining the range of person factors and environmental factors that alter susceptibility to acute confusion. Inherent in this conceptualization is the notion of a "brain reserve" (Reyes-Ortiz, 1997) that could protect against the decompensation that occurs in acute confusion. This reserve might be lowered

by a number of person factors, particularly age and dementia, explaining the increased incidence of acute confusion in these groups (Jacobson, 1997).

The Role of Neurotransmitters

Ongoing research in a variety of diverse populations has suggested associations between delirium and a whole array of neurotransmitters, hormones and neuromodulators. Studies have examined the role of acetylcholine, dopamine, serotonin, and GABA. Additionally, researchers have begun to investigate the activities of glutamate, beta- endorphins, and cytokines, underlining the importance of the chemical milieu in central nervous system function (Trzepacz, 1994).

It is beyond the scope of this paper to explore all aspects of the research literature on this topic. Moreover, the applicability of the results of many studies to the elderly cognitively intact hip-fractured patient is uncertain. Readers are referred to Trzepacz's (1994) review and critique of research on the neuropathogenesis of delirium for a detailed account of current knowledge and as a starting point for additional investigation of the topic.

To date, the role of acetylcholine in acute confusion has been most heavily researched, with decreased acetylcholine identified as the proposed mechanism of action (Frances, 1992). This neurotransmitter will be addressed here. The neurotransmitter dopamine will briefly be addressed, and the possible role of cortisol and the stress response explored.

Acetylcholine

The first neurotransmitter to receive attention in delirium research was

acetylcholine. Itil and Fink (1966) found that delirium symptoms, with associated EEG slowing, could be induced experimentally with the administration of anticholinergic drugs. Symptoms could then be reversed using physostigmine salicylate, a cholinesterase inhibitor, or neuroleptic drugs. These results led the researchers to propose that an imbalance of cholinergic and adrenergic neurotransmitters was an important mechanism in the pathogenesis of delirium.

Studies of surgical populations (Golinger, Peet & Tune, 1987; Tune, 1991; Tune, Dainloth & Holland, 1981; Tune, Carr & Cooper, 1993) have supported this proposition. Researchers observed that serum levels of anticholinergic activity increased in postoperative delirium, and anticholinergic levels correlated with the severity of delirium, decreasing with resolution of symptoms. Mach, Dysken, Kuskowski, Richelson & Holden (1995) produced similar results in a medical population.

The work by Blass and Plum (1983) provides a link between Engel and Romano's hypothesis of reduced oxidative metabolism and the results of anticholinergic studies. Blass and Plum (1983) proposed that impaired oxidative metabolism in the brain would result in reduced synthesis of neurotransmitters, especially acetylcholine. This could occur through effects on general metabolic routes (eg. the citric acid cycle) that produce acetyl CoA, the precursor for acetylcholine. Subsequently, research has supported the role of cholinergic mechanisms in arousal, memory, attention, and the ability to recognize received information (Wesnes, K., Simpson, P. & Kidd, A., 1988). Moreover, the reduced levels of acetylcholine found in the elderly could explain the increased incidence of acute confusion in this population.

Dopamine

Various studies have implicated excess dopamine in the onset of delirium confusion (Trzepacz, 1994), observing that the relationship between dopamine and acetylcholine is often reciprocal (ie. when levels of acetylcholine are decreased, levels of dopamine are elevated, and vice versa). Opiates, routinely administered to the surgical patient, are known to increase dopamine activity, offering a potential explanation for postoperative delirium. The drug haldoperidol, used frequently in the management of delirium, is a potent dopamine blocker. Its effectiveness in reducing the symptoms of delirium lends support to the proposed connection between dopamine and delirium.

Cortisol and the Stress Response

Lipowski (1987) outlines an additional hypothesis for the pathophysiology of acute confusion, one which has particular relevance to the elderly surgical patient. He refers to Kral (1975) who postulates that acute confusion represents a reaction to acute stress. Kral explains that the reaction is mediated by elevated levels of plasma cortisol (a glucocorticoid), exerting damaging effects on the reticular activating system and the cortex. A study by McIntosh, Bush and Yeston (1985) found a relationship between elevated cortisol and cognitive impairment in a sample of delirious postoperative patients, providing some support for the claim. The recent literature does not examine this hypothesis, although glucocorticoids have been speculated to affect neurotransmitter systems in the brain (Campbell & Schubert, 1991).

Lipowski (1990) provides a different account of the relationship between stress

and delirium. He cites evidence that anxiety provoking stimuli cause an increase in cerebral blood flow and brain oxygen consumption, mediated by the release of catecholamines. The rate of cerebral blood flow may be affected by amount of bodily movement, and the intensity and duration of the stressor(s). Lipowski postulates that anxiety and stress (both physiologic and /or psychologic) increase cerebral metabolic demands and reduce oxygen tension, predisposing the affected individual to onset of delirium. This theory echoes the concept of metabolic supply and demand discussed earlier.

Thus, the precise role of anxiety and stress in the development of delirium has yet to be illuminated. However, the impact of generalized stress (both physiologic and psychologic) on brain function cannot be discounted. This hypothesized relationship may be particularly useful in explaining the delirium of hip-fractured patients whose deliriums otherwise defy explanation (eg. Rockwood, 1989).

Summary

Research on the pathophysiology of acute confusion is fragmented, conflicting and inconclusive. One, several, all (or perhaps none) of the pathogenetic mechanisms discussed here may apply to the elderly hip-fractured population. Trzepacz (1994) suggests the need to focus research on homogenous populations in order to provide more definitive answers to questions of pathophysiology. She notes that comparisons between etiologic populations may reveal different symptom profiles, neurochemistry or even neuroanatomy. Certainly, the investigation of acute confusion in the hip-fractured population suggests the need to be open to any or all pathogenetic possibilities.

Review of the Literature: Behavioral Perspective

Introduction

Acute confusion is a phenomenon that has been characterized by its behavioral component- that is, by directly observable, measureable, verbal and motor responses. The literature, which is primarily descriptive and anecdotal in nature, portrays a syndrome which is diverse and variable. While a remarkably consistent range of behaviors associated with acute confusion has been catalogued through the centuries, debate continues as to the essential diagnostic features of the phenomenon (Foreman, 1990; Inouye, 1994).

Discussion of the behavioral perspective includes a review of the central features of acute confusion described in the literature. These features are contrasted with the features of dementia (chronic cognitive impairment), and the relationship between the two phenomena is addressed. This discussion concludes with an overview of the diagnostic tools used to identify the acutely confused individual.

Central Features of Acute Confusion

In the most recent literature, acute confusion has been described as a global disorder of cognition (ie. perception, memory and thinking), with changes in consciousness and attention, altered psychomotor activity and a disrupted sleep-wake cycle (Lipowski, 1987; Foreman, 1990). The behaviors manifested in the acutely confused individual are seen as distinctive in their abrupt onset, and their transient and fluctuating course. Importantly, the spectrum of behaviors manifested in acute confusion may vary dramatically between individuals and fluctuate within a single individual over

time (Foreman, 1993; Neelon and Champagne, 1992; Simon, Jewel, & Brokel, 1997; Wilson, 1993). These behaviors will be discussed within the following categories- consciousness and attention, orientation, memory, thinking, perception, psychomotor behavior, and the sleep-wake cycle, and are summarized in Table 4.

Table 4

Summary of Behavioral Characteristics of Acute Confusion

- Diminished attention
- Disorganized thinking
- Disorientation
- Altered perception, including illusions, delusions and hallucinations
- Memory disturbance
- Increased or decreased psychomotor activity (including speech)
- Altered sleep cycle

Consciousness and Attention

Consistent with the diagnostic criteria of the DSM IV (1994), many authors characterize acute confusion as a disturbance of consciousness, in which the patient demonstrates a reduced or fluctuating awareness of the external world and a reduced ability to respond to stimuli (Jacobson, 1997; Kozak-Campbell & Hughes, 1996; Rasin, 1990). The term "clouding of consciousness" appears in a number of sources to describe this feature of acute confusion (Rasin, 1990). Other authors charge that clouding of consciousness is too vague to be clinically useful (Trzepacz, 1997; Lipowski, 1987), focussing instead on attention as a key diagnostic sign (Foreman & Grabowski, 1992; Lipowski, 1987; Matthiessen, Sivertson, Foreman & Cronin-Stubbs, 1994; Wilson, 1993).

Alertness or the readiness to respond to stimuli may be abnormally heightened or reduced (Lipowski, 1989). The acutely confused person may be inattentive, easily distractible or hypervigilant and unable to shift focus purposefully from the object of attention to other salient stimuli. This inability to attend results in short term memory loss and poor recall.

Thinking

Disorganized thinking is another central feature of acute confusion, with a diminished ability to form a logical stream of thought, impaired problem solving and a reduction in abstract reasoning (Rasin, 1990). Speech may be garbled, clear or unintelligible (Williams et al. 1985a), broadening the gulf between caregiver and recipient.

Foreman (1992) describes the acutely confused patient as "incoherent, illogical, undirected and unconnected", posing a danger to self through attempts to remove tubes or dressings, to "escape" the bed, to resist care, etc. (Wilson, 1993). Delusions may be present and are characterized as "fleeting, poorly organized, and changeable" (Lipowski, 1987, p. 1790). The delusions are not only poorly systematized but also paranoid (Trzepacz, 1997), and may contribute to the patient's refusal to accept medications, food, or personal care.

Orientation

Orientation has been cited most frequently by practicing nurses as an important indicator of acute confusion (Brady, 1987; Palmateer & McCartney, 1985). The patient may be disoriented to time, place or persons, failing to recognize loved ones and

mistaking hospital staff for relatives (Lipowski, 1987; Simon et al., 1997; Wilson, 1993;). Disorientation to self, however, is rarely seen (Matthiesen et al.,1994).

The diagnostic utility of orientation as an indicator of acute confusion has been challenged on several levels. Foreman and Grabowski (1992) suggest that abrupt admission to hospital, acute illness, sedating medication, and the nature of the hospital environment may explain the disorientation of some elderly patients; for this reason, disorientation is considered insufficient as an indicator of acute confusion. Sullivan and Fogel (1986) criticize the "overemphasis" on orientation as an essential feature of acute confusion, citing a number of clinical cases in which disorientation was not manifested. Lipowski (1987) specifies that while disorientation, especially to time, is frequently manifested, it may not occur in "milder" cases.

Perception

Perceptual disturbances reduce the ability of the patient to discriminate percepts and grasp the meaning of stimuli in the internal and external environment. Distorted perceptions may include illusions that are visual (eg. spots on the wall become insects or intravenous lines become snakes) or auditory (eg. humming of an intravenous pump becomes the buzzing of a bee). Internal stimuli, such as pain or the urge to void may not be identified by the patient, with refusal to acknowledge basic needs despite objective evidence to the contrary (Wilson,1993; Lipowski,1987). Hallucinations (perceptions with no objective reality that the patient believes to be true) may also be present. They are primarily visual (Sirois,1988) but may include auditory elements as well. A study by Sirois found a 35% incidence of hallucinations in his delirious patients; ninety percent

of the hallucinations were visual. Generally, these hallucinations are projections of personally meaningful thoughts (Foreman & Grabowski, 1992).

Memory

As stated earlier, inability to attend to stimuli leads to problems with all aspects of memory- registration, retention and retrieval (Foreman and Grabowski, 1992; Lipowski, 1987; Rasin, 1990). Hospital records may describe the patient as a poor or vague historian. The patient has difficulty learning or retaining information, and often shows no awareness of previous instruction or direction. Thus, the patient may "forget" a recent visit, meal or preoperative teaching session, fail to use a call bell as previously directed, or attempt to mobilize independently, despite frequent admonitions from staff.

Psychomotor Behavior

Patients may demonstrate a range of psychomotor responses during acute confusion. These responses vary between individuals and may vary within the same person over time (Foreman, 1993).

Characteristics of the psychomotor response have been categorized into three variants. These are hyperkinetic, hypokinetic and a mixed variant, and correlate with differing levels of autonomic arousal (Lipowski, 1990). The hyperkinetic patient appears hypervigilant, with irritability, restlessness and agitation. The patient is easily startled or frightened, and may appear apprehensive when approached. Excessive activity may be evidenced by picking at bedclothes, pulling at tubes, waving of arms, etc. (Foreman & Grabowski, 1992). Speech may be rapid, loud and pressured (Lipowski, 1987). Associated symptoms of sympathetic nervous system arousal include elevated pulse, blood pressure

and respirations, increased muscle tension and dilated pupils. The hyperkinetic patient fulfills the stereotypic image of the delirious or acutely confused patient.

The hypokinetic patient is uncharacteristically lethargic, and may respond to stimuli slowly or hesitantly. Some patients become stuporous or (occasionally) catatonic (Lipowski, 1987). The hypoactive patient generally typifies the "quietly confused" patient, slow and withdrawn from reality (Treloar & Macdonald, 1997). Inouye (1994) suggests that the hypoactive form is manifested more frequently in the elderly patient and is more likely to be overlooked by health personnel.

The patient who manifests the "mixed" psychomotor variant displays a combination of both hyperactivity and hypoactivity. These patients may be resistive and climbing out of bed at one moment, and shortly after, so weak as to be unable to weight bear (Wilson, 1993).

Sleep-Wake Cycle

In general, the patient with acute confusion will demonstrate a reversal of the sleep-wake cycle. Wakefulness is reduced during the day, and the patient is drowsy, with frequent naps. At night the patient is awake and agitated. In some cases sleep is resisted entirely and the patient may remain awake for several days, with only a few brief and unpredictable naps (Lipowski, 1987). This pattern becomes more difficult to interpret in the surgical patient who is experiencing the effects of analgesia and anesthesia, and whose sleep patterns can be expected to alter as a function of treatment.

Validation Studies

In addition to speculation about the relationship between etiology and

symptomatology, questions about the centrality of specific features to the phenomenon of acute confusion remain unanswered. Trzepacz (1994; 1996) points out that research into the "phenomenology of delirium" (ie. that records the type, frequency and clustering of symptoms in various subgroups of patients) is critically lacking. Rudberg, Pompeii, Foreman, Ross & Cassel (1997) have begun this quest, examining the natural history of delirium in a mixed group of medical and surgical patients. No patterns could be identified, possibly due to the heterogeneous nature of the patient population.

Few studies have attempted to scientifically validate the fundamental features of acute confusion. A study by Foreman (1991) is one exception. Foreman used factor analysis methods to identify five dimensions or factors common to acute confusion- cognition, orientation, perception, motoric behavior and higher integrative functions such as judgement or abstraction. He then used these factors to compare the symptoms of 113 elderly medical patients with acute confusion and 125 non-confused patients.

Results indicated that the factors accounted for only 30% of the variance in confused behavior. In addition, neither orientation nor motoric behavior were discriminant between groups. This suggested that the symptoms frequently used by staff to identify acute confusion (Brady, 1987) were not diagnostic of the phenomenon. It should be noted, however, that during this study, patients were only observed to the point of onset of the confusion; thus it is possible that motor changes and disorientation may have emerged as stronger factors, had patients been observed as the confusion evolved over time. Further work is needed to elaborate on Foreman's study.

Detection of Acute Confusion

The importance of diagnostic tools for measurement of confused behavior is evidenced in studies revealing the high rate of underdetection of acute confusion by both nurses (Miller, 1996; Palmateer & McCartney, 1985; Pinholdt, Kroenke& Hanley, 1987) and physicians (Frances, Strong, Martin, 1988; Gustafson et al., 1991; McCartney & Palmateer, 1985).

In their research, McCartney and Palmateer observed that medical and nursing assessments rarely included any formal testing of cognition. In examining nursing assessment of confusion, the authors state that "formal testing did not occur with any patient, even if the patient displayed behavior that suggested underlying deficits" (p.12). The authors also observed that 1) assessment of cognition never proceeded beyond questions of orientation and level of consciousness, disregarding the importance of memory and attention in the elderly 2) nurses failed to recognize more subtle cues of cognitive deficit, such as inattentiveness or mild restlessness 3) patients who appeared superficially appropriate were assumed to possess full cognitive capacity. These findings were supported in a subsequent case study by Eden and Foreman (1996), who also noted that nurses frequently failed to appreciate the meaning of observed cues and communicate them to the physician appropriately.

The reasons for underdetection are complex; however authors agree that the availability of a tool that is brief, sensitive, easy to use, and that minimizes burden on the patient will address at least one element of the problem (Inouye, 1990).

Measurement of Acute Confusion

The multidimensional and fluctuating nature of acute confusion and the uncertainties surrounding its definition and central features have driven instrument development in a number of directions, based on differing conceptualizations of the phenomenon (Miller, 1996; Rasmussen & Creason, 1991; Vermeersch, 1990). This has occurred in both medicine and nursing. Instruments can be categorized into those that provide a general screening for cognitive impairment and those tools that specifically measure acute confusion or delirium.

Screening Measures of Cognitive Function

Foreman (1997) cites three mental status questionnaires that provide a global measure of cognition- the Mini-Mental State Examination or MMSE (Folstein, 1975), the Cognitive Capacity Screening Examination or CCSE (Jacobs, Bernard, Delgado, et al., 1977), and the more recently developed Neurobehavioral Cognitive Status Examination or NCSE (Kieran, Mueller, Langston et al., 1987). Another tool, the Short Portable Mental Status Questionnaire or SPMSQ (Pfeiffer, 1975), is also cited frequently in the literature (eg. Williams et al., 1985, 1988). A brief description of the tests' psychometric properties, advantages and disadvantages appears in Table 5.

Each of these tests measures more than one aspect of cognition (ie. perception, memory, thinking) and is purported to distinguish the cognitively impaired from the cognitively intact individual. Of the four, only the NCSE scores each area of cognitive functioning separately, providing more detailed information about the nature of the dysfunction. Unfortunately, the additional sensitivity and specificity offered by the

instrument is offset by the extra time required to administer the tool (ie. between 15 and 30 minutes; Foreman, 1997).

Mini-Mental State Examination

The MMSE is the most widely used of the four instruments, and frequently serves as a standard of comparison for newly developed tools. The MMSE measures orientation, registration, attention, recall, language, praxis, and visual spatial construction. It is a simplified, scored form that consists of eleven open-ended questions, evaluating an individual's orientation, recall, and ability to carry out commands. An overall score is attained, ranging from 0-30; a score of less than 24 is considered evidence of cognitive impairment. The test is reported to take approximately 5-10 minutes to complete (Foreman, 1997), although longer times may be required for those with low educational levels or physical impairment (Dellasega & Morris, 1993).

A 1992 review of the research literature on the MMSE by Tombaugh and McIntyre concluded that the tool was psychometrically sound, and robust across settings, despite gender, race, ethnicity, and social class. However, Dellasega and Morris (1993) and Murden and Galbraith (1997) observed that test results may be adversely influenced by low educational levels, a limitation particularly relevant to the elderly female cohort

Table 5

Overview of Global Measures

Testing Dimension	Psychometric Properties	Advantages	Disadvantages
Mini-Mental State Exam (MMSE)	Reliable and valid Test-retest reliability 0.82-0.98 Interrater reliability 0.88 Internal consistency 0.96 Criterion-related validity (confusion), Spear-man's rho= 0.76 Discriminant validity (depression), $r = 0.38$	Robust measurement across most settings Discriminates among normal, depressed, demented, and demented depressed individuals Brief (5-10 minutes)	Performance may be limited by education, physical impairment. Total scores do not reveal precise neuropsychiatric diagnosis. Does not distinguish between acute and chronic impairment
Neurobehavioral Cognitive Status Exam (NCSE)	More sensitive for detecting cognitive impairment than MMSE or CCSE because it scores each cognitive area separately, uses graded series of test items, and assesses a larger number of areas of cognition. No validation measures provided.	Easy to administer. Provides differential profile of patient's cognitive status.	Lengthier to administer (15-30 minutes)
Cognitive Capacity Screening Exam (CCSE)	Validation studies Interrater reliability 100% Sensitivity 0.71-0.79 Specificity 0.45 Internal consistency 0.97 Concurrent validity (MMSE) 0.78; SPMSQ 0.71	Brief (5-10 minutes).	Performance influenced by age, education level, ethnicity, language. Cannot distinguish between acute and chronic impairment. All aspects of cognition not addressed.
Short Portable Mental Status Questionnaire (SPMSQ)	Test-retest in a community sample 0.82, 0.83 Internal consistency (K-R 20) 0.83-0.85	Brief (5-10 mminutes). Ten items place minimal burden on patient. Scoring allows for differences in education.	Four category scoring scheme yields equivocal results in middle range.

Adapted from Foreman, 1997

In addition to the limitations already noted, successful administration of the MMSE requires a subject whose vision is adequate to read and copy a figure, whose hearing is sufficient to understand directions, and whose muscular control permits holding a writing tool. In total, these are significant limitations to the use of the MMSE as a screening tool in the study population of elderly, immobilized, recently hip-fractured women.

Measures of Acute Confusion/ Delirium

Measures such as those already described may in some circumstances provide an effective method of screening for cognitive impairment. However, the tools do not distinguish between chronic dementia and acute confusion (Frances & Kapoor, 1990; Jacobson, 1997; Neelon & Champagne, 1996) a distinction that is crucial to effective intervention and management. More recently, efforts have been directed to develop tools specific to the detection of delirium or acute confusion.

In medical circles, Inouye (1994) observes that the development of diagnostic criteria and corresponding instruments has been evolving, impaired by disputes over essential versus supportive features of delirium. In her review of eighteen published instruments designed for evaluation of delirium or acute confusion, Inouye identified only two tools which met established criteria (ie. 1) validated specifically for use in delirium, 2) capable of distinguishing delirium from dementia, 3) assessment of the multiple features of delirium 4) feasibility for use in delirious patients). These tools are the

Confusion Assessment Method or CAM (Inouye, van Dyck, Alessi, et al., 1990), and the Delirium Rating Scale or DRS (Trzepacz, Baker & Greenhouse, 1988).

A third instrument, the Delirium Symptom Interview or DSI (Albert, Levkoff, Reilly, 1992) was observed to meet three of the four criteria, as yet unvalidated in its ability to distinguish between delirium and dementia. Inouye states however that when combined with a caretaker interview, the DSI could distinguish delirium based on a history of temporal onset and course. A descriptive overview of these three tools is provided in Table 6.

Of the three tools, the CAM offers the key advantages of brevity and ease of use. Inouye (1990) developed the tool based on a simplified, operationalized diagnostic algorithm derived from the DSM-III-R (1987), and is shown in Appendix .

Jacobson (1997) points out that while all three instruments have been demonstrated to have good reliability, sensitivity and specificity, the ongoing changes in diagnostic criteria as set out by the American Psychiatric Association present challenges to the tests. For example, the DSM-IV requires the presence of disturbance of consciousness for diagnosis of delirium, a requirement which was not present in the DSM-III-R. Changes in the diagnostic criteria are based on expert opinion derived from research and practice. Recent studies, such as Treloar and Macdonald (1997), continue this challenge. The results of their examination of the central features of "reversible cognitive dysfunction" question the weighting of "positive features" such as hallucinations and delusions that are found in some tools (eg. the DRS). Thus, tool development continues to face challenges, leading to disputes over diagnostic validity.

Table 6

Overview of Three Delirium Instruments

Description	Domains	Validation	Reference Standard	Reliability	Feasibility
Confusion Assessment Method, CAM Nine operationalized criteria from DSM, scored according to CAM algorithm. Based on observations during interview.	Onset/course Attention Organization of thought LOC Orientation Memory Perceptual problems Psychomotor behavior Sleep-wake cycle	Sensitivity= 0.94-1.0 Specificity= 0.90-0.95 Convergent agreement with four other cognitive measures. Ability to distinguish delirium and dementia verified.	Gero-psychiatrists' diagnoses based on clinical judgement and DSM-III-R criteria.	Inter-rater: Kappa coefficient= 1.0 overall	Observer-rated; 10-15 minutes to complete.
Delirium Rating Scale, DRS Ten-item rating scale, with additive score 0-32, designed to be completed by a psychiatrist after complete psychiatric assessment	Onset/course Cognitive status Perceptual problems Delusions Psychomotor behavior Emotional lability Sleep-wake cycle	No overlap in scores between delirious group and 3 controls. Convergent agreement with 2 other cognitive measures. Ability to distinguish delirium and dementia verified	Consult-liason psychiatrist's diagnosis based on DSM-III criteria	Inter-rater: intraclass correlation coefficient= 0.97	Observer-rated; based on lengthy interview and detailed assessment (time not specified).
Delirium Symptom Interview, DSI Includes interview with brief cognitive assessment and rating scale for 7 symptom domains, by trained interviewer	Course Organization of thought LOC Orientation Perceptual problems Psychomotor behavior Sleep-wake cycle	Sensitivity= 0.90 Specificity= 0.80 Ability to distinguish delirium and dementia not tested.	Psychiatrist's and neurologist's assessments based on presence of any 1 of 3 "critical symptoms" (disorientation, change in LOC, perceptual disturbance).	Inter-rater: Kappa coefficient=0.90 overall	Observer-rated in part; approximately 30 minutes to complete.

Adapted from Inouye, 1994

Nursing Tools to Evaluate Acute Confusion

Nursing has attempted to approach the measurement of confusion from a broader perspective, incorporating both cognitive and behavioral dimensions of the phenomenon (Nagley & Dever, 1988; Neelon, Champagne, Carlson and Funk, 1996; Vermeersch, 1990; Williams et al., 1985a). This perspective has derived from the view of confusion as a multidimensional problem that comprises more than cognitive changes, altered consciousness or disorientation (Vermeersch & Henly, 1996). Tools have been developed to reflect the experiences of nurses at the bedside and nursing observations of patient behavior. Three tools are addressed here- a Confusion Rating Scale devised by Williams, et al. (1985a), the Clinical Assessment of Confusion-Aor CAC-A (Vermeersch, 1990), and the NEECHAM Confusion Scale (Neelon et al., 1992). A summary of their psychometric properties, advantages and disadvantages is found in Table 7.

Confusion Rating Scale

Williams et al., (1985a) observed in earlier work that behaviors cited by nurses as indicative of confusion correlated significantly with tests of cognitive function. For the purposes of their study, these behaviors were categorized into four groups- 1) verbal or nonverbal manifestations of disorientation to time, place or persons in the environment; 2) inappropriate communication or communication unusual for the person such as nonsensical speech, calling out, yelling, swearing and/ or unusual silence; 3) inappropriate behavior such as attempting to get out of bed, pulling at tubes, dressings, and /or picking at the bedclothes; 4) illusions or hallucinations.

Table 7

Nursing tools to evaluate acute confusion

Tool	Psychometric properties	Advantages	Disadvantages
Confusion Rating Scale	No data available	Behaviors easily recognized by nurses Provides a range of scores reflecting severity of confusion	Not validated
Clinical Assessment of Confusion-A	In hospitalized adults: Interrater reliability 0.98 Concurrent validity with SPMSQ 0.71, with VAS-C, 0.81 Test-retest 0.85	Quick to administer- 5 minutes Easy scoring Unobtrusive	Emphasis on the agitated or hyperactive forms of acute confusion.
NEECHAM Confusion Scale	In hospitalized or institutionalized elders: Interrater reliability 0.96 Test-retest reliability 0.98 Internal consistency using Cronbach's alpha 0.86 Correlations to MMSE 0.76- 0.81 Sensitivity 0.95, Specificity 0.78	Unobtrusive and nonthreatening Includes focus on hypoactive or quiet forms of confusion Behaviors easily identified during routine caregiving	Subjective Immature

Adapted from Foreman (1997)

Each of the four categories of behavior were scored 0,1, or 2 during each 8 hour shift; 0 indicating that the behavior was not present during the shift, 1 indicating presence at some time during the shift in mild form, and 2 indicating the behavior was present at some time during the shift in marked form. A patient's score could range from 0 (no disturbances in any of the four areas) to 8 (marked disturbances in all four areas).

William's approach to measurement corresponds to comments by Rasin (1990) on

the value of measurement of confusion for nurses. Rasin suggests that for nursing, the benefit of using instruments to measure confusion lies not in the computation of a score so that the patient can be categorized as impaired or unimpaired, but in its ability to identify specific deficits so that individualized interventions can be devised. While Williams has used this tool in subsequent research (Williams, Ward & Campbell, 1988), its validity and reliability are not established.

The Clinical Assessment of Confusion-A

The Clinical Assessment of Confusion-A (Vermeersch, 1990) is an observational checklist of psychomotor behaviors developed for practicing nurses to measure the presence, pattern and level of confusion in hospitalized adults (Vermeersch, 1996; Foreman, 1997). The 25 item scale includes five dimensions, labelled as cognition, general behavior, motor activity, orientation and psychotic/ neurotic behaviors. These categories of behavior were developed inductively from the reports of staff nurses asked to rate a list of possible confused behaviors as to their importance in the clinical setting.

Scores for each behavior have been weighted as to perceived importance, and the patient is evaluated, based on the presence or absence of the behavior. Each category of behavior receives a summative score and a cumulative total is provided. The authors suggest that confusion can be graded into levels of severity, from mild to severe, based on total score.

The CAC-A was developed and validated using subjects in an acute medical-surgical setting (Vermeersch, 1990). Reports of reliability and validity pertain to this setting, and can be found in Table 7. The tool was reported to be quick (5 minutes), easy

to administer with minimal direction (written guidelines on the form), and unobtrusive (using data gathered during routine patient care).

One significant threat to the validity of this tool has not been directly addressed in the literature. This threat derives from the method used to develop the tool (ie. staff nurse ratings of the indicators of confusion). As reported earlier, underdetection of acute confusion by staff nurses has been reported in the literature (Eden & Foreman, 1996; Palmateer & McCartney, 1985). It has been noted that nurses overrely on behaviors such as orientation to detect acute confusion, and overlook more subtle cues associated with the phenomenon. The CAC-A reflects these staff nurse biases in the scales heavy weighting of categories of behavior such as orientation, general behavior and psychotic and neurotic behavior. Thus, the CAC-C may be built on erroneous nursing beliefs about acute confusion. Moreover, attempts to assess concurrent validity using nurse's ratings of confusion on a visual analogue scale is therefore also suspect.

NEECHAM Confusion Scale

The NEECHAM is an observational scale developed by nurses to measure a patient's cognitive processing and behavior (Miller et al., 1997). Its main purpose is to identify early cues to the development of acute confusion and to monitor response to care. The NEECHAM is unobtrusive because it uses information that can be gathered during other bedside assessments and interventions. Time to complete the tool is approximately ten minutes. It places a minimal response burden on the patient, utilizing existing data. This data includes ability to perform activities of daily living and interact in the environment as well as several measures of physiologic function (ie. vital signs, oxygen

saturation and urinary continence). The tool can be repeated at frequent intervals to monitor changes in condition and/ or response to care (Foreman, 1997).

The NEECHAM was developed deductively from information processing theory. Items were derived from the literature as well as a consensus of opinion from expert researchers and clinicians (Neelon, Champagne, Carlson and Funk, 1996). The tool is categorized into three subscales of assessment - processing, behavior, and physiologic control. A number of scaled items are included within each category. The inclusion of physiologic measurements in the scale reflects the notion of a relationship between the physiologic and cognitive domains outlined by Neelon and Champagne (1992), and corresponds to recent literature on predictors of confusion.

Total scores may range from 0 to 30. Scores are levelled from 'no confusion' (27-30), to 'mild or early confusion' (20-24), to 'moderate to severe confusion' (0-19). The tool also purports to identify those at high risk of confusion (25-26) (Miller, Neelon, Champagne, et al., 1997).

Psychometric indices of the tool, tested in two samples of elderly hospitalized medical populations (n=168 and 258, respectively), are reported in Table 7. These results need further validation in the elderly surgical population.

In their discussion of study findings Neelon, Champagne, Carlson, et al. (1996) report that the NEECHAM is sensitive to both the hyperaroused and the "quiet" manifestations of confusion, and is capable of detecting confusion in its mild or early stages. These capabilities are important, given the growing evidence of a link between mild acute confusion, cognitive decline, decreased self-care, and increased mortality

(Francis & Kapoor, 1992; Levkoff, et al. 1992) and research which suggests that mild confusion is most likely to be overlooked by health-care personnel. (Inouye, 1990). The NEECHAM Confusion Scale can be found in Appendix A.

Summary

The many behavioral manifestations associated with acute confusion have been well documented. However, questions about central or defining features remain unanswered. The natural course of the phenomenon within specific subgroups of the population is relatively uncharted. Trzepacz (1994) points out that the type, frequency, and clustering of symptoms and their relationship to etiology requires further investigation and validation. This may be best accomplished in homogenous populations, whose cognitive functions are intact (ie.uncomplicated by the potentially interactive effects of dementia).

Many assessment tools have been developed to detect acute confusion or delirium. These have derived from beliefs about the central and defining features of the phenomenon. The weaknesses of the tools derive, in part, from insufficient scientific validation. However, more importantly, weaknesses are the result of fundamental uncertainties surrounding the nature of the phenomenon which will only be resolved as more research based evidence comes to light. The NEECHAM tool was selected as the most appropriate tool for use in this study.

Literature Review: Experiential Perspective

Introduction

The experiential perspective is derived through self-report and includes personal experience, elements of introspection and "the derivation of shared meaning (Mitchell, 1991, p. 156)". This perspective is fundamental to the nurse's understanding and interpretation of behavior, promotes empathy, and guides the selection of supportive nursing interventions (Andersson, Knutson, Hallberg & Norberg, 1993).

There are few reports of the experience of acute confusion found in the literature. This may be attributed to the communication breakdown associated with cognitive impairment, to memory loss surrounding the event (Lipowski, 1990) or to a devaluing of the patients verbalizations, which are often considered bizarre, disconnected and devoid of meaning (Andersson, et al., 1993).

Four published articles were useful in exploring this topic; one which provided excerpts of a woman's personal journal (Wilden & Howling, 1994), a case study of an elderly hip-fractured woman (Andersson et al., 1993), a cross-sectional qualitative study of the remembrances of 19 elderly hospitalized patients (Schofield, 1997), and reports of the experiences of a number of ICU patients who had recovered from delirium (Easton and MacKenzie, 1988).

The Experiences

The most gripping and detailed account of acute confusion was found in Wilden and Howling (1994). They portray the ordeal of 57 year old Stella, a relatively low risk candidate who became acutely confused following general surgery. Her remembrances,

stimulated and supplemented by information from family and staff, were recorded in a journal. Stella describes smiling faces on the wall and spinning gymnasts, vapour pools from Asia minor and trees blowing in the wind. Her perceptions were vivid and strikingly real, consistent with the reports of Schofield (1997).

In Schofield's qualitative study of a group of elderly patients, the participants emphasized the realistic and detailed nature of their experiences. One participant described an enormous Persian cat as "the most beautiful thing I've ever seen... I swear if I'd seen it I would know him immediately, that cat" (p.945). Another participant remarked "I can see all this in front of me and what is going on...so real , as real life" (p.946). Another elderly man contrasted his experiences with dreaming. "I do dream a lot you know...but not a dream like this you know...so vivid, so vivid...I do dream...but not like this"(p.946).

A few of the perceptual disturbances described in the literature were reported to be pleasant and comforting. Stella stated that "as soon as I awoke from surgery I saw little faces smiling at me from my bedside locker. I knew it was the configurations from the paint, but they were quite comforting. I liked to reach out and touch them" (Wilden & Howling, 1994, p.28). One participant in the Schofield study (1997) frequently "popped down" to the wild parties that she believed to occur regularly on another floor of the hospital, and another was entertained by ballet.

More characteristically, experiences were sinister and frightening. " I remember at one point being certain my son was dead and that he really wasn't there at my bedside. When he said to touch his hand and if I could feel it he couldn't be dead, my relief was

enormous" (Wilden and Howling, 1994, p. 29). The elderly participant of another study related feeling terrified..."I was out with my wife...it was snowing. We had trouble to get home from where we'd been...(there was) an attack on the house...a perpendicular wall..." (Schofield, 1997).

Stella attributed most of her delusions and hallucinations to reality and to past life experiences. "Interestingly, reality figured in nearly all my experiences with delusions and hallucinations... in one instance, a group of small gymnasts dressed in red leotards were spinning in the room. My daughter was a gymnast" (Wilden & Howling, 1994, p.28). The reports of both Andersson et al. (1993) and Schofield (1997) concurred with this observation.

The elderly hip-fractured woman in the case study by Andersson et al. (1993) incorporated remembrances of World War II, her previous work, and her family members into her delusions and hallucinations. In Schofield's study, an elderly man described a relentless funeral procession with "coffin after coffin, coffin after coffin..". It was later determined that the man was positioned at the entrance to the surgical ward and that patients on stretchers were regularly wheeled past his bed as they entered or left the unit for surgery.

Stella's transfer to a new room stimulated a "whole new set of delusions. To me, this change was additional proof that I wasn't in the hospital. There were trees blowing outside, and the wallpaper changed, which fed my hallucinations of being captured and killed"(Wilden, 1994, p.29).

The theme of imprisonment was also found in other sources. The 86 year old hip-

fractured woman in Andersson's case study indicated that she had "mixed various things...that she felt belittled, locked up, and unable to influence her situation, and ...wanted to escape ...to her apartment ...and to those who were important to her..." (Anderssen et al. 1993, p. 244).

Easton and MacKenzie (1988) recounted the experiences of five patients in the SICU. "Some individuals thought there was a conspiracy against them or their families. Some...believed they were held captive in a bizarre environment; others believed that they were being controlled" (p. 232). These responses were noted to be consistent with an earlier study of 25 trauma patients admitted to intensive care; 22 of the patients sensed they were being held prisoner and 14 recalled feeling that they were trying to escape.

The sense of imprisonment experienced by so many patients was also supported by factual events. Stella (Wilden and Howling, 1994) was restrained. "I can't begin to describe the horror I felt when tugging at the straps. If tied to the chair, I moved myself all over the room" (p.28). The elderly orthopedic patient was told she could not get up (Andersson, et al. 1993), and the trauma patients in the intensive care unit were immobilized with tubes, catheters, and in some cases, ventilators (Easton & MacKenzie, 1988).

Stella described her response to her "imaginings" as initial intrigue and then complete involvement. No other sources addressed this aspect of the experience, although Schofield observed that her elderly participants retained a sense of being separate from the "apparent reality of these images... holding on to the fact that they were in hospital" (p.946). She cited one man who said "All the movements going on of the nurses and

people talking. Although I knew I was in a ward, I thought I was in my flat" (p.946).

Another woman, who imagined herself to be entertained by ballet, reflected on her perceptions..."I think to myself, this is a strange hospital, people dancing and men walking through" (p.947).

These patients seemed less absorbed by their misperceptions than Stella. This may have reflected a more moderate confusion, or perhaps another dimension of the experience that has not been sufficiently examined.

Stella also describes her response to nursing intervention and her needs during her episode of delirium. She noted that nurse's efforts to orient her created anger and frustration, because "in my mind I thought I knew where I was". This response to orientation efforts contradicts current theory (Schofield, 1997), but finds some support in the case study by Andersson, Knutson, Hallberg et al. (1993). Andersson, et al. characterized the nurses' responses to the woman as objective and distant, using reality orientation procedures and avoiding entry into her world. This was seen to reinforce the patient's feelings of alienation and to impede communication of the meaning embedded in her verbalizations.

Stella outlined her care needs..."I think I needed implicit understanding and reassurance from the staff that they knew I was somewhere else, but that I could and would, come back. My children were also there for me with their strength and support. They pulled me back to reality by their presence at the bedside..." (Wilden and Howling, 1994, p.29).

Summary

In summary, the literature exploring the experience of acute confusion reveals an array of sensations and responses. Patients represent a range of ages and situations. The literature, however, is limited in size and scope. Three of the references cited are retrospective in nature, involving patients' recollections of their experience. The impact of retrospection on these reports is uncertain. The case study by Andersson and colleagues involved a two hour contact with the patient at the "height" of her experience, with followup interviews several days later. The study was strengthened by its prospective approach. However, since the researchers were notified after nurses determined the patient was acutely confused, there was no record of the patient's experience during the prodromal period (if this existed). Thus, there is much room to expand our knowledge of the experiential aspects of acute confusion.

Literature Review: Person Factors and Environmental Factors

Affecting Acute Confusion

Introduction

While there continues to be speculation surrounding the pathophysiology of acute confusion, considerably more investigation has focussed on the identification of etiology or risk factors. Research has implicated a vast range of variables in the development of acute confusion, but the relative influence of the variables either singly or in combination remains unclear (Foreman 1993; Rasmussen & Creason, 1991; Wilson, 1993). The limited size and the correlational design of many of these studies has weakened the strength of their evidence, providing little definitive evidence of causality (Foreman,

1993). An overview of key studies cited in this discussion is provided in Table 8.

Inouye (1993) identified seven prospective studies that systematically examined risk factors for acute confusion. Discrepant results were attributed to disparate populations (ie. medical populations vs. surgical populations) selected with varying ages and differing case finding methods. Foreman's 1993 literature review echoed these observations, pointing to varying etiologies "across the trajectory of illnesses, the nature of the health problem and the setting" (p. 15). While the results of studies examining medical populations might seem peripheral to this investigation, the complexity of health problems presenting in the hip-fractured elderly (ie. both medical and surgical) suggests the need for a broad perspective.

The most recent literature on risk factors for acute confusion distinguishes between predisposing factors (ie. those factors existing in the patient at baseline that increase vulnerability to acute confusion) and precipitating factors (ie. noxious insults or hospitalization-related factors that contribute to acute confusion) (Inouye, 1996). Inouye also emphasizes the need to differentiate between emergent and incident (ie. already present on admission) cases of confusion, in order to more systematically assess the effects of different variables. The literature describes delirium as a threshold phenomenon, where etiologies are multifactoral and cumulative (Foreman, 1993; Inouye, 1996; Jacobson, 1997; Neelon & Champagne, 1992).

Table 8

Overview of Studies Examining Risk Factors For Acute Confusion

Study	Population	Risk Factor Examined	Incidence	Significant Predictors
Bowman 1992	<ul style="list-style-type: none"> • 44 surgical patients, 50% elective, 50% non-elective • Ages 60-91 years 	<ul style="list-style-type: none"> • State and trait anxiety 	18% incidence overall (32% in unplanned group)	<ul style="list-style-type: none"> • None found
Bowman 1997	<ul style="list-style-type: none"> • 43 surgical orthopedic patients, 26 elective, (mean age 74 years) • 17 emergency (mean age 80 years) 	<ul style="list-style-type: none"> • Sleep satisfaction • Pain 	34.9% incidence overall (47% unplanned group) (27% planned group)	<ul style="list-style-type: none"> • Age
Duggleby & Lander 1994	<ul style="list-style-type: none"> • 60 total hip replacement surgical patients • age 50-80 	<ul style="list-style-type: none"> • Pain • Analgesia 	33% recorded one or more episodes post surgery	<ul style="list-style-type: none"> • Pain
Fisher & Flowerdew 1995	<ul style="list-style-type: none"> • 80 elective orthopedic surgical patients • Age 60 or older 	<ul style="list-style-type: none"> • Cognitive function • Medication • Co-morbidities • Age • Gender • Depression • Alcohol use • Preoperative active level • Urine elimination 	17.5% incidence	<ul style="list-style-type: none"> • Gender • Clock drawing scores

Study	Population	Risk Factor Examined	Incidence	Significant Predictors
Foreman 1989	<ul style="list-style-type: none"> • 71 medical patients • Age 60 or older (average 74.8) 	<ul style="list-style-type: none"> • Age, gender • Co-morbidities • Blood chemistry • Vision, hearing • Oxygenation • Medications • Environmental factors 	38% incidence	<ul style="list-style-type: none"> • Hypernatremia • Hypokalemia • Hyperglycemia • Hypotension • Azotemia • High number medications • Low number interactions
Francis, et al. 1990	<ul style="list-style-type: none"> • 291 medical and surgical patients • Age 70 or older 	<ul style="list-style-type: none"> • Cognition • Medication • Co-morbidities • Age, gender • Blood chemistry • Mobility • Infection 	22% incidence	<ul style="list-style-type: none"> • Abnormal sodium • Severe illness • Cognitive Impairment • Altered temperature • Psychoactive drugs • Azotemia
Gustafson et al. 1988	<ul style="list-style-type: none"> • III hip fracture patients • age 65 to 96 	<ul style="list-style-type: none"> • Preoperative characteristics • Anaesthetic type • Medication • Surgical complications 	33% incidence preoperatively 28% postoperatively	<ul style="list-style-type: none"> • Age • Dementia • Anticholinergic drugs • Depression • Operative hypotension • Urinary retention • Urinary catheters

Study	Population	Risk Factor Examined	Incidence	Significant Predictors
Inouye et al. 1993	<ul style="list-style-type: none"> • 107 general medical patients • Age 70 or older 	<ul style="list-style-type: none"> • Cognitive status • Co-morbidities • Age, gender • Depression • Blood chemistry • Hearing, vision • Mobility • Hemoglobin 	25%	<ul style="list-style-type: none"> • Cognitive impairment • Severe illness • Vision, hearing deficits • Dehydration
Marcantonio, Goldman, et al, 1994	<ul style="list-style-type: none"> • 1341 major elective non-cardiac surgical patients • Age 50 and older 	<ul style="list-style-type: none"> • Co-morbidities • Blood chemistry • Medication • Preop cognitive status • Depression • Alcohol use • Age • Type of surgery 	9% incidence on or after postop Day 2	<ul style="list-style-type: none"> • Severe physical impairment • Markedly abnormal K, Na, Glucose • Age 70 or older • Cognitive impairment
Marcantonio, Juarez, et al 1994	<ul style="list-style-type: none"> • 246 general surgical patients (91 delirious, 154 controls) • Age 50-90 	<ul style="list-style-type: none"> • Psychoactive medications • Narcotics • Benzodiazepines • Anticholinergics 		<ul style="list-style-type: none"> • Meperidine • Epidural analgesia • Benzodiazepines
Rockwood 1989	<ul style="list-style-type: none"> • 80 medical patients • Age 65-91 	<ul style="list-style-type: none"> • Age • Dementia • Severity of illness • Activity level 	25%	<ul style="list-style-type: none"> • Age • Unstable illness • Dementia
Rogers, et al. 1989	<ul style="list-style-type: none"> • 46 elective hip or knee surgery patients • Age 70 or older 	<ul style="list-style-type: none"> • Medication 	28% incidence	<ul style="list-style-type: none"> • Scopolamine • Propanolol • Flurazepam
Seymour and Vaz 1989	<ul style="list-style-type: none"> • 288 general surgical patients • Age 65-97 	<ul style="list-style-type: none"> • Co-morbidities • Age, gender • Elective vs emergency surgery • Type of surgery 	7% incidence	<ul style="list-style-type: none"> • Preoperative activity level

Study	Population	Risk Factor Examined	Incidence	Significant Predictors
Williams et al. 1985	<ul style="list-style-type: none"> • 170 hip fractured patients • Age 60 or over 	<ul style="list-style-type: none"> • Admission characteristics • Pain • Medication • Depression • Alcohol use • Blood chemistry 	51% incidence	<ul style="list-style-type: none"> • Age • Poor cognitive scores • Preoperative activity level • Urinary elimination problems
Williams-Russo et al. 1992	<ul style="list-style-type: none"> • 51 bilateral knee replacement surgical patients • Average age 71.6 	<ul style="list-style-type: none"> • Age • Gender • Dementia • Co-morbidities • Depression • Type of postoperative analgesia • Alcohol use • Education 	51% incidence	<ul style="list-style-type: none"> • Age • Gender • Preoperative alcohol use

In this paper, etiologic or risk factors will be considered within the response to illness framework, using person factors (both non-modifiable and modifiable), and environmental factors (environmental and social) to organize the variables. Given the proposed interrelationships among the different elements of the model, these etiologic or risk factors may not only influence the onset of acute confusion but also the experience of acute confusion by the sufferer. This supposition has not been addressed in the literature to date.

Person Factors (Non-Modifiable)

Age

With few exceptions (eg. Francis, Martin & Kapoor, 1990), increasing age has been identified in the research literature as an important predictor of acute confusion (Elie, Cole, Primeau & Bellavance, 1998). The phenomenon has been documented rarely in persons under age 25 years (Wilson 1993), increases fourfold in the population over age 50 years (Lipowski, 1990), and reaches peak incidence in those patients over 80 years (Schor et al.).

Vogel (1996) explains the effects of aging on cognition, observing that "only by giving up their ability to replicate do neurons attain stability of structure, an attribute prerequisite to cognition" (p. 62). This stability of structure permits the accumulation and retrieval of information essential to perform, but also leads to the accumulation of metabolic errors or deficiencies that impair neuronal function. The extent and impact of these changes remain unclear, due to an absence of longitudinal research and the heterogeneity of the aging population (Carmen, 1997; Rowe & Khan, 1987; Smith & Earles, 1996).

A number of age related changes are believed to occur in the brain. These include a decrease in the absolute number of neurons, a reduction in the number and efficiency of lysosomes, reduced production of neurotransmitters such as acetylcholine, and a slowed reuptake of transmitters (Bissette, 1996; Lipowski, 1987; Vogel, 1996). Albert and Moss (1996) cite evidence to dispute reports of reductions in grey matter (ie. cortical changes), pointing to changes in white matter, and the subcortical neurons involved in neurotransmitter synthesis.

Reduced cerebral blood flow may occur, attributable to atherosclerotic changes in the cerebral vasculature. This decline in blood flow, and a reduced metabolic rate impair cellular energy production (required for the synthesis of neurotransmitters, reuptake processes, maintenance of the sodium-potassium pump, etc.) and reduce the capacity for homeostatic regulation.

The magnitude of these changes and their impact on cognitive functions in the aged population are extremely variable. Studies of various skills show a large range of functioning in all cohorts, from age 50 to age 90, causing some authors to distinguish between the concept of "normal aging" and "successful aging" (Rowe & Khan, 1987).

Carmen (1997) refers to the Baltimore Longitudinal Study on Aging (BLSA) to identify some age-related changes that have been associated with the well elderly. These include a decline in sensory abilities (vision, hearing, taste, and smell), and increased reaction times. Results have also indicated a decline in short term memory, although other studies have challenged this finding.

Albert and Moss (1996) suggest that noted changes in short term and working memory are more appropriately attributed to decreased speed in processing new information presented as part of the memory task; the elderly are "not more rapidly forgetting what they learned but rather are taking longer to learn the new information" (p.221).

The BLSA reports two other age related changes that are noteworthy here. These include an overall decline in logical processes such as problem solving, and a decline in learning of verbally presented materials. The authors emphasize, however the heterogeneity of the participants, and note the presence of exceptions to the findings

within all groups.

Overall, age-related changes suggest a reduced efficiency in transmitting and processing incoming stimuli, with a general slowing of responses. The impact of these changes may only be evidenced when a specific individual threshold is exceeded. Neelon and Champagne (1992) hypothesize a diminishing reserve capacity in the aging brain, with a resultant decrease in the ability to respond to the challenge of cumulative stressors.

Gender

A number of studies have identified male gender as a risk factor for acute confusion (Fisher & Flowerdew, 1995; Schor et al. 1992; Sirois, 1988; Williams et al., 1985; Williams-Russo, 1992). An exception to this was Gustafson, Beerggren, Brannstrom et al. (1988) whose study of 111 patients with fractured hips found an equal distribution of confusion between men and women. There has been little speculation as to the basis for such a gender difference. One consideration absent from the literature was the speculation that men manifest acute confusion differently than women (in this case, with more aggressive behaviors), affecting rates of detection in some situations.

In related research cited by Easton and MacKenzie (1988), Kornfield et al. suggested that individuals with a personality type characterized by dominance, aggressiveness and self-assuredness were the most likely to be affected by acute confusion. Whether this finding is pertinent to the issue is uncertain, since research on the personality characteristics of elderly women has not been located.

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Preexisting Cognitive Impairment

Most studies have identified dementia as a strong contributing factor to the development of acute confusion (Elie et al., 1998). The relationship between dementia and acute confusion is also supported by the theory of reduced threshold discussed earlier; that is, organic brain changes result in the reduced ability of the brain to process stimuli and respond appropriately to external demand.

Williams and colleagues (1985) were more cautious in their comments regarding cognitive impairment, noting that patients who scored lower during cognitive testing (using the SPMSQ) were at greater risk of confusion. They speculated that while low test scores may have reflected an underlying dementia, poor performance may have resulted from the stress and anxiety associated with traumatic hip fracture and emergency admission to hospital.

Prehospitalization Activity Levels

The relationship between prehospitalization activity levels and incidence of acute confusion was identified by Williams et al. (1985a). The study noted that individuals with higher levels of activity prior to admission were less likely to succumb to confusion during hospitalization. Whether activity was a protective factor or simply an outcome of better physical and cognitive health was not clarified in the study.

Person Factors (Modifiable)

Impaired Vision and Hearing

Speculations about the link between impaired vision and hearing can be found in the early writings of Wolanin and Phillips (1981). Through photographs and discussion, the authors made a strong case for the impact of these impairments on the sensory-perceptual

processes crucial to the interpretation of incoming stimuli. Lipowski (1987) has attributed some of the age related changes in vision and hearing to the noted increase in acute confusion in the elderly.

Inouye (1993), in a carefully designed study, identified impaired vision as a risk factor for acute confusion that was independent of other factors. The relative risk created by hearing impairment was only slightly less than that of vision impairment. This finding supports the notion that accurate sensory input plays an important role in cognitive function.

Severity of Illness- Physiologic Instability

The number of physiologic derangements cited in the literature as predisposing to acute confusion are legion (Foreman, 1993; Jacobson, 1997; Lipowski, 1990; Marcantonio, Goldman & Mangione, 1994). These include metabolic, cardiopulmonary, nutritional, and fluid and electrolyte imbalances as well as infectious processes. Indeed, the diagnostic criteria for delirium set out in the DSM-IV requires the identification of a physiologic etiology.

This stance is supported by Rockwood (1989), whose study of 24 delirious patients identified an underlying physiologic cause in 22 of his cases. The author observed that resolution of the patients' deliriums accompanied resolution of their illnesses. It should be noted, however, that Rockwood also reported "the improvement in the mental state often closely followed the commencement of treatment... improvement was often before clinical or laboratory evidence for improvement could be demonstrated" (p. 153).

A number of research studies have identified severity of illness as a predictor of acute

confusion (Frances, Martin & Kapoor, 1990; Inouye, 1993; Rockwood, 1989). Not all studies identify the predictor in these terms, sometimes referring to instability of condition on admission (Rockwood, 1989), and measuring severity in different ways (eg. number of admitting diagnoses, subjective perception of nurse or researcher, APACHE II score greater than 16). Other studies have implicated more specific indicators of physiologic instability, often reflective of the patient population under study.

For example, Foreman (1989) described the confused medical patient as "hypermotremic, hypokalemic, hyperglycemic, hypotensive, and had elevated blood levels of creatinine and urea nitrogen..." (p.27), indicators confirmed in other studies of elderly medical populations (Frances, Martin & Kapoor, 1990; Inouye, 1993). Levkoff, Saffran, Gallup & Phillips (1988) added hypoalbuminemia and elevated white blood cell count to this list. In the surgical population (a group of patients admitted with hip fracture), intraoperative hypotension was identified as a significant predictor of confusion by Gustafson and colleagues (1988). This hypotension was observed to occur with greater frequency in patients undergoing spinal or epidural anaesthesia (vs. general anaesthesia). The researchers observed that 12 of the 13 subjects who experienced severe hypotension (systolic blood pressure under 80 mm Hg) developed acute confusion. In the postcardiotomy population, altered temperature (either increased or decreased) and hypoxemia have been associated with acute confusion (Wilson, 1993).

In sum, the list of physiologic derangements associated with acute confusion is limited thus far only by the size of research populations and the range of their health problems. A number of variables have been identified, and in some cases, confirmed by other studies.

However, many questions about the relationship between these risk factors and acute confusion remain to be answered. This is due, in part, to the fact that many patients labelled "at risk" do not develop acute confusion. Other patients defy the literature, manifesting acute confusion in the absence of any detectable etiology.

Immobility

Wolanin and Phillips (1981) and Lipowski (1990) have suggested a relationship between mobility (ie. lack of) and the incidence of acute confusion. While the work of Wolanin and Phillips explores the effects of immobilization on perception, little is known about the nature of this relationship (Jacobson, 1997).

In an early study, Williams (1979) associated the immobility created by the hip fracture with confused episodes. Exploring the topic of immobility and reduced sensory input, Roberts and Lincoln (1988) cited the early work of Zubek (1963), who demonstrated that five minutes of physical exercise four times a day minimized or eliminated cognitive disturbances in individuals subjected to sensory deprivation.

Inouye and Charpentier (1993) examined immobility and its relationship to incident delirium (ie. delirium whose onset occurred after admission to hospital) in an elderly hospitalized medical population. The following variables were measured: use of physical restraints, presence of a bladder catheter, use of 3 or more immobilizing devices, use of 3 or more immobilizing devices or restraints, and out of bed less than once a day. The investigators required that each factor be present for at least 24 hours before the onset of delirium to ensure that the variables preceded the onset of confusion.

While the incidence of all five factors was greater in the delirious group, two factors

emerged as significant predictors of confusion- 1)use of physical restraints 2)use of a bladder catheter. The authors explained the impact of these factors on confusion in terms of the increased (and often involuntary) immobility imposed on the patient. Thus, immobilization may have contributed to confusion by more than one mechanism- eg. decreased sensory input, stress and anxiety evoked by the involuntary nature of the immobilization, or both.

In another body of literature, the application of restraints has been found to diminish physical and psychological function (Mion, Frengley, Jakovic & Marino, 1989; Strumpf & Evans, 1991); additionally, Sullivan-Marx (1994) cites evidence that nursing interaction decreases after application of restraints, further limiting meaningful stimulation and potentially increasing anxiety.

Medication

Medications have been cited as a leading cause of acute confusion in the hospitalized elderly (Foreman, 1993; Francis, Martin & Kapoor, 1990; Inouye, 1993). Their action is frequently exaggerated in the elderly due to age-related changes in pharmacokinetics and pharmacodynamics (Lipowski, 1987). The most common medications implicated in acute confusion include those with anticholinergic properties (Tune et al., 1992) and drugs with psychoactive side effects such as sedative-hypnotics and narcotics (Marcantonio, Juarez, Goldman & Mangione, 1994).

Anticholinergics

Tune et al. (1992) have postulated that the "systemic absorption of anticholinergic medication is one mechanism of drug-induced delirium in the elderly" (p.1393). This is

consistent with one of the proposed pathophysiologic mechanisms for acute confusion- ie. failure of central nervous system cholinergic transmission.

Some medications such as atropine are well known for their anticholinergic properties; others include the antihistamines, tricyclic antidepressants and antiemetics and some narcotics. However, the list of medications that exert some anticholinergic effect include many lesser known drugs that are frequently administered to the elderly patient. Tune and colleagues assayed 25 of the drugs most commonly prescribed in the elderly population to determine their anticholinergic properties. Fourteen drugs produced detectable anticholinergic effects; of these, 10 were noted to produce anticholinergic levels associated with impairments in recent memory and attention in elderly subjects. Results are in Table 9.

Tune, et al. point out that since most elderly patients take three or more drugs, it is possible to experience a toxicity or drug induced delirium due to the cumulative effects of less readily identifiable compounds. This position is supported by research on the precipitating factors for delirium (Inouye and Charpentier, 1996). Inouye and Charpentier found that the addition of three or more new medications to a patient's drug regimen during hospitalization was a significant predictor of acute confusion.

Table 9

Anticholinergic activity of 25 commonly prescribed medications

Medication	Anticholinergic Drug Level (mg./ml. of atropine equivalents)
1. Furosemide	0.22
2. Digoxin	0.25
3. Dyazide	0.08
4. Lanoxin	0.25
5. Hydrochlorothiazide	0
6. Propanolol	0
7. Salicylic acid	0
8. Dipyridamole	0.11
9. Theophylline anhydrous	0.44
10. Nitroglycerin	0
11. Insulin	0
12. Warfarin	0.12
13. Prednisolone	0.55
14. Alpha-methyldopa	0
15. Nifedipine	0.22
16. Isosorbide dinitrate	0.15
17. Ibuprofen	0
18. Codeine	0.11
19. Cimetidine	0.86
20. Diltiazem hydrochloride	0
21. Captopril	0.02
22. Atenolol	0
23. Metoprolol	0
24. Timolol	0
25. Ranitidine	0.22

Research involving surgical patients has produced conflicting results. Gustafson, Berggren, Brannstrom, et al. (1988) reported a significant relationship between drugs with anticholinergic effect and the onset of acute confusion ($p=0.0005$). In their study, eighty-five percent (33/39) of the hip-fractured elderly subjects regularly treated with these drugs developed acute confusion. Conversely, Marcantonio, Juarez, Goldman, et al. (1994) found no relationship between these variables. They clarified these results, suggesting that the low rate of anticholinergic administration in their population (only 9% of their

245 subjects) limited statistical power.

Sedative-Hypnotics and Narcotics

Two other groups of drugs have been associated with acute confusion- the sedative hypnotics, specifically the benzodiazepines, and the narcotics (Frances, Martin & Kapoor, 1990; Schor, Levkoff & Lipsitz, 1992).

In the study by Marcantonio and colleagues (1994), both drug classes were examined for potential effects on the cognitive status of elderly surgical patients. The researchers scrutinized each drug class closely, to identify specific drugs within each category exerting effects on cognition.

Study results showed that as a group, narcotics were not associated with delirium, a finding contrary to the results of Francis, Martin and Kapoor (1990) and Schor et al. (1992), whose populations were largely medical. Among the specific narcotic agents, only meperidine showed a statistically significant association. Morphine, fentanyl, oxycodone and codeine showed no association to the incidence of delirium. The authors of the study speculated on the mechanism underlying the relationship between meperidine and confusion, referring to the anticholinergic activity of the drug and its active metabolite normeperidine. They also noted the long half-life of normeperidine, its idiosyncratic metabolism in the liver, and the potential for toxic accumulations, particularly in the elderly cohort.

The same study also considered the more recent modes of narcotic administration ie. epidural and patient controlled analgesia. Epidural analgesia was associated with delirium while patient-controlled analgesia was not. This might also have been explained by the

more frequent use of meperidine in the group of patients receiving epidural analgesia, or by other characteristics differentiating the groups (eg. the old old are rarely considered as candidates for patient controlled analgesia).

Williams-Russo, Urquhart, Sharrock et al. (1992) also investigated analgesic route and delirium, using a prospective randomized controlled trial. Elderly patients undergoing elective orthopedic surgery were assigned to one of two groups; one group received continuous epidural fentanyl and the other, continuous intravenous fentanyl. No significant differences were found between groups in rates of delirium. Other studies have been unable to detect a difference in cognitive outcomes related to epidural analgesia (Gustaffson, et al., 1988).

The study by Marcantonio et al. (1994) also found that benzodiazepines were significantly related to delirium, supporting earlier work by Frances et al. (1990) and Schor et al. (1992). Marcantonio and colleagues noted that the long-acting group of benzodiazepines (eg. diazepam, flurazepam) showed a stronger association with delirium than the short acting agents (eg. oxazepam, lorazepam, and midazolam). This finding was attributed to the prolonged half-life of the longer acting drugs, and potential for toxic accumulations.

To summarize, a vast array of drugs have been identified as potential contributors to acute confusion in the vulnerable elderly population. Some of these medications may contribute individually to onset of confusion. In more cases, however, confusion may be attributed to the effects of multiple drugs and their cumulative effects on cognition.

Stress and Anxiety and Coping

Lipowski (1990) has identified psychological stress or anxiety as a factor contributing to the occurrence of acute confusion. (The proposed mechanism for this relationship was described previously in the "pathophysiologic perspective"). However, little formal research on the relationship between these variables exists.

Sirois (1988) assessed the role of anxiety in 100 case studies of delirium, rejecting the notion that anxiety was secondary to cognitive deficit, and proposing that anxiety acted as a "catalytic factor aggravating the delirium" (p.377). He based this view on several observations. 1) There were a number of surgical patients who experienced "interval delirium" (delirium after a lucid interval postoperatively) in the apparent absence of any metabolic factors or other presumable causes. "Very often in the surgical cases, anxiety and the postoperative status were the only noted elements" (p377). 2) Anxiety was found in 44% of the surgical cases, almost twice the rate of the medical patients, leading Sirois to the conclusion that anxiety was a more significant contributor to postoperative delirium than to medical cases. Sirois noted that anaesthesia and anaesthetic products were confounding variables not accounted for in the study. It is also not clear whether the role of pain was examined in the affected surgical patients.

Rockwood (1989) also considered the role of anxiety in attempting to explain his subjects' apparently premature improvements in cognitive status following the initiation of treatment for underlying medical causes. It is also noteworthy that in his study of 22 subjects who experienced delirium, the two patients whose etiologies could not be identified were elderly women who had sustained traumatic limb fractures .

Other studies have found the incidence of delirium to be high amongst orthopedic patients (Williams-Russo, 1992), particularly those with hip fractures (Rogers, Liang, Daltroy, et al., 1989; Williams, Campbell, Raynor, et al., 1985). Bowman (1992) observed a higher rate of acute confusion in orthopedic patients with unplanned surgery (versus planned surgery), attributing the difference to the effects of the trauma underlying the initial injury, the unexpectedness of the surgery, and the uncertainty of outcome.

Bowman's study (1992) examined the effects of anxiety on postoperative delirium, hypothesizing that unrelieved anxiety might contribute to the development of delirium as adaptive mechanisms became exhausted. She differentiated between state anxiety (a situation specific response) and trait anxiety (a more stable tendency which is considered to be part of an individual's acquired disposition), testing for both characteristics in a surgical group of 50 patients over the age of 60 years. Bowman did not find any direct or linear relationship between anxiety and delirium; she noted that patients who experienced delirium postoperatively did not experience greater state or trait anxiety than those who did not exhibit delirium. Patients' levels of anxiety actually decreased in the postoperative period, at a point when the incidence of delirium increased. Small sample size or measurement error might have accounted for her findings. Bowman suggested the need for future research into alternative concepts such as uncertainty and coping styles and their relationship to acute confusion.

In brief, the relationship between anxiety and acute confusion remains unclear. However, this topic, and concepts of uncertainty and coping are important to the group of patients selected for this study, and require further exploration.

Pain

There are few studies in the literature that have examined the relationship between pain and cognition. This relationship has been confounded by the interrelatedness of other factors such as age, analgesia, immobility (Williams et al. 1985), and associated fatigue and sleeplessness (Bowman, 1997; Duggleby & Lander, 1993).

In examining predictors of confusion in elderly hip-fractured patients, Williams et al. (1985) postulated that unrelieved pain (as opposed to narcotic administration) might account for confused episodes. They observed that the average amount of administered narcotic in their population was modest, and that as narcotics increased, odds for confusion decreased. The basis for this correlation was not elaborated, and might also be explained by the reluctance of health practitioners to prescribe or administer narcotics to the old old or to the cognitively compromised patient (Duggleby and Lander, 1993). Other evidence suggests that cognitive status influences reporting of pain, with increased underdetection in the cognitively impaired individual (Miller, Moore, Schofield & Ng'andu, 1996).

The studies by Duggleby and Lander (1994) and Bowman (1997) focussed on pain as a predictor of cognitive function in the older population. Duggleby and Lander studied sixty cognitively intact orthopedic patients, aged 50-80, who had undergone total hip arthroplasty. Using the MMSE as an indicator of cognitive function, cognition, pain, narcotic use, and sleep disturbance were tracked throughout the pre and postoperative period. Analysis of the data revealed pain as the major predictor of cognitive decline - not analgesic intake. The authors identified a number of uncontrolled variables that could

have affected outcomes. These included nonanalgesics and anaesthetic agents administered in the perioperative period, and fatigue, a common complaint offered spontaneously by participants during data collection. An additional weakness of the study, not identified by the authors, was the presumption that a reduction of one point in the MMSE score (the mean day 2 score) represented a meaningful change in cognitive function in this group of patients.

Bowman (1997) examined pain and acute confusion in two groups of elderly orthopedic surgical patients- one group who underwent a planned surgical event (eg. hip replacement), and another whose surgery was unplanned (eg. hip-fracture repair). Her intent was to compare the effects of similar surgical interventions occurring within different contexts. Bowman's study also addressed psychological concerns and sleep satisfaction as variables, responding to previously identified weaknesses in the literature on pain and cognition. In relation to sleep satisfaction, Bowman observed that deprivation of REM sleep (likely to occur in postoperative patients receiving opioids and drugs with anticholinergic effects) had previously been found to reduce the availability of acetylcholine and produce changes in memory performance, establishing a potential relationship between altered sleep patterns and confusion.

Several outcomes of Bowman's study are pertinent to this discussion. As a group, subjects who experienced delirium had pain scores which were consistently higher than the scores among those without delirium. However, further analysis revealed that the unplanned surgery group who experienced delirium had the highest pain scores of any group throughout the entire hospitalization, while the delirious group of planned surgery

patients reported the lowest measured pain scores of any group.

Thus, results did not support a direct causal link between pain and acute confusion. Moreover, since sleep satisfaction was poor in the planned surgery group, even an indirect link between pain, poor sleep and acute confusion could not be established.

To summarize, the literature on pain and cognition is limited. Results have been contradictory, and obscured by uncontrolled variables and differences in methodology.

Environmental Factors

Some factors associated with acute confusion are introduced to the patient as a function of their hospitalization. Inouye (1996) uses the term "precipitating factors" to encapsulate these events, described as "noxious insults or hospitalization-related factors"(p852). Here, the term environmental factors will be used, and will include the subcategories of the physical environment and the social environment.

Factors in the Physical Environment

Hospitalization represents a drastic change in the amount, character, quality and intensity of environmental stimuli (Wilson, 1993). Theorists suggest that this change in normally encountered cues from the external environment interferes with neural function and impairs perception (Lipowski, 1990; Roberts & Lincoln, 1988).

Relocation to the hospital environment involves the sudden loss of familiar objects and normally encountered cues (Foreman, 1989; Williams et al., 1985), creating a disruption in the pattern and meaning of life experiences (Wolanin & Phillips, 1981). Poor environmental lighting (Kolanowski, 1992) predisposes to misperceptions of visual stimuli, and diurnal variations in light and dark are lost. New auditory stimuli are

encountered, with intercoms and a host of unrecognizable (frequently inaudible) voices that include both patients and hospital caregivers. Intravenous pumps hum, alarming at unpredictable intervals, and personal pagers beep. The environment that is normally relied upon to provide orienting cues, now presents a barrage of stimuli to process and interpret.

Thus, the hospital environment may in some cases contribute to an overload of unfamiliar sensory information, and a breakdown of sensory processes (Easton & MacKenzie, 1992). In other circumstances, the hospital environment may provide stimulation that is meaningless and insufficient to maintain cognitive processes in the vulnerable individual (Evans, Kenny & Rizzuto, 1993; Kozak-Campbell & Hughes, 1996; Neelon & Champagne, 1992).

Research on the impact of the environment on acute confusion is limited. Roberts and Lincoln (1988) were able to demonstrate an environmental effect on the cognition of institutionalized elderly, but failed to observe this in the hospitalized individual. The literature on delirium in the intensive care unit suggests that while environmental factors may contribute to delirium, they are not sufficient to cause delirium in the absence of other factors (Easton & MacKenzie, 1988).

Studies on nursing interventions to manipulate the environment and reduce confusion in the vulnerable elderly have produced equivocal results. Williams (1985b) found some improvement in the cognitive outcomes of the hip-fractured elderly, but stressed that interventions met with only limited success. Nagley (1986) found no difference between her experimental and control groups, but cited possible measurement difficulties in

accounting for a low incidence of confusion in both groups. Miller (1996) was unable to identify changes in the outcomes of her elderly, hospitalized subjects but stressed that measurement was difficult due to wide variations in outcome and a small patient population. Thus, there is considerable need to expand the research base on this topic.

Factors in the Social Environment

Admission to hospital produces a drastic change in the patient's social environment. Contact with family and friends is disrupted, and the patient is surrounded with unfamiliar and frequently changing personnel (Easton & MacKenzie (1991). This is postulated to reduce meaningful cues necessary for accurate perception, and to increase patient anxiety (suggested earlier as contributing factor to acute confusion). Foreman (1989) observed that nonsurgical hospitalized patients who had little contact with significant others were more likely to experience acute confusion, a correlation that has not been examined in other published work.

A number of nursing intervention studies have attempted to modify the patients social environment in an attempt to reduce the incidence of acute confusion (Miller, 1996; Williams, Campbell, Raynor, et al., 1985b). Changes have included increasing continuity of caregivers through more consistent assignment, modifying nursing approaches to reduce the fragmented, impersonal and rushed interactions that characterize the surgical setting, and increasing the presence of significant others.

Studies have met with varying degrees of success, and the use of multiple approaches have made it difficult to isolate the effectiveness of specific approaches. In both the aforementioned studies, participating nurses observed the difficulties in reducing numbers

of health personnel in contact with the patient and in improving the length and quality of their interactions with the patient. One nurse commented on frequent disruptions and the lack of available time..."We're walking backwards out the door. Patients are trying to talk to us and we keep walking backwards to try to get out" (p. 444). Staff nurses in Miller's study (1996) reported the personal benefits of greater continuity in caregiving, citing the opportunity to bond with the patient..." we finally got the chance to bond with the patient...They became individuals...they were people" (p.444).

Knowledge of the patient, and its impact on the early detection of acute confusion has not been empirically tested in the research literature. However, given the tendency of staff to attribute cognitive changes in the elderly to senescence (ie. a natural consequence of aging) (Eaton, Stones & Rockwood, 1986; Foreman, 1993; Inouye, 1994; Palmateer & McCartney, 1985; Rasmussen & Creason, 1991), more individualized caregiving could be predicted to improve detection and treatment of acute confusion.

From a different perspective, Wells and Baggs (1997) examined the cognitive benefits of rooming-in for elderly orthopedic surgical patients. The authors speculated that the constant presence of a familiar person would reduce anxiety, and in patients exhibiting confusion, reduce the need for restraint as a protective measure. Outcomes showed no difference in rates of confusion (perhaps due small sample size) but showed high feasibility and satisfaction amongst patients and significant others.

The impact of the social environment on development of acute confusion remains vague and relatively unstudied. This situation can be attributed to difficulties in control of independent variables, and in establishing causality (due to multifaceted intervention

conditions). These difficulties will need to be surmounted for quantitative research of the topic to progress. Qualitative study offers a more viable alternative to the study of this topic.

Summary

Research on the factors influencing acute confusion has been slowed by the diversity of the affected population, and the cumulative and interacting nature of the variables. Investigators such as Inouye have attempted to refine the (quantitative) research of influencing factors, distinguishing between predisposing and precipitating factors, and emphasizing the importance of selecting emergent cases of delirium for study.

However, given the current results of study, it is likely that factors influencing the development of acute confusion may be as individual as those experiencing the phenomenon. The use of qualitative research, with its emphasis on the individual as part of a whole, may provide a useful vehicle for study of this topic.

Conclusion

Acute confusion emerged from the literature as a complex phenomenon whose "whole is greater than the sum of its parts". The phenomenon has multiple etiologies that are likely cumulative in their effect, and multiple, shifting manifestations. Core characteristics are still controversial and unvalidated, and the natural history of the response within various subgroups is largely undocumented.

Use of the Human Response to Illness Model to structure this literature review revealed a paucity of research on the experiential component of acute confusion. The relative absence of literature on this aspect of acute confusion was significant, given the

"powerfully subjective" nature of the response (Foreman, 1990). Foreman (1993) pointed out that "without insight into the subjective meaning and experience of acute confusion, a comprehensive understanding of this phenomenon may not be attainable" (p.20).

In sum, gaps in the literature suggested the need to examine the experiential aspects of acute confusion, as well as its natural history and influencing factors. A qualitative approach, using a relatively homogenous group of participants offered a viable and meaningful way in which to explore these dimensions.

Chapter III

METHODOLOGY

Introduction

The literature portrays acute confusion as a complex and multifaceted phenomenon, diverse in its presentation and course, with multiple and possibly cumulative etiologies that vary within the affected populations. Rudberg, Pompei, Foreman, Ross, Cassel (1997) describe acute confusion as a "syndrome of heterogeneity". Thus, despite the developing research base, acute confusion remains a poorly understood phenomenon. The quantitative approach to data collection has produced equivocal results, and the experiential dimension of the phenomenon remains understudied.

A case oriented approach (Hamel, 1993; Sandelowski, 1996) was selected to examine the experience of acute confusion within a specific population- ie. elderly women with traumatic hip-fracture. This approach offered a way in which to optimize understanding of the individual experience of acute confusion, and facilitated the in depth exploration of variables necessary to gain insight into a phenomenon of such complexity (Polit & Hungler, 1995). Using five participants, the study addressed the following questions:

- 1) What is the experience of acute confusion in elderly hip-fractured women?
- 2) What are the clinical characteristics of acute confusion in this population?
- 3) What person factors and/or environmental factors contribute to the response of acute confusion in this group?

Sandelowski (1996) explains that the case oriented approach emphasizes exploration of a phenomenon as a whole, treating the features of each case as an ensemble rather than as disaggregated variables. Data analysis attempted to discern the confluence of variables and their relationships for each participant (ie. case); then all cases were examined for patterns or themes emerging from the group.

The case study approach used both qualitative and quantitative elements. However, the epistemological thrust of the study was qualitative. The intent of the study was to gain an "understanding (of) the particular in the altogether" (Sandelowski, 1996, p. 525) - that is, to understand the response of acute confusion within its fullest context. The participant's perspective was a central element of the design (Tellis, 1997), and the selected setting was naturalistic. No attempt was made to control "extraneous variables", outside the criteria for sample selection (Morse & Field, 1995).

The study did not adhere to any of the "traditional" qualitative research methods (ie. phenomenology, grounded theory, or ethnography), instead integrating both qualitative and quantitative data from the psychosocial and biophysical realms. This "mixed" approach (Thorne, Kirkham, and MacDonald-Emes, 1997) was devised as the best "fit" for the research questions, given current knowledge of the topic. Additionally, it was consistent with my view of the human health and illness experience as portrayed by the Human Response to Illness Model.

In the following chapter, details of the study design are addressed, including selection of participants, the setting, data collection methods, analysis of data, and ethical considerations. Measures to enhance the rigor of the study are also discussed.

Study Design

Selection of Participants

Selection of participants for this exploratory study was purposive, guided by the questions and the research base to date. Sampling was intended to comply with the principles of appropriateness and adequacy applicable to qualitative work, as outlined by Morse and Field (1995). In addition, the inclusion criteria was intended to produce a relatively homogenous group of participants, as suggested by Trzepacz (1994). Inclusion criteria and pertinent rationale are provided in Table 10.

The need for the researcher to establish her presence at the bedside before the participant developed acute confusion created additional complexity in the research design. This element of the study was important, however, because it allowed documentation of the experience, course and characteristics of acute confusion prospectively from the prodromal period (which is frequently missed by staff) to resolution of symptoms in most participants. Initial presence at the bedside provided an opportunity to gain the participant's recognition and trust, and to explore the person and environmental factors that might impact on the experience of acute confusion.

Staff identified potential participants during admission to the surgical unit, and verified their interest in the study (see "Appendix C"). Both the patient and her family were approached. After notification by the unit clerk, and within two to three hours, the researcher approached the patient and family for consent to participate. (Consent issues will be discussed further in the section "Ethical Issues"). An exception was made to this protocol for one patient, who was admitted to the study after resolution of her symptoms

of acute confusion. This is discussed in Chapter IV "Findings".

Table 10

Inclusion criteria for participants

INCLUSION CRITERIA	RATIONALE
Female	Women constitute the largest segment of the elderly population; are frequently overlooked by researchers; may experience or manifest acute confusion differently than men.
Age 80 or older	The incidence of acute confusion is highest in this age group.
Cognitively intact on admission to hospital; no validated history of psychotic illness (determined by entry diagnoses, reports of family, and ability to participate in an admission history)	While those with chronic cognitive impairment are more susceptible to acute confusion, their experience may be impacted upon by preexisting dementia (in ways that are not readily discernible). Mental illnesses such as schizophrenia may produce some of the symptoms associated with acute confusion.
Admitted to the general surgical unit for treatment of a traumatic fracture of the hip or femur	The incidence of hip fracture in the elderly cohort is high, making this an important group to study. Moreover the rate of acute confusion in this group has been reported to be 50% or greater, and is poorly explained.
No validated history of alcohol abuse (obtained as part of routine admission history)	Delirium tremens, which results from alcohol withdrawal, has been identified as a distinct disorder, with characteristic changes in EEG, specific behavioral patterns, and a definable etiology and treatment. etc.
Living independently prior to injury	An independent living situation suggests a more cognitively capable individual. Moreover, the psychological impact of traumatic hip fracture and sudden hospitalization may differ between those at home and those who have been previously institutionalized.
Able to communicate in English	The research design requires ongoing communication between the participant and myself. The need for an interpreter would place unmanageable constraints on the study.
Develops symptoms of acute confusion within 48-72 hours of contact (as determined by a score of 24 or less on the NEECHAM Confusion Scale).	While the literature varies on when acute confusion is likely to occur, usually prodromal symptoms or acute manifestations are observed in this group of patients within 48-72 hours. Note that the participant is initially admitted to the study <i>before</i> onset of acute confusion, and then retained as a participant should symptoms of acute confusion appear within the specified time frame. (see discussion below).

Once consent was obtained, the patient was admitted to the study for 48-72 hours.

During this time, The researcher was present at the bedside twice daily as a participant

observer (see details in "Data Collection"). The participant observer role provided the opportunity for the researcher to develop a rapport with the participant and learn about her background, needs and personality.

The NEECHAM Confusion Scale was administered during each period of contact to provide an "objective" determination of the onset of acute confusion. At the end of 48-72 hours, contact with the participant was concluded if no symptoms of acute confusion were observed. Brief followup visits were made to avoid sudden termination of the relationship and to provide ongoing support during hospitalization.

The patients who developed symptoms of acute confusion remained study participants until symptoms resolved or, in the case of one participant, until her symptoms stabilized.

Role of the family or significant others

The elderly hip-fractured woman was the focal point of this investigation. However, for all of these women, family members were frequently in attendance at the bedside.

Williams (1993) suggests that significant others may be highly influential in the decision making process for elderly participants, and clinical experience indicated that many wish to be involved in caregiving activities and decision making during their elder's hospitalization. Family and significant others provided a wealth of information about the participant, and served as an important resource in the investigation.

Families provided historical information on the participant's background and character as well as recent cognitive and functional abilities. This was useful in interpreting behaviors manifested by the participant, particularly during the intense and stressful admission and perioperative periods, as well as during periods of confusion, when some

participants were unable to interpret and respond to questions. The participation of significant others also served to decrease stress on the participant by reducing the need for questioning during difficult periods. Those close to the participant were well positioned to judge whether behaviors manifested by the participant were "in character" or newly developed and to interpret behaviors and comments within the framework of the participant's life story.

It was anticipated that the incorporation of family members into the research process would present some ethical concerns regarding the rights of the participant. These were addressed by requesting permission of the participant to interview family members as part of the data collection process. Family members were also approached for their permission to act as contributors to the study (see Ethical Considerations).

Sample size

The sample included five participants (exclusive of significant others), and was limited by time constraints and the time and labor intensive design of the study. This produced a large, complex, and detailed data base.

Setting

A small (30 bed) surgical unit in a community hospital was selected as the research setting. The unit had a stable, experienced staff that was relatively easy to inform of my presence and role, and communication between parties was good. The researcher's past clinical experience on the unit as a graduate student found staff were willing and able to provide prompt notification of newly admitted patients who fulfilled outlined criteria.

The setting was extended to include the operating and recovery rooms (when the patient

was accompanied to surgery).

Plan for Data Collection

Within the case study approach a variety of methods were used for data collection.

Methods included participant observation, questioning and formal and informal interview of the participant and significant others, as well as chart review.

Participant Observation

Participant observation served as the primary method of data collection for the study.

Morse and Field (1995) distinguish four types of participant observer roles; 1) complete observation, in which the researcher acts as a member of the group (ie. a nurse) and conceals the researcher role, 2) participant-as-observer, in which the researcher participates in caregiving, while at the same time collecting research data, 3) observer-as-participant, in which the researcher participates minimally as caregiver, and focusses on data collection, and 4) complete observer, in which the researcher is passive, with no direct social contact in the setting.

The participant-as-observer role, in which the researcher provided basic hygiene and personal care, was selected for data collection in this study. This method was essential to the success of the study for several reasons. First, the four or more hours of contact between researcher and participant each day provided the close and prolonged contact necessary to gain the participant's trust and to access the participant's "world". Second, participant observation afforded an opportunity to learn about each participant's personality or character in order to more accurately assess the meaning of her behavior. Third, knowledge of the participant gained through ongoing contact helped distinguish

new or uncharacteristic behaviors that signalled the onset of acute confusion. Fourth, participant observation helped acquire an understanding of the environment and the circumstances contributing to the participant's responses. It allowed the researcher to identify the sequence and connectedness of events surrounding the participant's experience. Finally, given the current stresses within the health care system, and the high needs of the elderly hip-fractured patient, a less active role in caregiving would likely have served to alienate both the participant, family, and nursing staff.

Specific nursing care responsibilities were negotiated with ward staff, and clearly specified to unfamiliar staff at the onset of each observational period. Duties included basic comfort measures such as skin care, turning and backrubs, assistance with hygiene, feeding and mobilization. The researcher completed vital signs and oxygen saturation measures as required and reported the need for analgesia or other care to the responsible staff nurse.

The number of hours spent with each participant varied, based on the acuity of the participant, and the "phase" of our contact. Contacts were intended to extend for approximately two hours twice daily, and interspersed between the day and evening shifts. This was intended to correspond with the diurnal pattern of symptoms that has been documented in the literature. More time was spent with the participant during the perioperative period, when she was accompanied to surgery and recovery.

Content of observations

In keeping with the HRI Model, observations focussed on the participant's verbal and nonverbal behavior (ie. facial expression, body language and /or psychomotor behaviors),

and the physical and social environment. An observation guide is outlined in Appendix D.

The NEECHAM Confusion Scale was used at each contact to quantify cognitive function and to determine the presence and severity of acute confusion. A description of the tool and its psychometric properties was provided in the review of the literature; the reader is referred to this section to avoid redundancy. Observations were not confined to those outlined by the tool, but included any verbal or nonverbal behaviors that the researcher perceived to represent a change from baseline characteristics.

Physiologic parameters will also be measured, with particular attention to vital signs and oxygen saturations, easily monitored at the bedside with available equipment. The frequency of these measures correlated with the perceived acuity of the participant, both physiologically and psychologically. The researcher's measurements were supplemented by data taken from the chart.

Cognitive status of each participant was assessed throughout contact (ie caregiving) using discrete observations, to minimize threat to the participant. Observations are listed in the assessment guide as well as the NEECHAM scale. Rasin (1997) points out that the elderly may be particularly susceptible to anxiety when confronted with a "testing" situation. Heightened autonomic arousal can be associated with decreased performance, particularly in memory related tasks. Given the anxiety producing nature of the hip-fracture situation, the researcher felt an obligation to minimize any additional stress created by research participation.

Observations of the physical and social environment included the overall physical

layout of the room, presence of familiar objects such as bedcovers from home, pictures, etc., presence of orienting devices such as clocks and calenders, and the presence and interactions of staff and significant others.

Chart Review

With consent of the participant, chart review was used to confirm demographic information such as age, injury, concomitant illness(es) and medical history. In addition, ongoing documentation of the participant's condition (eg. vital signs) supplemented researcher observations. Data such as vital signs, laboratory results (eg. hemoglobin, white blood count, electrolytes, blood glucose, blood urea nitrogen, urinalysis, was collected daily. All medications from the pre, intra, and postoperative periods was tracked, including utilization of analgesics, sedatives, etc. Finally, fluid balance records were used to supplement observations of hydration status.

Questioning, Formal and Informal Interviewing

Questioning took different forms during the course of data-gathering. This ranged from the informal and spontaneous questions that arose during direct caregiving, to the questions raised during a post-confusion semistructured interview with one participant. Questions were directed to both the participant and (with the consent of the participant) family caregivers. The overall purpose of these questions was to understand what the participant was experiencing as different behaviors were manifested.

Questions posed to the participants during care focussed on their experience as it evolved. Some were open-ended, such as "Can you tell me what you are seeing when you close your eyes?". In another example, a participant who had been agitated, aggressive

and resistive of care the previous evening was asked "You weren't your usual self last evening. You were very upset with the nurses. Can you tell me what you remember about the evening?". Often, the researcher simply encouraged participants to lead interaction during caregiving by asking such general (and purposefully vague) questions as "How are you doing right now?".

Other questions during caregiving were direct and closed ended, used when the participants were less able to attend or were distressed and agitated. Examples of this type of questioning included "Are you in pain?" or "Can you hear me right now?". Questions were minimized during periods of distress if the participant was incapable of attending or responded with increasing agitation.

Questions directed to significant others addressed their perceptions of the participant's behavior. The intent was to explore the underlying basis for the participant's statements or behaviors, and to learn whether specific behaviors could be understood within the participant's character and life story or current circumstances.

Semistructured Interview

An open-ended semi-structured interview was completed with only one participant, five days after resolution of her acute confusion. The participant's readiness to participate in a post-confusion interview reflecting on the confusion experience was determined by a NEECHAM Confusion Scale result of 29, my own perceptions of the her lucidity and general strength, confirmed by the participant. The interview was held as soon as possible after resolution of symptoms to minimize memory loss surrounding the event. The primary intent of the interview was to learn more about the participant's perceptions and

remembrances of the experience of being confused, and the feelings that the episode elicited.

The interview was held at the participant's bedside, in a semi-private room. The participant was comfortable with the privacy this afforded, since her roommate was semi-conscious and slept (somewhat noisily) throughout the time. Curtains between the beds were drawn and the door of the room closed. Staff, informed of the interview in progress, limited entry to the room to occasional checks of the adjacent patient. The interview lasted for approximately 30 minutes, determined by the participant's desire to continue and her physical wellbeing.

Before proceeding with the interview, the researcher reviewed its nature and purpose, and reminded the participant that participation was completely voluntary. She was told that she could refuse to answer questions if desired and that she could stop the interview at any time.

The interview was tailored to the verbal responsiveness of the participant, providing as little external structure as possible to elicit meaningful data. This less structured approach was intended to encourage the participant to respond in her own words and focussed on aspects of the experience most memorable or meaningful to her.

The interview began with a "grand tour" question (Polit & Hungler, 1995), and the participant's responses served to structure the remainder of the interview. Probes were used as necessary to stimulate thoughts about the described events and to clarify the participant's perceptions. An interview guide is found in Appendix E.

Field Notes

During the course of my participant observation, field notes were used to document observations and experiences at the bedside, including verbal and nonverbal behaviors of the participant and the context in which these occurred. Field notes included ideas generated by my observations and experiences at the bedside, and noted possible relationships between factors in the social and physical environment and the cognitive and behavioral responses of the participant.

Some observations were recorded in a small notebook at the bedside during caregiving (the construction of words and sentences used by the participant may be disconnected and poorly organized, making them difficult to remember for later recording). This practice was suspended once, at the request of a participant who was paranoid and delusional, to avoid exacerbating her symptoms.

Alternatively, events, situations or ideas were recorded immediately following each caregiving period, in a quiet location in the locker room. Remaining in the setting ensured minimal loss of data (Morse & Field, 1995), and allowed a return to the bedside or the chart to verify data.

Some field notes were made following interview of the participant. These recorded nonverbal behaviors manifested by the participant during the interview, observations of context, and "intuitive" responses I had to the data set. All field notes were dated and timed to permit sequential filing.

Tape Recording

A tape recorder was used to record the semi-structured interview, on consent of the participant. This allowed minimal distractions for both the participant and myself, and ensured focus on the topic at hand. The literature suggests that use of a tape recorder may be intimidating for some participants, but that anxiety usually diminishes after a brief period. The researcher looked for evidence of this, but found the participant was unfazed by the recording device, even asking for it to be turned off at one point to share an "unrelated" thought (which remained in confidence).

The tape recording of the interviews was transcribed verbatim, dated and filed with additional field notes taken after the interview.

Ethical Issues

This study presented a number of ethical challenges, created by the qualitative nature of the study, the characteristics of the participants, and the number of involved parties. Ethical challenges were inherent in the process of obtaining informed consent, the immersion of the researcher in caregiving activities, data analysis and the recording and reporting of data (Robley, 1995). Each of these areas were addressed in order to receive approval from the Ethical Review Committee, Faculty of Nursing, University of Manitoba and to gain access to the clinical setting.

Qualitative research implies an involvement and interaction between researcher and investigator that is unique to naturalistic inquiry (Munhall, 1988; Robley, 1995). There is little distancing between the two parties. In fact, success of the investigation is founded on a trusting relationship, conducive to the sharing of the participant's innermost thoughts

and feelings. This study, with its prolonged participant observation and semi-structured, face-to-face interview, increased the vulnerability of the participant and demanded a high degree of ethical responsibility. I believe that the inherent risks of the study (ie. primarily psychological or emotional stress of sharing the experience of acute confusion) were offset by the benefits to both the research community (ie. gaining insights into the phenomenon to improve nursing practice) and to the participant (ie. having a knowledgeable and supportive caregiver with which to share and explore feelings and responses).

The participants in this study were especially vulnerable for a number of reasons. They are female, elderly, and frightened and distressed by their unexpected injury and admission to hospital. At some points in the data-gathering process, they were incapable of giving informed consent (due to impaired cognitive function and/or to the effects of anaesthesia or medication).

Williams (1993) studied the concerns of elderly patients and their families regarding research participation, making several important observations. She noted that the "incapacitated patient can be frightened and intimidated by strange surroundings, fearful of their health and perhaps their life, and far from exercising free power of choice" (p.14). Williams also observed that many times elderly persons and their families are not aware that participation is voluntary and withdrawal of participation without penalty. Finally, Williams' study also underlined the importance of significant family members or friends in the decisionmaking process surrounding the elder's research participation.

In short, the needs of these participants required special attention to ensure their rights

were protected throughout the study. Measures to achieve this goal are outlined here.

Consent

Patients were approached for consent to participate after being admitted to the surgical unit. The unit provided a quieter, less distressing, and less distracting milieu than the emergency department, and patients were more settled. This arrangement was intended to reduce additional stress on prospective patients and allow more time to consider their decision about participation.

The staff nurses (who were briefed on the study's entry criteria- see Appendix F for "Explanation of the Study") informed potentially suitable patients and significant others that a research study was in progress, and verified willingness to speak to the researcher. Nurses were provided with a script to guide their comments (see Appendix C). On agreement of the patient and family, the researcher contacted them directly to describe the study and solicit participation. An "Invitation to Participate" for both the participant and family, and a consent to participate for the prospective participant were provided to the respective parties. These are found in Appendices G,H,I respectively.

All participants and families consented to participate. Only one participant showed hesitancy, looking to her family for direction before proceeding. Family indicated her response was characteristic of all her decisionmaking and did not reflect an unwillingness to participate.

Patients provided a written consent, consulting with significant others as desired. The form was typed in larger, bold print, and used common language to accommodate visual deficits and ensure understanding by the reader. Potential participants were encouraged to

read the consent form out loud, and ability to read and understand its contents was considered as partial evidence of cognitive intactness (Schofield, 1996). Families were asked to read and sign their invitation to participate, to indicate their willingness to assist in the study.

The researcher emphasized that participation was completely voluntary, and could be withdrawn at any time without jeopardizing care. This was reaffirmed prior to the semistructured interview.

Finally, staff were approached to inform them of the details of the study, as well as their role in the study (ie. first, to identify and inform potential participants about the study, and second, to have a peripheral role as participants because of their presence and interaction at the bedside). Staff were informed of the voluntary nature of their roles and asked to notify the researcher if they preferred not to participate. This was outlined to them in a written explanation, found in Appendix . All staff were extremely supportive, and none expressed a desire to be excused from the study.

Involvement of Significant Others

As noted earlier, many elderly participants look to significant others to advocate for them in all aspects of care and decisionmaking. For this reason, significant others were involved in many aspects of the research design, and their consent to participate was obtained. However, it was anticipated that in some cases, participants and their families might not share such a relationship. To avoid conflict between participant and family, and to ensure the participant's rights were protected before all other parties, the participant's views on family participation were solicited. The consent to participate also addressed

this topic. Fortunately, all participants in the study had close and supportive relationships with family, and no conflicts arose.

Issues Surrounding Participant Observation

Participant observation was a central feature of this study. The dual role of researcher and caregiver created a number of potential problems. These included the terminal nature of the researcher-participant relationship, and potential conflict between the nurse and researcher roles. Both of these problems were anticipated.

The close and ongoing contact between researcher and participant created a potential for the participant to feel betrayed or disappointed by the researcher's departure. This was exacerbated by the current state of caregiving in the hospital setting, where nurses have limited time to spend with "noncritical" patients.

Preparation for termination began with the initial contact, where the length and duration of contacts was explained both verbally and in writing. This information was reinforced periodically throughout the research period (Fields and Morse, 1995). The evening prior to the last anticipated formal contact, both the family and participant were informed. This was framed in a positive light, since it generally meant that the participant's cognitive function was stable. The participant's value to the study was reinforced, and the researcher's future plans discussed. Expression of thoughts and concerns was encouraged so that closure could be attained.

Throughout the caregiving period, the researcher reinforced the competence of staff and attempted to demonstrate reliance on their skill and judgement during caregiving situations. This was intended to reassure participants that staff would serve their needs

well.

The reasearcher made informal followup visits to all participants once daily for several days, decreasing the frequency of visits as time progressed. All participants and their families were provided with the researcher's phone number. One participant called a month after discharge to "let you know how I was doing and to thank you again for all your help".

It was also anticipated that the researcher's dual role as caregiver and researcher might conflict while in the participant observer role. This occurred mainly in relation to pain management, and once, in relation to a participant's need for rest. Although it was clear that researcher input was responsible for the provision of more analgesia (possibly changing the experience of the participant), the needs of the participant for care were seen to supercede the needs of the researcher. The impact of researcher presence is explored further in the section "Reflection and Reflexivity".

Issues Related to Data Analysis, Recording, and Reporting

The rights of the participant to privacy, confidentiality and anonymity are critical to the research process, and fundamental to the free sharing of information between participant and researcher. These "rights" are particularly difficult to safeguard within the qualitative framework, because of the need for "thick description" (dense, detailed descriptions of situations, behaviors, etc.) to ensure accurate portrayal and strengthen the trustworthiness of the data (Munhall, 1988; Robley, 1995). The small number of participants, and the smaller size of the research site for the study compounded this difficulty. Given these constraints, the following measures were taken to safeguard privacy, confidentiality and

anonymity.

Participants were assigned a pseudonym and an identification code on entry to the study. A record of the participant names and identification codes were kept in a separate, locked file. The names of all significant others and health personnel were also changed. Demographic details seen to jeopardize anonymity, such as residence in a specific rural location, were altered unless deemed critical to analysis. There were no situations that arose to threaten the safeguarding of anonymity.

All entries into field notes were received an identification code, date etc. Similarly, tapes were identified only by number. Field notes, tapes and transcriptions are locked in a secure location.

Raw data (once assigned an identification code) was transcribed by the researcher, and was discussed only with members of the thesis committee using the assigned pseudonym or assigned case number.

Reporting of analyzed data included individual cases as well as analysis across cases. The use of pseudonyms has preserved the participant's right to privacy. As described within the consent, findings are to be published within the thesis, and, in modified form, submitted to relevant nursing journals. Finally, data may be used as a source of material for presentation at conferences or inservices of health personnel, to increase awareness and understanding of the experience of acute confusion.

In summary, there are a number of ethical concerns arising from the implementation of a qualitative research study such as this. Efforts were made to minimize risk to the participant, so that the benefits of the study exceeded the risks, and the rights of the

participant were protected.

Data Analysis

Data analysis for this case-oriented study presented a number of challenges. These challenges were due, in part, to the large and diverse types of data that were collected within each case. Information included prospective data, derived from multiple sources collected during participant observation, as well as interview data, shared by one participant following resolution of the confused episode.

Once all data was reviewed, it was determined that the HRI model provided a satisfactory fit with the data. As stated by Sandelowski (1995), "In inductive kinds of qualitative work, any framework for analysis must ultimately be data-derived, or must earn its way into the study by virtue of its fit with and faithfulness to the data" (p.375).

Tellis (1997) notes that data analysis is the least developed aspect of case study methodology . He refers to several principles of analysis, outlined by Yin (1994), which include the need to 1) show that the analysis relied on all the relevant evidence and 2) addressed the most significant aspect of the case study.

Sandelowski (1996) was more helpful, explaining that in a case-oriented approach to data analysis, researchers work with the data collected to discern the confluence of specific variables "in whatever relationships with each other... and in whatever contexts... seem salient"(p.526).

Common sense suggested that examination focus on those aspects of the data collection most salient to the original research questions. Data analysis techniques also varied in

response to the different requirements of each research question.

Data analysis began as the first data was gathered and continued throughout the entire data collection process. Data was examined for possible relationships and themes, and tentative hypotheses recorded in field notes to await confirmation or rejection as the data collection proceeded. Triangulation, using multiple data sources from participant observation, chart review and semi-structured interview strengthened the data base and emerging hypotheses.

Each individual case was analyzed independently to look for interrelationships among variables before proceeding to cross case comparison. Charts or tables were used to catalogue more discrete data so that relationships and patterns can be seen more readily.

Content analysis, combining approaches described by Burden (1991) and Sandelowski (1993) were used to extract meaning from data collected during informal questioning and the semi-structured interview.

Recurring themes or topics were identified, and compared to the literature. This was most successful in relation to the behavioral and experiential perspectives.

Measures to Enhance Credibility of the Study

The nature and underlying principles of qualitative research create special problems for those who wish to judge the merit or truth value of a qualitative study such as this. For example, within the naturalistic/interpretive paradigm, reality is assumed to be multiple and constructed rather than singular and tangible (Sandelowski, 1993). The researcher is the instrument of data collection (Rew, Bechtel & Sapp, 1993), and study results represent the "retelling" of participants' experiences by the researcher. Thus, attempts to

apply traditional (ie. quantitatively based) evaluative criteria such as reliability, validity and generalizability are flawed.

Sandelowski (1993) suggests that the trustworthiness of a qualitative work "becomes a matter of persuasion whereby the scientist is viewed as having made those practices (ie. methods of collecting and interpreting data) visible and therefore auditable; it is less a matter of claiming to be right about a phenomenon than of having practiced good science" (p.2). There are several elements of this research design that were intended to enhance credibility of the results. These include prolonged engagement, persistent observation, peer debriefing, and progressive subjectivity, as outlined by Guba and Lincoln (1989).

Prolonged engagement and persistent observation

The researcher's direct involvement with the participant during caregiving over a number of days and evenings facilitated the rapport and trust between researcher and participant fundamental to the sharing of experiences. This extended interaction allowed time to "identify those characteristics and elements in the situation that are most relevant to the problem...and focus on them in detail" (Guba & Lincoln, 1989, p. 237). The rich and detailed data derived from these observations and interactions provided the "thick description" important to help readers arrive at their own conclusions about the meaning of data.

Peer debriefing

Discussion of findings with members of my committee helped to challenge my perceptions, stimulate self awareness, and clarify observations.

Progressive subjectivity

In the naturalistic setting the researcher collects data, and serves as the instrument through which data are collected (Rew, Bechtel & Sapp, 1993). Thus, the interpretations, values and beliefs of the researcher become central to the research process, and their impact on study outcomes must be open to scrutiny. This was accomplished through the use of a reflexive journal (Porter, 1993), an important part of the "paper trail" required for audit.

The journal was maintained throughout the research period, examining the investigator's reactions, thoughts, beliefs and perceptions as they relate to the research process, the participants, and the phenomenon under investigation. A review of the journal helped to reveal the process by which findings were constructed and the participants "given voice".

In summary, these elements of my research design, in combination with the "paper trail" created by my audiotapes and field notes, have served to enhance the trustworthiness of the findings.

Conclusion

In this chapter details of the study design have been addressed, including selection of participants, the setting, and data collection procedures. A number of ethical issues pertinent to the study were identified and measures to protect the rights of the participants described. Data analysis was outlined and measures to enhance the trustworthiness of the data reported. The methodology provided the groundwork for data analysis, which begins with a presentation of the findings.

CHAPTER IV

FINDINGS

Introduction

This chapter provides an overview of the study participants, and presents their stories in case study format. Key findings derived from each case study are identified.

During the ten weeks of data collection, five women were admitted to the surgical unit who fulfilled the criteria for inclusion in the study. Another four women were admitted to the unit who met age, injury, and gender criteria, but who were transferred from nursing homes, and who presented as confused on admission. The names (all pseudonyms), ages and previous living arrangements of the women admitted to the study are presented in Table 11. Cases are listed in the order of their entry into the study.

Table 11 Demographic overview of participants

CASE #	NAME	AGE	LIVING ARRANGEMENTS
1	Mrs. Lyle Rempel	88	independent in apartment
2	Mrs. Emma Kopp	95	independent in senior's complex
3*	Mrs. Joan Robertson	90	independent in apartment
4*	Mrs. Annie Willett	89	shared apartment with brother in senior's complex
5*	Mrs. Sharon Klassen	80	independent in apartment

Of the five women admitted to the study, three subsequently experienced acute confusion. These are marked in the table with an asterisk (*). The nature and course of acute confusion differed dramatically among these three women. Moreover, in two of the

three cases, circumstances precluded a post confusion interview of the experience. In Case #4, Mrs. Willett's acute confusion did not resolve sufficiently to allow for formal retrospection. In Case #3, Mrs. Robertson did not acknowledge that she had experienced an episode of acute confusion, normalizing her behavior by relating actions to past behavior and practice.

Two women in the study remained cognitively intact throughout their hospitalizations. Their cases serve as "controls" in analysis of the factors contributing to acute confusion.

Of the five women included in the study, one woman (Mrs. Klassen) was enrolled after her acute confusion resolved. Mrs. Klassen was admitted to the surgical unit the evening prior to commencement of the data gathering period. By the following morning, she had experienced a severe respiratory depression and was acutely ill, such that an invitation to participate could not be extended. This woman subsequently developed an acute confusion so marked that it was recognized by staff, and reported to the researcher. In the ensuing days, the researcher interacted on occasion with Mrs. Klassen and her family, largely to provide information and support not available from regular staff. Following resolution of the episode, Mrs. Klassen indicated a willingness to discuss her experiences and to be included retrospectively in the study. For this reason, NEECHAM scores are not available for all periods of Mrs. Klassen's experience. Her case study necessarily relied more heavily on information from the chart as well as nurse's recollections.

A sixth participant, Mrs. Mary Miller, was excluded from data analysis. Mrs.

Miller, age 73, was accepted into the study during a three week period in which candidates of a more suitable age were not available. The researcher considered broadening age criteria to increase the viability of the study. However, Mrs. Miller's case became extremely complex due to multiple physical and psychological complications resulting from a ten day delay of surgery. A longstanding psychiatric history (not documented in the chart) contributed to her difficulties. Time spent with this participant reinforced the researcher's perception that women of this age are qualitatively different from their older counterparts- physically hardier, and with different life situations. The researcher believes that a case study of this participant would have detracted from the main target group in the study.

In summary, five cases are presented. The first two of these cases represent women who did not experience acute confusion. The last three studies represent women who experienced some form of acute confusion during their stay in hospital.

Case #1- Mrs. Rempel

Mrs. Lyle Rempel is a serious looking, intellectually capable, and physically active 88 year old woman who lived independently in an apartment until her fall. "I got up to have a midnight snack to help me sleep...all of a sudden I was on the floor by the stove. I dragged myself to the phone... I really have no idea what happened..."

Health History And General Background

Before this hospitalization, Mrs. Rempel led an active life, swimming at her apartment block two or three times weekly and exercising daily on a stationary bicycle when unable to walk outside. Her diet was "healthy", and alcohol intake was limited to an "occasional glass of wine on special occasions". Mrs. Rempel had an uncomplicated recovery following total hip replacement of the uninjured hip five months earlier, although she described her rehabilitation as "slow" (one month). Mrs. Rempel used a cane "occasionally", and a 4 wheeled walker for walking long distances. She stated she had always been in good health, aside from some arthritis in her back and hips, and an irregular and "racing heart" that was managed with medication. See Table 12 for medications prescribed prior to hospitalization.

Mrs. Rempel had a supportive family, with two sons (and their wives) living in Winnipeg and another who visited regularly. She was widowed several years ago after a "long and happy marriage", moving to an apartment shortly before her husband's death. Since that time she developed friends in the block, initiating a Bible study group that was "a great success". Mrs. Rempel's strong "personal faith in Jesus" was a focal point in her life.

Day Of Admission

Mrs. Rempel arrived in Emergency by ambulance at 0040 hours, accompanied by her daughter - in law, Marlene. She was "moaning +++" with pain in the affected hip, but was otherwise in good condition. Vital signs were 35.8, 167/115, 76, 20. Pulse was regular and full. An electrocardiogram showed a regular sinus rhythm with a complete Right Bundle Branch Block with nonspecific T wave change, all present since 1994. Chest x-ray was clear. Aside from shortening and external rotation of the injured hip, findings on physical examination were unremarkable. Mrs. Rempel was described as "alert and oriented", and "a reliable historian". She was diagnosed with an intertrochanteric fracture of the right hip, and put on "surgical standby" for a Richard's Ambi Nailing.

Intramuscular analgesia (see Table 13) was administered shortly after admission, and was effective in reducing both Mrs. Rempel's pain and her blood pressure (to 148/69). Additional orders included a Foley catheter to straight drainage, an intravenous of normal saline at 125 cc./hour, and 5 pounds Buck's traction. Her metaprolol was to be continued (see Table 14). Mrs. Rempel was transferred at 0300 to a four bed room on the surgical unit.

On admission to the surgical unit, Mrs. Rempel's vital signs and oxygen saturation were stable (see Table 15) and she was noted to be alert and oriented. She was quickly settled. Meperidine and promethazine were readministered at 0500, although their effects

Table 12

Prescribed Home Medications

Drug	Dose	Frequency
Metoprolol	25 mg	OD
Ibuprofen	400 mg	TID

Table 13

Administration of Nonroutine Medications

Hospital Day	ADM		1		2		3		4	
Post Op Day	OR		1		2		3		4	
Drug (Route)	Time	Amt.	Time	Amt.	Time	Amt.	Time	Amt.	Time	Amt.
Meperidine (IM)	0100	75								
	0500	75								
	2150	25								
Promethazine (IM)	0100	25								
	0500	25								
Acetaminophen With Codeine 30 mg (o)	0900	ii	0200	ii	0030	ii	0640	ii	0400	ii
	2215	ii	0820	ii	0440	ii	1040	ii	0930	ii
			1120	ii	0900	ii	1510	ii	1300	ii
			1435	ii			2100	ii	1820	ii
									2220	ii
Morphine (IV)	0830	5	0420	7.5	0720	5	0310	5		
	1125	2.5	1030	7.5	1110	5	0915	2.5		
	1145	2.5	1320	2.5	1900	2.5				
	1205	2.5	1350	2.5	2200	2.5				
	1315	5	1420	2.5	2330	5				
	1530	2.5	1550	5						
	1630	2.5	1945	7.5						
	1650	2.5								
	1710	7.5								
	2310	2.5								
	2330	7.5								
Metoclopramide (IV)	0830	10	0420	10	0720	10	0310	10	1510	10
	1315	10	1030	10	1110	10	0915	10		
	1710	10	1550	10	1300	10				
	2330	10	1945	10	1725	10				
					2330	10				
Prochlorperazine (Rectal)					1400	i				
Lorazepam (o)					0110	.5				

Table 14

Routine Medications

Drug	Hospital Day Ordered	Hospital Day Discontinued
Metoprolol 25 mg. (BID)	Admission	2
Metoprolol 50 mg. (BID)	2	
Ferrous Fumarate 300mg. (TID)	3	
Docusate Calcium 240 mg. @HS	4	

Table 15

Vital Signs, Oxygen Saturations, Fluid Balance and Neecham Scores

Hospital Day	ADMISSION						1						2						3					
Post. Op. Day	OR						1						2						3					
Hour	0200	0600	1000	1400	1800	2200	0200	0600	1000	1400	1800	2200	0200	0600	1000	1400	1800	2200	0200	0600	1000	1400	1800	2200
Temp.	35 ^a		37 ^a	37 ¹	37 ^a	37 ^a		37 ³	37 ³	36 ^a	37 ^a	37		37 ²		36 ^a	37 ^a	37 ³		37 ^a	37 ³	37		
Pulse	80	66	65	71	65	71		75	71	74	74	90		140	125	137	121	118		113	109	90	96	
Resp.	20	16	16	20	16	14		16	20	20	24	16		18	18	16	18	18		18	16	20	16	
B.P.	S	148	156	123	137	123	145		114	105	116	97	114		108	75	113	129	110		113	105	98	115
	D	69	71	65	66	65	73		58	52	63	46	59		56	59	66	77	70		59	53	71	65
O ₂ sats (RA)			94	96					96			95			92	94				96	95	92		
O ₂ sats (31. / O ₂)																								
Fluid Balance																								
IN			2250						2110						1350						2220			
OUT			1450						1350						1550						2000			
Neecham Scores																								
AM			27						26						25						26			
PM			27						27						26						26			

Table 16

Laboratory Results

Hospital Day	ADM	1	2,3,4,5	6
Post Op Day	OR	1		
Hemoglobin	117.0*	90.0*	--	75.0*
White Blood Count	7.4	6.0	--	4.3
Potassium	4.5	4.4	--	
Sodium	136.0	136.0	--	
Glucose	7.4			
Urea	5.0			
Creatinine	63.0			

*Indicates Result Outside Normal Range

were not documented.

During the early morning Mrs. Rempel was seen by internal medicine and pronounced fit for surgery. Her oxygen saturation was 94% on room air. Results from blood work are listed in Table 16. At 0800, previous analgesic orders were discontinued and replaced by intravenous morphine and metoclopramide.

On first contact with the researcher (at 1130), Mrs. Rempel was pale but lucid. She was a substantial woman (approximately 150 pounds, five ' six" tall) and wore a hearing aid in one ear as well as "glasses for reading". Mrs Rempel was conversant and interacted readily with the researcher, immediately calling her by name and observing that they shared the "great misfortune" of having men's names as their given names..."I've never liked my name".

Mrs. Rempel stated her pain was "very bad", and had just received analgesia minutes before. She read the study consent carefully and asked several pointed questions. "What will your Masters qualify you to do?" She wondered "if I didn't have this problem last time (ie. with my last surgery), is it likely I'll have it this time?". Her assessment of the consent was that it seemed "pretty straight forward" and she signed without hesitation.

As the afternoon wore on Mrs. Rempel continued to complain of severe pain. After analgesia, she stated that her pain had "maybe gone down 1/4 point from 3 1/2...It's terrible". She reflected that "I think I must have a low pain threshold- I really haven't suffered with a lot of pain in my life...I also had a lot of pain with my hip replacement".

Mrs. Rempel's mental acuity was excellent, calling caregivers by name, and remembering these names over periods of several hours. When the anaesthetist arrived

and jokingly explained that his name was "Dr. Es- Smile", the participant dryly responded "That's got to be better than Dr. Grumpy". Mrs. Rempel showed an interest in research, explaining that her youngest son had a Doctorate in biostatistics. She mourned her lack of computer knowledge, and described herself as "computer illiterate".

During the course of the day Mrs. Rempel's daughter-in-law had been present. Marlene was a nurse and advocated for Mrs. Rempel, ensuring that she received medication when required and attending to her general needs. Staff came in on request, and quickly attended to stated needs. There was no interaction between the patients in the four bed room.

Later in the afternoon, Mrs. Rempel dozed intermittently. However, she was easily aroused, responsive and appropriate. Mrs. Rempel's NEECHAM score at this time was 27 (see Table 3), reduced by the presence of a catheter and a slightly elevated temperature.

At 1815, Mrs. Rempel was taken to the operating room. She expressed some relief that her hip would soon be repaired, suggesting that the outcome was "in the Lord's hands". Mrs. Rempel was informed prior to leaving the unit that she would return to a semiprivate room after surgery.

In the operating room the participant was cooperative and appropriate. She was able to isolate her discomforts and communicate them to personnel. Fentanyl was used for sedation, and both the spinal anaesthetic and the surgery proceeded without incident over the course of one hour. Blood loss was estimated at 300 cc. Vital signs and oxygen saturations remained stable and within an acceptable range for the participant. Recovery

also proceeded smoothly over the course of 1 1/2 hours. Blood pressure ranged from 110/59 to 142/76, pulse from 70-95, peaking just prior to transfer. Oxygen saturations ranged from 95-98%, and continued at this level after supplemental oxygen was discontinued. Mrs. Rempel was alert and appropriately responsive, providing a clear indication of the level at which sensation returned- "I can feel your touch, but I can't wiggle my toes right now". The participant took an interest in the nursing staff, asking the researcher "the name of that nurse", and then using her name during interaction with the nurse. Mrs. Rempel dozed intermittently, awakening to voice and touch. No analgesia was provided during recovery.

Mrs. Rempel returned to the ward at 2115 and was settled into a new semi-private room with a quiet roommate. Her daughter-in-law was waiting and remained for several hours, only leaving when she felt the appropriate analgesic orders were in place. "She came back from surgery with an order for Demerol 25 mg. IM, which was useless! The nurses said the doctor would not be prepared to change the order. I finally saw her internist and got him to put her back on the Morphine protocol that she had been on before surgery. It was awful! She was in so much pain..."

On the ward, Mrs. Rempel's vital signs and oxygen saturation continued stable. She was alert and lucid, and complained of severe postoperative pain. Morphine was administered shortly after 2300 (see Table 13).

Hospital Day 1- Postoperative Day 1

During the night, both morphine and metoclopramide as well as acetaminophen with codeine 30 mg. were administered for ongoing pain. Temperature was mildly

elevated, and blood pressure slightly decreased but within acceptable limits. Oxygen saturation was consistent at 96% on room air. Urine output was extremely low- 30 cc in total over the night shift. Mrs. Rempel slept for short periods, but awoke readily, responsive, appropriate, and cooperative.

When the researcher arrived at 0915 Mrs. Rempel looked tired and pale. She greeted the researcher by name, and reported on her "very rough night". The participant had received acetaminophen with codeine at 0820, and thought "it worked a little". However, she described the pain as "relentless-its always there". Mrs. Rempel reported eating "very little" of her breakfast, taking only sips of her tea..."I just have no appetite". She was assisted with morning care and then, with the help of two staff, transferred into a chair for the morning. During these activities Mrs. Rempel followed direction well, and cooperated despite the obvious pain she experienced with the slightest movement. She was returned to bed before lunch, having received both intravenous and oral analgesia during the morning but finding it ineffectual. At 1300, Mrs. Rempel stated that her pain was "excruciating", and this was supported by her occasional moaning and breath holding. Additional morphine was administered. Her pastor visited, and family arrived shortly after.

Surgically, the dressing was dry and intact, and circulation, sensation and movement were adequate. Blood pressure remained low and urine output diminished. Postoperative hemoglobin was 90 and electrolytes were within normal range. Despite these stressors, Mrs. Rempel's cognition was unaltered. She processed information well, and interacted meaningfully with family, friends and staff.

There were few changes during the evening. Pain persisted and was treated with morphine and metoclopramide. When the researcher arrived, Mrs. Rempel was in bed, surrounded by family. She welcomed the researcher by name, and made the appropriate introductions.

One of her sons approached the researcher in the hall to voice concerns over some "confusion" the family had observed. They noted that Mrs. Rempel had been confused about events over the past two days such as who had visited her and when this had occurred. On interview, Mrs. Rempel was fully oriented. She knew the day and spoke of her third sons impending visit the following Saturday, arranged in honor of her birthday. Mrs. Rempel was able to account for her time since the researcher had left earlier in the day, and detail her response to nursing interventions. Speech was clear, and Mrs. Rempel was an active participant in discussion. Physiologically, Mrs. Rempel was stable, although her temperature and pulse remained mildly elevated and urine output marginally low. Oxygen saturation was 95% on room air. Mrs. Rempel's stated that she had "no appetite", and only accepted sips of water. Nursing staff recorded the participant's cognitive status as "alert and oriented".

Hospital Day 2- Postoperative Day 2

During the night Mrs. Rempel tried oral analgesia for pain control, dozing intermittently. However, on assessment at 0700, her pulse was 140; blood pressure was 108/56 and oxygen saturation 97%. Her physician was notified and an electrocardiogram ordered for "first thing in the morning". Morphine and metoclopramide were administered a short time later for continuing severe postoperative pain.

The researcher arrived at 0920 to find Mrs. Rempel sitting in a commode at the sink in her room, left by staff to wash. Half clothed, ashen, distraught and dishevelled she greeted the researcher, "Thank God you're here to help me. I've been left here and I didn't know what to do. I must get back to bed." The participant was moved to the bedside, when a technician arrived to complete the electrocardiogram ordered earlier. Pulse was 145, with a regular sinus rhythm. On return to bed, her pulse decreased to 125, blood pressure was 75/59, oxygen saturation 94%. Mrs. Rempel stated that she felt "awful- so weak I can barely lift my arms". Shortly after, her family physician arrived. She was able to recount the events of the morning accurately, and dialogue with him regarding a change in her medication dosage (see Table 14). During this period, Mrs. Rempel's family also arrived to spend time at the bedside.

Mrs. Rempel remained in bed throughout the morning. Her blood pressure improved slowly, although her weakness, fatigue and general malaise continued. Operative pain was still "bad", and analgesia was only partially effective. In addition, Mrs. Rempel's abdomen was distended; she complained of nausea as well as "gas" and bloating. Her appetite was poor. Fluid balance was slowly improving; her intravenous infused at 75cc/hour, and urine output was increased slightly. Oral and intravenous analgesia were administered for operative pain.

During the afternoon, metoclopramide and prochlorperazine were administered for nausea; in the evening morphine was used for pain control. Mrs. Rempel was assisted up in the wheelchair for dinner, although she "couldn't eat a thing". Her vital signs were generally stable, although her tachycardia was not yet resolved, and her temperature

mildly elevated.

Throughout the days events, Mrs. Rempel was lucid, appropriate and conversant with her family and staff. Nurses documented her cognitive status as "alert and oriented". Her NEECHAM score was 25.

Hospital Day 3- Postoperative Day 3

At 0015, Mrs. Rempel received lorazepam to "settle". She also required analgesics through the night. Her cognition remained clear, and she slept intermittently.

In the morning the participant greeted the researcher by name, and note (correctly) that the visit was unexpected. There was no significant change in her cognition, aside from one memory lapse. When the nurse attempted to administer Mrs. Rempel's newly increased dose of metoprolol, the participant initially refused the medication, stating that she didn't "normally take that much." Since staff was new, and unaware of the previous days events, the researcher intervened to remind Mrs. Rempel of the reasons for the changed dosage. This input seemed to stimulate Mrs. Rempel's memory, and she readily accepted the drug.

Epilogue

Mrs. Rempel was transferred to a geriatric rehabilitation unit in the afternoon of her third postoperative day. Prior to transfer, she had received care from at least a dozen nurses, three aides and four physicians, excluding operating room staff. She continued to experience nausea, poor appetite and general malaise, and was diagnosed with a severe bladder infection on postoperative day 10. Her pulse rate and temperature returned to baseline by postoperative day 12. Operative pain continued to require treatment with oral

analgesia, and made ambulation slow and difficult. For this reason, Mrs. Rempel was transferred to a longterm rehabilitation facility, where she remained for three more weeks before returning home to her apartment. Throughout the course of her hospitalization, Mrs. Rempel was considered by staff to be alert and oriented. On Day 8, an MMSE was administered to assess for longterm care needs; she scored 30/30. Mrs. Rempel attributed her mental acuity to "the grace of God", an active life, and "lots of cribbage and chess games".

Key Points For Discussion

Table 17 provides a synopsis of central aspects of the case as they relate to the topic of acute confusion. These points will be explored more thoroughly in the discussion chapter to follow.

Table 17

KEY POINTS OF THE CASE

Mrs. Rempel did not develop acute confusion despite the presence of the following factors:

- "excruciating" hip pain in the preoperative and postoperative period
- heavy use of intravenous morphine, metoclopramide, and acetaminophen with codeine
- two doses of intramuscular meperidine and promethazine
- exhaustion, nausea, and malaise, especially in the postoperative period
- an episode of extreme distress, with tachycardia, associated hypotension and decreased oxygen saturation
- presence of a Foley catheter and a subsequent severe bladder infection
- a hemoglobin as low as 75
- a change of rooms postoperatively
- mild vision and hearing loss

Elements of the case which may have reduced chances of acute confusion:

- no history of acute confusion with recent hip replacement; no preexisting dementia
- limited alcohol intake
- active pre-injury lifestyle, physically, mentally, and socially
- a strong "personal faith in Jesus", which may have reduced fear and anxiety levels
- presence of family at the bedside throughout hospitalization
- hip repair within 24 hours of admission, reducing emotional and physical stress of waiting time" and minimizing period of immobility

Family detected more subtle aspects of confusion. On the evening of postoperative Day 1, family identified some "confusion" (ie. inaccurate recall of previous days events such as who visited and when this occurred). The researcher was unable to detect any changes in attention, memory, processing or motor behavior at this time.

One episode of memory lapse observed by researcher on postoperative Day 2, when Mrs. Rempel refused an increased dose of medication ordered the previous day to treat her tachycardia. While Mrs. Rempel had discussed this change with the physician, she had no recall of this discussion until her memory was prompted by the researcher.

Case #2- Mrs. Kopp

Mrs. Emma Kopp, aged 95, is a soft, round German woman with a cherubic face and warm, welcoming eyes. She was living independently in a senior's apartment block when she fell. "I turned around too fast and lost my balance. I was trying to get to the intercom to answer the buzzer... Sometimes my mind moves faster than my body will let me go."

Background And General History

Mrs. Kopp stated that she had been in "good health" all her life. Her medical history included osteoporosis, osteoarthritis of the spine, pernicious anemia, atrial fibrillation, wide-angle glaucoma, recurrent urinary tract infection and mild COPD. "My arthritis has slowed me down". Mrs. Kopp's prescribed medications from home are listed in Table 18.

Mrs. Kopp was hospitalized for a cholecystectomy "many years ago", and for treatment of severe sinusitis "about three years ago". Her surgery had been uncomplicated; however, her family explained to the researcher that during hospitalization for sinusitis, Mrs. Kopp had become "very confused" for a short time. The family noted, "we never talked about it because we thought she wouldn't want to."

Mrs. Kopp's first language was German. She communicated well in English, although her speech was accented, and she occasionally searched for the English words to represent her thoughts. A widow since 1963, Mrs. Kopp had a large and doting family network of five sons, their wives, "seventeen grandchildren and thirty-two greatgrandchildren".

Mrs. Kopp prized her independence and had only recently moved from her two story home of 43 years, agreeing with her family that she was "getting older". She ambulated independently in her apartment, but used a walker for longer distances because of severe arthritic back pain. Mrs. Kopp prepared her own meals and kept the apartment "tidy", using Home Care once weekly for help with bathing, and a housekeeper weekly for heavier cleaning. Family assisted with errands, shopping and finances.

Mrs. Kopp explained that she kept her mind clear "by reading, and by keeping track of the birthdays of all my grandchildren and great-grandchildren!". The importance of God and faith were evident in her comment that "I always pray each day that God will let me keep my mind clear, my sight and my hearing."

Day Of Admission

Mrs. Kopp arrived with her family in emergency at 2220, approximately 30 minutes after her fall. She presented as alert and oriented, and as a "credible historian", recounting her fall in detail, and reporting that she had also hit her head. She was "in pain +++", and her blood pressure was 178/103 (See Table 19). Pulse was 77 and oxygen saturation on room air 99%. On physical exam, her affected hip was shortened and externally rotated, and she had sustained a contusion on the back of her head. The remainder of the physical examination was unremarkable. X-ray revealed an intertrochanteric fracture of the left hip, and an enlarged heart with mild pulmonary venous congestion. EKG showed a normal sinus rhythm with a "nonspecific ST

Table 18

Prescribed Home Medications

Drug	Dose	Frequency
Digoxin	0.125 mg	OD
Co-Trimoxazole	i	BID
Brimonidine Drops 0.02%	i gtt	BID
Dorzolamide Drops 2%	i gtt	BID
Betaxolol Drops 0.25%	i gtt	BID
Cyanocobalamin	100 mg	monthly

Table 19

Vital Signs, Oxygen Saturations, Fluid Balance and Neecham Scores

[illegible]

Table 20

Laboratory Results

Hospital Day	ADM	1	2	3	4
Post Op Day	OR	1	2	3	4
Hemoglobin	123.0	91.0*	87.0*		86.0*
White Blood Count	4.4	5.5	6.7		5.0
Potassium	4.5	4.9	5.0		5.0
Sodium	128.0, 131.0*	129.0*	125.0*		127.0*
Glucose	6.8				
Urea	6.7				3.4
Creatinine	1.0				63.0

*Indicates Result Outside Normal Range

Table 21

Administration of Nonroutine Medications

Hospital Day	ADM		1		2		3		4	
Post Op Day	OR		1		2		3			
Drug (Route)	Time	Amt.	Time	Amt.	Time	Amt.	Time	Amt.	Time	Amt.
Meperidine (IV)	0230	25								
	1045	25								
	1430	25								
Dimenhydrinate (IV)	0230	25								
	1045	25								
	1430	25								
Morphine (IV)	1855	5			1250	5				
	1900	2.5								
	1905	2.5								
	1910	2.5								
	1915	2.5								
Acetaminophen and 30 mg Codeine (o)	2245	ii	0400	ii	0650	ii	0635	ii	2030	ii
			1030	ii	0900	ii	2200	ii		
			2010	ii	1500	ii				
Metoclopramide (o)					0900	10				

Table 22

Routine Medications

Drug	Hospital Day Ordered	Hospital Day Discontinued
Digoxin 0.125 OD	Admission	--
Brimonidine 0.2% 1 gtt BID	Admission	
Dorzolamide 2% 1 gtt BID	Admission	
Betaxolol 0.25% 1 gtt BID	Admission	
Nitropaste 2 cm	1	2
Heparin 5000 units (sc) BID	1	7
Ferrous Fumarate 300 mg (o) OD	3	—
Flovent 250 mcg ii puffs OD	1	7

abnormality". Blood work was within expected norms (see Table 20), with the exception of Mrs. Kopp's serum sodium, which was 128.

Meperidine and dimenhydrinate were administered intravenously at 2305 to control pain (see Table 21), and plans were made for transfer to the surgical unit. Surgery, an Ambi hip nailing, was tentatively scheduled for the end of the day's slate. Mrs. Kopp was to be kept NPO, with an intravenous of Normal Saline "TKO", Buck's traction at 5 pounds, and her previous home medications were reordered (see Table 22).

Mrs. Kopp was admitted to a 4 bed room on the surgical unit at 0045. Her blood pressure was 225/89; other vital signs were within the normal range. She was alert and appropriate, and complained of severe pain to the affected hip. Buck's traction was applied, and she was "settled" for the night. A second dose of meperidine and dimenhydrinate was administered at 0230, after which she slept intermittently. Night staff recorded Mrs. Kopp's cognitive status as alert and oriented.

When the researcher met Mrs. Kopp at midmorning, her son and daughter-in-law were at the bedside. Mrs. Kopp was an accommodating woman, eager to please, asking few questions about the research study, but enrolling willingly. "I would like to do this for you".

Mrs. Kopp was able to relate the events of the previous twelve hours with clarity and detail. She expressed her concern that her Home Care nurse, who "comes to help me with my bath on Tuesdays... needs to know I won't be there tomorrow". Mrs. Kopp occasionally used a German word in her responses, but was quick to attempt a translation, aware of her slip. Her hearing was good, but she required glasses for everyday activities.

Mrs. Kopp's stated weight was "about 145 pounds".

The participant's blood pressure was now 167/74, pulse 62, temperature 37.3 and respirations 22. Oxygen saturation was 93% on room air. Her air entry was good, although there were occasional audible wheezes which she stated were a result of a recent "cold" that was now resolving. Mrs. Kopp's mouth was very dry and her urine concentrated. Pain was a significant problem, with analgesics helping only "a little". Shortly after her meperidine at 1045, she described the pain as "terrible- worse than the pain of my five births, it is so bad...But I can stand it if I don't move". (Mrs. Kopp was unable to describe her pain using a numerical scale). She was afraid of being touched or repositioned, and expressed concern that she might cry out or scream, disrupting her roommates, and antagonizing nursing staff.

Additional intravenous analgesia was administered to Mrs. Kopp in the afternoon, and she spent her time dozing intermittently and visiting with her family. At 1630, Mrs. Kopp was taken to the operating room. She was quiet and watchful in the holding area, holding the researcher's hand for comfort, and commenting that she was "placing my life in God's hands".

In the operating room the participant was cooperative and eager to please, following direction readily. When the spinal catheter could not be inserted due to her advanced arthritic changes, a general anaesthetic was administered. Concerns about her elevated blood pressure (approximately 210/110) led to insertion of an arterial line. Drugs administered to the participant included fentanyl, midazolam, propofol and forane. The general anaesthetic was reversed with glycopyrrolate and edrophonium chloride. The

procedure was completed by 1850 (the lengthy time period partly due to time required for anaesthetic). Blood pressure ranged between 210/110 and 140/50, generally hovering around 180/70. Oxygen saturations remained stable between 97-99% on 5 liters of oxygen. There were no surgical complications, although the surgical site was more edematous than could be accounted for, given the time frame of the injury. Several larger vessels were cauterized, and blood loss was estimated at 300-400 cc.

Mrs. Kopp was responsive on arrival in the recovery room. She recognized the researcher by name, and commented "I'm just glad to have the operation behind me". Shortly after admission to recovery the participant, gazing at the ceiling, asked "is that a mouse?". However, even before she completed the question, she acknowledged the absurdity of this observation, "my eyes play tricks...". She reported no further incidence of visual distortions, and her nonverbal behavior supported their absence. Mrs. Kopp remained alert and oriented, responding appropriately to requests and accepting sips of fluids. At one point early in her recovery, Mrs. Kopp lapsed into German; however once reminded that no one spoke the language, she immediately provided an English translation. After this, Mrs. Kopp communicated in English.

Nursing staff in recovery were quick to treat operative pain. Morphine was administered intravenously over 5 minute intervals upon Mrs. Kopp's first mention of discomfort. Mrs. Kopp received a total of 10 mg. of morphine during the recovery period. Metoclopramide was also administered to prevent nausea associated with the morphine. Mrs. Kopp became drowsy following medication, but was easily aroused by touch or command. Vital signs and oxygen saturations remained stable, with blood pressure

ranging from 179/54 to 108/64, and oxygen saturation at 95% on 3 liters oxygen.

At 2015, Mrs. Kopp returned to the surgical unit, still alert and oriented, and surgically stable. Postoperative orders included oxygen at 3 liters overnight, intravenous fluids D1/2NS @75/hour, Nitro paste 2 cm Q6H overnight, and heparin 5000 units SC for seven days. For the next few hours Mrs. Kopp slept intermittently, arousing for her frequent vital sign checks. At 2245, oral analgesia was administered for complaints of operative pain.

Hospital Day 1-Postoperative Day 1

When the researcher arrived at 0915, Mrs. Kopp was bright and lucid, sitting up in bed. She welcomed the researcher by name, and provided an account of the night that was consistent with the account by staff. "I had a good sleep. At 4:30 I asked the nurses what time it was...I had some pills for the pain..." She noted that her physician had already been in and explained that she would be getting a "small needle under the skin to keep the circulation good". Mrs. Kopp had eaten well and was accepting fluids that were offered. Her pain was "OK, as long as I don't move". Earlier, her physician had directed staff to avoid the use of morphine for pain control to avoid the risk of confusion, satisfied that acetaminophen with 30 mg. codeine would adequately control her pain.

Mrs. Kopp's blood pressure was low, 108/52, and her oxygen saturation had slipped to 92% on room air. Staff discontinued her oxygen as per physician orders. Urine output per Foley catheter was very low, approximately 10-15 cc/hr. Postoperative hemoglobin was 91, and serum sodium (which had increased to 131 preoperatively) had now decreased to 129.

At 1030, analgesia was administered in anticipation of moving Mrs. Kopp from bed to gerichair. This transfer was accomplished with two assists, and the participant, while experiencing "terrible pain", was able to participate actively and follow direction well. Family arrived shortly after transfer, and remained at the bedside for much of the day.

The remainder of the day was uneventful. Mrs. Kopp napped after receiving analgesia in the afternoon, and ate and drank "well" at both lunch and dinner. Her blood pressure continued low, her temperature mildly elevated and urine output was minimal.

When the researcher returned in the evening, Mrs. Kopp and her family were visiting. She introduced the researcher by name to each of her various grandchildren; "this is my tallest grandson, Jeremy..." Mrs. Kopp had remained all day in the gerichair, stating that she found it very comfortable and requesting that she remain there for sleep. After family had left, an oral analgesic was administered (only Mrs. Kopp's second of the day), and a transfer to the bed was attempted with two to assist. However, a combination of extreme weakness and acute pain impaired Mrs. Kopp's ability to follow direction and to participate in the transfer. By the time she was safely returned to bed, Mrs. Kopp was distressed, apologetic and weak. Her blood pressure, pulse, temperature, and respirations were elevated (see Table 19). Oxygen saturation was 91% on room air, and supplemental oxygen was established at 3 liters/minute. This increased oxygen saturation to 98%. Urine output was stable but low. Staff recorded Mrs. Kopp's cognition as "alert and oriented".

Hospital Day 2. Postoperative Day 2

In the morning Mrs. Kopp's roommates greeted the researcher in chorus "Thank heavens you're here. She had a terrible night. She's been waiting for you". Mrs. Kopp was in bed looking pale and distressed, with a basin in hand. She reported feeling "so sick", and retched as if on cue. Her roommates verified that Mrs. Kopp had "barely slept" and "was in so much pain after they turned her at 4:00".

Mrs. Kopp confirmed that her pain was "very bad", wincing in response to the slightest movement of either leg. Oral analgesia had been administered at 0650 and repeated at 0900, along with an intravenous dose of metoclopramide to control her nausea. Mrs. Kopp's abdomen was distended. She reported passing no flatus, although bowel sounds were very active.

A porter arrived to transport Mrs. Kopp to x-ray for a "routine" postoperative cross section of the hip. She was moved to a stretcher, and wheeled to the x-ray department in pain, nauseated and retching. Once in x-ray, she was moved to the x-ray table, crying with pain, and then required to flex and abduct her unaffected hip, raising it to balance on a large wedge. Mrs. Kopp was cooperative and followed direction despite her misery.

On return to the ward, Mrs. Kopp was exhausted and weak. Her oxygen saturation on room air was 89%, increasing to 98% with administration of 3 liters of oxygen. The participant's air entry was good, but she continued to have audible wheezing. Blood pressure was 181/80 and her temperature down to 36.8. The participant's hemoglobin was

now 87 and her serum sodium 125.

Staff had made plans to transfer the participant to a chair, but with intervention by the researcher, she was allowed to rest for an hour prior to mobilizing. During this period a grandson arrived with his children for a brief visit. Mrs. Kopp opened her eyes on hearing their voices, recognized them immediately by name, and initiated a conversation which focussed on the children.

The physician, once apprised of Mrs. Kopp's pain, ordered morphine 5mg. IV to be administered prior to activity. Flovent and ferrous fumarate were also prescribed, although the ferrous fumarate was to be held until gastrointestinal function had resumed.

At 1250, Mrs. Kopp received intravenous morphine and was then moved from bed to gerichair. A Sara Lift was used to assist in the transfer due to Mrs. Kopp's weakness. The participant was able to cooperate in the procedure, and followed direction well.

In the evening, the researcher found Mrs. Kopp returned to bed. Family were again at the bedside. The participant reported having taken only sips of fluids during the afternoon and evening, although her nausea and gas was "a little better". Pain was a continuing problem, although Mrs. Kopp would not initiate requests for medication and tried to manage by limiting her movement. Staff reported that the participant had been alert and oriented when aroused during the afternoon, but noted that Mrs. Kopp was drowsy and slept frequently during this time. This was communicated to the physician, who subsequently discontinued the morphine because of its "sedative effects". There was little change in vital signs, and oxygen saturations were not improved. Urine output had increased slightly over the previous 24 hours. NEECHAM score was 25.

Epilogue

The following morning, Mrs. Kopp reported that her night had been "a little better". Mrs. Kopp's roommates shared this view. However they pointed out that most nights were very disrupted because of visits by staff to monitor and provide skin care, and rounds by housekeeping staff that began at 0500.

Mrs. Kopp's nausea and malaise improved during the day. She participated more actively in her transfer from bed to chair, following direction well. Oxygen saturation returned to 95% on room air, and supplemental oxygen was discontinued.

The following day, she was transferred to the geriatric rehabilitation unit in the hospital. Her continued recovery and rehabilitation was erratic, however, plagued by weakness and hip pain that escalated as activity progressed. Hemoglobin remained at 84-86 until postoperative day 15, when it climbed to 95. An x-ray of the affected hip on day 20 suggested the surgical pins may have slipped, possibly accounting for Mrs. Kopp's pain. At time of transfer to a longterm care facility, this had not been investigated further.

Throughout her stay, Mrs. Kopp maintained her alertness, orientation and general lucidity. Sporadic visits from the researcher were met with instant recognition, and questions about events in the researcher's life that the participant knew had occurred between visits. Mrs. Kopp's reports of her progress, and the difficulties she had encountered were credible and accurate, as verified by progress notes from medicine, nursing and physiotherapy. On postoperative day 13, Mrs. Kopp completed the MMSE, scoring 25/30. Her weaknesses on the test revolved around a numeric problem and copying of a schematic diagram.

On postoperative day 22, Mrs. Kopp was transferred to a long term care center to continue her rehabilitation.

Key Points For Discussion

Table 23 provides a synopsis of the central aspects of the case as they relate to acute confusion. These points will be explored more thoroughly in the discussion chapter to follow.

Table 23

KEY POINTS OF THE CASE

Did not develop acute confusion, despite presence of a number of factors:

- an unconfirmed episode of "confusion" following hospitalization for sinusitis, as reported by family members
- advanced age
- "terrible pain", often unrelieved
- a postoperative episode of severe gastrointestinal distress
- administration of three doses of intravenous meperidine and dimenhydrinate in the first 12 hours following admission.
- administration of a total of 10 mg. intravenous morphine during recovery
- inadequate sleep, "exhaustion"
- poor hydration, evidenced by extreme dryness of oral mucosa, concentrated urine
- serum sodium as low as 125
- postoperative hemoglobin as low as 84
- oxygen saturation as low as 88%
- English as a second language
- mild vision impairment

Elements of case which may have reduced chances of acute confusion:

- presence of supportive extended family throughout hospitalization
- surgical repair of hip within 24 hours of admission, reducing physical and emotional stressors associated with a longer wait and enforced immobilization
- pre- injury lifestyle which included some physical activity associated with light housekeeping, and mental stimulation associated with reading and involvement with her large extended family and their life events
- strong religious faith, reducing anxiety and fear.

Frightened of developing confusion- "I always pray each day that God will let me keep my mind clear..."

Morphine withheld by physician due to concerns re potential for confusion and fear of oversedation, although the researcher found no evidence of sedation that could not be explained by exhaustion.

Remained engaged with and responsive to her external environment throughout her "ordeal"; responded to a visual distortion in recovery by rejecting it - "my eyes play tricks".

Case #3- Mrs. Robertson

Mrs. Joan Robertson is a thin, wiry, birdlike 90 year old woman, with piercing eyes accentuated by her thick lensed glasses. She was living independently in her apartment at the time of her fall, which occurred in the early evening. "I have no idea what happened...I got up from the couch and must have tripped. Thankfully, I was able to get to the phone and call my daughter."

Health History And General Background

Mrs. Robertson had been hospitalized for pneumonia approximately one month previous to this admission. Her family stated that "she was just getting over her pneumonia when this happened". The participant had been receiving weekly help for bathing following her hospitalization, but was otherwise managing well with her family and friends assisting with errands and management of finances.

In addition to pneumonia, Mrs. Robertson's medical history included hypertension and cataracts. Mrs. Robertson had undergone "one of the first cataract surgeries in the city, 20 years ago". In the more distant past (ie. 35 years ago), the participant underwent a right hemicolectomy for treatment of colon cancer. Medications Mrs. Robertson had been receiving prior to admission are listed in Table 24.

Mrs. Robertson led a very involved, energetic life prior to her last hospitalization, and was in the process of returning to her many activities when the fall occurred. Her social network evolved from active membership in the Toastmasters Club, the Eastern Star, and as a longstanding and now "ex-officio" member of her church board. A widow

Table 24

Prescribed Home Medications

Drug	Dose	Frequency
Enalapril	5 mg	BID
Entrophen	325 mg	PRN

Table 25

Laboratory Results

Hospital Day	ADM	1	2	3	4	5	6
Post Op Day			OR	1	2	3	4
Hemoglobin	117.0		115.0*	78.0*	85.0*		90.0*
White Blood Count	12.5*		6.4	6.7	6.1		5.1
Potassium	3.9						
Sodium	142.0						
Glucose	5.7						

*Indicates Result Outside Normal Range

Table 26

Vital Signs, Oxygen Saturations, Fluid Balance and Neecham Scores

Hospital Day		ADMISSION												1						2						3					
Post. Op. Day		OR																								1					
Hour		0200	0600	1000	1400	1800	2200	0200	0600	1000	1400	1800	2200	0200	0600	1000	1400	1800	2200	0200	0600	1000	1400	1800	2200						
Temp.							35 ⁹		36 ²		38				36 ⁹	37 ¹		37 ⁹	38 ¹			38 ³		38 ¹							
Pulse							56		60	63	56	70	65		68	69		75	73			67		70							
Resp.							18		20	22	20	20	18		18	18		20	20			18		14							
B.P.	S						152		130	156	128	184	161		180	203		168	134			115		148							
	D						76		70	64	57	72	64		62	86		59	56			47		59							
O ₂ sats (RA)							91															83		84							
O ₂ sats (31. / O ₂)							98				98							97				99		98							
Fluid Balance																															
	IN		1650 + sips							3260							1700						900								
	OUT		3375							775							280						280								
Neecham Scores																															
	AM									26							26						25								
	PM																26						22								

Table 27

Administration of Nonroutine Medications

Hospital Day	ADM		1		2		3		4	
Post Op Day					OR		1		2	
Drug (Route)	Time	Amt.	Time	Amt.	Time	Amt.	Time	Amt.	Time	Amt.
Meperidine (IM)			0005	50						
Promethazine (IM)			0005	12.5						
Codeine (IM)			1130 2135	30 30	0630 1345	30 30	0325	30	0330	30
Acetaminophen Plain (o)			1900	650	1700 2240	650 650				
Acetaminophen With Codeine 30 mg (o)							1100	ii		

Table 28

Routine Or Stat Medications

Drug	Hospital Day Ordered	Hospital Day Discontinued
Enalapril 5 mg. (o) BID	Admission	--
Heparin 5000 units (sc) BID	2	
Clindamycin 300 mg (IV) OH6	2	4
Ferrous Fumarate 300 mg. (o) OD	2	

for 35 years, Mrs. Robertson went to work full time as a secretary and bookkeeper when her husband's employer refused to provide her with a pension following his death. A pragmatic woman, her family stated that since becoming widowed, she had guarded her independence "fiercely". For the last two years, Mrs. Robertson had been mobilizing independently with the use of a cane.

DAY OF ADMISSION

Mrs. Robertson arrived in emergency at 1900 hours via ambulance, accompanied by her daughter. She was alert and oriented, with minimal complaints of pain, even on gentle movement. Her blood pressure was elevated at 180/76, pulse 60, respirations 18 and temperature 36.9. Oxygen saturation was 91% on room air. A chest x-ray was clear, and EKG demonstrated a normal sinus rhythm, with a possible old anteroseptal infarct and mild ventricular hypertrophy. Blood work results are found in Table 25. On physical examination, Mrs. Robertson's condition was unremarkable, aside from evidence of hip fracture and complaints of longstanding urinary frequency and occasional stress incontinence.

Orders were left to administer oxygen per nasal prongs to maintain oxygen saturation at 95% or greater. This was accomplished at a flow rate of 3 liters/minute, with saturations levelling at 98%. Additionally, orders were left for Buck's traction, 5 pounds, an intravenous of normal saline TKO, Foley catheter to straight drainage, resumption of enalapril, and meperidine 50 mg. and promethazine 12.5 mg. IM OH3 PRN for pain. A single dose of furosemide, 40 mg. IV was ordered and administered.

Mrs. Robertson was transferred to a semi-private room on the surgical unit at 2245. She denied pain, and settled quickly after traction was established. Her blood pressure was decreased, and the Foley catheter was draining good amounts. Oxygen was maintained at 3 liters/ minute via nasal prongs.

Hospital Day 1

Night staff noted that Mrs. Robertson was alert and oriented. At 0005, meperidine and promethazine were administered for complaints of pain. The remainder of her night was quiet, as was the morning. She diuresed in response to the furosemide administered in Emergency , producing over 3300 cc. dilute urine over the next 24 hours (see Table 26). Mrs. Robertson was kept NPO for possible surgery later in the day. At noon time surgery was rescheduled for the following morning due to problems with OR availability.

On first contact with the interviewer (at midmorning), Mrs. Robertson was bright and responsive, revealing her sharp intellect, and knowledge of current events. The interviewer explained that the purpose of the study was to help nurses improve their care. She observed that "nurses aren't the problem ... it's the person with the purse strings that's the problem- Gary Filmon". Mrs. Robertson displayed a sense of whimsy in her communications, occasionally introducing adages, or singing a small verse that pertained to the topic at hand..."I think my mother taught me that one, although I can't remember the other verses...I've always liked singing". Mrs. Robertson was reliant on her glasses for vision - "I can only see larger objects without them". She used a hearing aid in her left ear, but "I can hear pretty well without it". The participant's stated weight was "101 pounds", and height, 5' 5".

Mrs. Robertson admitted to pain in her affected hip. "It's terrible when I move, probably 3 and 1/2 (on a five point scale)" she estimated thoughtfully; "otherwise (if I don't move) I can feel it but I can manage". Analgesia (an order for codeine replaced the meperidine- see Table 27) was administered during the interview, and then repeated at bedtime.

Vital signs remained stable with the exception of an elevated temperature, which spiked to 38C at 1400 and remained high for the remainder of the day. This was treated with plain acetaminophen. Throughout the day and evening, her cognition remained clear. An initial NEECHAM score was 26, lowered only by her need for oxygen to maintain oxygen saturation, and the presence of the Foley catheter.

Towards the end of the interview, Mrs. Robertson's daughter arrived, and shortly after, a close neighbor. She had company intermittently for the remainder of the day, and continued bright and conversant, despite her elevated temperature.

Hospital Day 2- Day Of Surgery

Mrs. Robertson had a quiet night, and stated she had slept well. "Usually I have to get up to go to the bathroom, but with the catheter it was wonderful...I could just sleep through". Preoperatively, blood pressure was elevated at 203/86. Oxygen saturation was 96% when supplemental oxygen was administered, although Mrs. Robertson desaturated quickly to 87-89% on room air. The participant was less verbal than the previous day, but still alert, responsive, and capable of initiating conversation. She denied anxiety "I'm just fine".

Mrs. Robertson was cooperative and appropriate in the operating room as she was

prepared for surgery. After administration of Fentanyl, spinal anaesthetic was initiated without incident. The Moore's replacement progressed uneventfully, with approximately 300cc. blood loss. There were no episodes of intraoperative hypotension. During the course of the surgery, Mrs. Robertson's eye's remained closed- she appeared relaxed and calm, attributed by the researcher to the effects of the fentanyl. Towards the end of the procedure, she opened her eyes. When the researcher asked if she was "OK", she responded "How can I be bad with all these people taking care of me?" However, once it became clear that the surgery was completed, Mrs. Robertson commented "Oh good, my arm is just killing me".

In the recovery room, the participant was alert and conversant. "Maybe they'll feed me now". She observed that the operating room had been "freezing", and revealed that she had heard "all the banging and hammering...sometimes I thought I might just fly off the table!" [with the force of the hammering]. These observations were made with little fanfare and no distress.

Vital signs in recovery were stable, and blood pressure remained high, ranging from 206/69 on admission to 201/80 prior to transfer. Oxygen saturation on 3 liters of oxygen hovered at 98%. Sensation began to return shortly after admission to recovery. No analgesia was administered, and pain was rated as absent by staff. Mrs. Robertson was transferred to the surgical unit at 1320, after a one hour stay. Postoperative orders included clindamycin 300 mg. OH6 X 6 doses, heparin 5000 units sc BID (see Table 28), codeine 30 mg. IM and acetaminophen with 30mg. codeine (o) OH4-6 PRN.

On return to the ward, Mrs. Robertson referred to her pain when she commented

"Now I'm feeling it". Vital signs were 37.6, 214/87, 74, 16, with an oxygen saturation of 97% on 3 liters oxygen. Codeine was administered, and noted by staff to be effective in reducing her pain. While plain acetaminophen was administered twice later in the day to manage both pain and a temperature elevation, no further narcotic was administered. Pain appeared to be well controlled.

The researcher discussed the events of the day with the participant. She acknowledged that she had probably been nervous before the operation but "I don't believe in whining about things- you just need to be tough". This explanation applied to her behavior in the operating room, where she believed that her role was to accept the situation and cope with it. She attributed her attitude to a staunch English background.

Mrs. Robertson's family and close friends arrived mid-afternoon, and remained at the bedside until early evening. Staff listed the participant's cognitive status as "alert and oriented". Her dressing was dry and intact, circulation adequate, and Mrs. Robinson was able to carry out deep breathing and leg exercises on command.

Hospital Day 3- Postoperative Day 1

Records indicate the participant continued lucid and oriented through the night. Codeine was administered once for pain, and no surgical problems occurred. The participant remembered the researcher's comments of the previous day; "I thought you might have come back last evening- my family were asking after you". She was able to recount the events of the evening and night, noting that she had awoken at 0600, having gotten a "good sleep (thanks to that catheter!)".

Mrs. Robertson conversed freely about the events of the two days, including the

"hammering and drilling in the operating room". She appeared to be philosophical about the experience. "I've been through much worse than this" (referring to her surgery for colon cancer). "I've learned you have to accept some things ...".

The participant was able to isolate her discomfort; for example, she noted "I'm very itchy around my dressing". (She had developed a series of small blisters at the margins of the adhesive). Mrs. Robertson followed direction well, assisting with morning hygiene, and actively participating in her transfer from bed to chair. Her temperature remained elevated at 38.3, while other vital signs were stable. Mrs. Robertson denied significant pain, only accepting an oral analgesic with encouragement prior to dangling and transfer to a wheelchair. She was able to eat lunch with minor assist to open packaging, and drank fluids when provided.

In the early afternoon a roommate was admitted, a middle-aged woman recovering from a laparoscopic cholecystectomy. During this time, the curtains were drawn and there was limited interaction between the two women and their families.

Results of postoperative blood work revealed that Mrs. Robertson's hemoglobin had dropped to 78. White cell count had decreased from its preoperative level. Orders were left to discontinue the Foley catheter, and to infuse one unit of packed cells.

When the researcher returned in the early evening, Mrs. Robertson was in bed. Visitors had only recently left. Her oxygen was not in place and the oxygen tubing was hanging from the adjacent flow meter. The participant's oxygen saturation was 84%. The researcher replaced the oxygen, and saturation returned quickly to 98%. Despite this intervention the participant seemed mildly vague and inattentive, less able to follow our

conversation and occasionally changed topics inappropriately. Her eyes were more glazed and she was less inclined to make direct eye contact. When asked whether she had received any blood yet, she was unable to provide an answer, asking "Do you see any?". She was also unable to demonstrate the location and use of the call bell (on the safety rails), gesturing broadly towards the intravenous tubing instead.

Mrs. Robertson was able to recount her recent unsuccessful attempts to void- "They poured water over me but nothing helped"- but could not remember her deep breathing exercises -"No one ever told me". On settling, she answered in the affirmative when asked if she would like to remove her teeth for the night. However, once she had removed them, she observed that "I don't know what I was thinking- I never take out my teeth at night."

Mrs. Robertson was catheterized for 105 cc. concentrated urine at approximately 2000 hours; her total urine output for the day was 280 cc. Her intravenous was interstitial, and restarted in anticipation of blood administration. Temperature continued to be elevated, and respirations were slightly depressed at 14/minute. When the researcher left, Mrs. Robertson was dozing intermittently.

One unit of packed cells was established late in the evening, following Mrs. Robertson's IV antibiotic. No analgesics were administered. Evening staff documented the participant's cognitive status as "alert and oriented".

Hospital Day 4- Postoperative Day 2

Blood administration continued until 0130. At 0330, Codeine was administered, although there was no indication of its purpose or effect. Mrs. Robertson was reported to

be alert and oriented during this time.

When the researcher arrived at 1000 hours, day staff expressed surprise that Mrs. Robertson was being followed as a participant in the study. "She's been great- certainly not confused at all". When questioned about her night, the nurse indicated that there had been "no problems".

Mrs. Robertson was up in her wheelchair, having completed her breakfast. The vagueness of the previous evening had dissipated and she was appropriate and responsive. When asked how long she would like to stay up in her chair, she indicated that "I want to stay up until after lunch, and then lie down after that". Even though she had been reoriented to the call bell the previous evening, she was still uncertain about its location, and was reorientated once again. Mrs. Robertson briefly alluded to her experiences in the operating room, but inaccurately depicted herself as having made requests for help that went unanswered. When the researcher clarified these events, she stated "I guess I just imagined that I asked for help".

Mrs. Robertson and her roommate provided a different version of the night's events than was evident in the report provided by the staff nurse (or recorded in the chart). The late evening and night had been "a bit rough". As the evening progressed, Mrs. Robertson had been "talking and singing to herself", sometimes waving her arms in the air. At some point "in the middle of the night" an alarm had sounded (from some equipment), startling both women, and causing Mrs. Robertson to attempt to get out of bed. Fortunately this attempt was interrupted by the staff nurse, who was responding to the alarm.

Mrs. Robertson's roommate pointed out (privately) that from her perspective, Mrs. Robertson's behavior was not surprising. She observed that Mrs. Robertson had an "endless stream of visitors" for most the afternoon and evening, and "then nurses were in and out half the night with medications and watching the blood and taking her blood pressure....She must have been exhausted!... And then when it was finally quiet, to have that alarm go off...Then the nurse came in and gave her something for pain and she finally settled down to sleep!"

Mrs. Robertson did not admit to confusion, simply describing her talking and singing as "writing my book...I do that at night sometimes, just before I go to sleep. I didn't intend to be so noisy. I often talk to myself- just not out loud...My mother used to do the same thing..."

During the morning, Mrs. Robertson slept intermittently in her chair, and looked tired and pale. She regained urinary control, requesting the bedpan regularly, although output remained low. She accepted fluids with encouragement. Her pattern of vital signs and oxygen saturations continued, with the exception of her temperature, which returned to normal. Mrs. Robertson's hemoglobin had increased to 85 after transfusion. Ferrous fumarate (i) OD was ordered to treat her anemia, and her intravenous was discontinued following her last dose of clindamycin.

On the researcher's return at 2000 hours, Mrs. Robertson presented as "her old self"- bright, sharp, and conversant. Her roommate clarified that the participant had recently awoken from "a very sound nap" of more than an hour, which had followed the last of her visitors for the afternoon. Her roommate believed this nap "made all the

difference". Mrs. Robertson commented that "I was awfully tired, but I feel better now". She recounted her visitors..." May was asking after you- it seems that you keep missing each other", and then provided a vivid account of the "culinary skills" of her last visitor, who she described as a "more flamboyant cook" than another of her friends.

Mrs. Robertson had received no analgesia during the course of the day, and described her pain, "I can feel it, but if you can't take a bit of pain...". She was able to lift her hips for the bedpan with minimal discomfort, and declined medication. The participant's temperature remained at 37 C, and her blood pressure high. There was also no change in oxygen saturation - it was maintained at 98% on 3 liters of oxygen, but declined rapidly to 89% on room air.

Epilogue

Mrs. Robertson continued to progress well and was transferred to a rehabilitation unit to complete her recovery. Cognitively, she remained bright and articulate. Her score on the Mini-Mental Examination, completed on Hospital Day 10, was 27/30 (with most errors accumulated on the visual aspects of the test). While never acknowledging her brief postoperative confusion, the following week she requested a change in her analgesic because "the tylenol doesn't do a very good job and codeine makes me feel a bit confused". This confusion was never observed or recorded by staff.

Mrs. Robertson's oxygen saturations improved markedly on Hospital Day 6, when mobilization had increased. Supplemental oxygen was discontinued at this time. Mrs. Robertson's most pressing ongoing problem was her urinary frequency and occasional incontinence. More than an inconvenience, she recognized that her frequent night

awakenings and trips to the bathroom made her tired and more likely to "need reminders of what to do" [ie. how to mobilize safely and avoid falling]. For this reason, on Hospital Day 13 she was transferred to a longterm care facility for continued supervision and rehabilitation.

Key Points For Discussion

Table 29 provides a synopsis of the central aspects of the case as they relate to acute confusion. These points will be explored more thoroughly in the discussion chapter to follow.

Table 29

SYNOPSIS OF KEY POINTS
<p data-bbox="272 395 1365 463">Mrs. Robertson experienced a mild acute confusion on the evening of Postop Day 1, with a NEECHAM score of 22.</p> <p data-bbox="272 502 832 534">Factors which may have contributed included:</p> <ul data-bbox="272 538 1313 715" style="list-style-type: none"> • extreme fatigue • hemoglobin of 78 • low oxygen saturation on admission, declining to 83% (RA) on Postop Day 1 • significant temperature elevation above 38 • vision impairment (although confusion occurred when she was wearing her glasses) <p data-bbox="272 751 981 783">No apparent relationship between analgesia and confusion.</p> <p data-bbox="272 821 592 853">Main symptoms included:</p> <ul data-bbox="272 857 1059 998" style="list-style-type: none"> • vagueness, inattentiveness, with decreased eye contact • inability to consistently follow conversation • disinhibited behavior; singing, talking to self and waving arms • some memory lapses <p data-bbox="272 1034 1255 1066">Singing and talking behaviors an extension of previous personality characteristics</p> <p data-bbox="272 1104 1373 1172">Participant did not acknowledge confused episode, explaining that she was "just writing my book; I often do that at night...(although) I didn't intend to be so noisy."</p> <p data-bbox="272 1210 1284 1278">Staff unaware of the episode; all relevant data about the confusion provided by Mrs. Robertson's roommate.</p> <p data-bbox="272 1317 1381 1385">On postoperative day 2, some difficulty accurately recounting her responses in the operating room. "I guess I just imagined that I asked for help".</p> <p data-bbox="272 1423 1353 1491">Strong family presence; however, visitors may have compromised rest, and contributed to onset of the confusion.</p> <p data-bbox="272 1530 1310 1598">Mrs. Robertson's processing and behavior returned to pre-episode levels, after a "good sleep" on the evening of postoperative day 2.</p> <p data-bbox="272 1636 1365 1668">Factors which may have limited the intensity and duration of the confused episode include:</p> <ul data-bbox="272 1672 1378 1855" style="list-style-type: none"> • pre-injury lifestyle which was intellectually and socially stimulating, with some physical activity (although hampered by recent illness). • good coping skills derived from past life experiences and a positive personality, reducing feelings of stress and anxiety • supportive family at the bedside

Case #4- Mrs. Klassen

Mrs. Klassen is a diminutive, sprightly, well groomed, 80 year old woman who was living independently in an apartment (and driving her own car) at the time of her fall.

The fall occurred shortly after attending church, as the participant and her friends were entering a restaurant for lunch. The participant stated that she "always tried to be so careful, but I must have not been concentrating for that split second, and I tripped on a stair. And when I tried to get up, I couldn't put any weight on my foot... And the pain!".

Health History And General Background

Mrs. Klassen's health history included hypertension, asthma, pancreatitis, cholelithiasis (and subsequent cholecystectomy), hiatus hernia and depression. In 1998, she had experienced a TIA, and a CT scan done at the time revealed "ischemic demylenation of the frontal lobes".

Hypertension was controlled with medication. Asthma was mild, and required no active treatment. The pancreatitis, diagnosed several years previous, had been successfully resolved, and the hiatus hernia was managed with conservative measures and medication. Mrs. Klassen 's history of depression was longstanding; she had received electroconvulsive therapy during the 1950's and was currently receiving antidepressant medication for a problem she described as "nerves". No psychoses had ever been documented, and her family described her as a "sensitive" woman who had experienced a "difficult" life. This included a divorce, which left her with three small children to care for in a small tightly knit and religious rural community opposed to the practice. She had lost a teenaged son in a car accident, and her second husband unexpectedly left her in

later years (something the family ascribed to his developing dementia).

Mrs. Klassen was able to list her medications from home. These are outlined in Table 30. She also noted that she was "very sensitive to lots of drugs", and was "allergic" to codeine.

Day Of Admission

The participant arrived in the emergency department via ambulance at 1300 hours, shortly after the fall. She was noted to be alert and oriented, and complaining of "+++ pain". Her blood pressure was significantly elevated at 204/98. Intravenous morphine, 5mg. was administered @1350. At 1415 "some relief" was noted and her BP had decreased to 168/80. Another 5 mg. morphine was administered at 1435, with no documentation of its effect.

Mrs. Klassen was admitted to a semi-private room on the surgical unit @ 1545, with a diagnosed "slightly displaced left subcapital hip fracture". Treatment was to include bed rest with 5 pounds Buck's traction, and morphine 2.5 - 5.0 mg. IV PRN for pain. A Knowle's pinning under spinal anaesthetic was scheduled for the following afternoon.

Staff found Mrs. Klassen to be a "delightful" woman- pleasant, well oriented and appropriately responsive. She was able to provide a detailed description of the circumstances surrounding her fall and was aware that she would require surgery to treat her fracture. The participant was organized in her thinking, presenting her son with a list of toiletries to retrieve from her apartment. She observed with a knowing wink and some wry humor, that he would be "lucky to return with even half of what's on the list!". The

participant provided an informed consent for surgery shortly after admission to the unit.

On admission to the surgical unit, Mrs. Klassen was observed to be pale but alert, appropriate and generally in good health. Her height and weight were estimated at 5 feet tall, 45 kg. Her use of glasses and a hearing aid for the right ear were noted, and their use encouraged. Affect and mood were bright, given the circumstances. She complained of extreme pain to the left hip. Vital signs were within the normal range with the exception of her blood pressure, which remained elevated at 190/84 . Her temperature was 36.5, pulse 75 and regular, and respirations 16. Her air entry was adequate, although pulse oximetry (done in emergency) revealed an oxygen saturation of 86% on room air (see Table 31). The abdomen was soft and nontender. Blood work was within normal parameters, including hemoglobin and electrolytes (see Table 32). An EKG showed a normal sinus rhythm, and suggested a "possible chronic pulmonary disease pattern". The chest x-ray was clear.

Mrs. Klassen was placed in traction and treated for complaints of severe hip pain. An intravenous of D5 in .45 saline was maintained TKO. She received no supplemental oxygen, and no followup oxygen saturations were completed during the evening.

Morphine was administered intravenously as outlined in Table 33. By 2330, a total of 20 mg. morphine had been administered, and nursing observations indicated the medication was effective in relieving her pain.

At 2100, it was noted that the participant had not voided since 0800, and was

Table 30

Prescribed Home Medications

Drug	Dose	Frequency
Paroxetine HCl	20 mg	OD
Trazedone	150 mg	OD
Zopiclone	7.5 mg	OD@HS
Lorazepam	1 mg	PRN
Diltiazem SR	120 mg	OD
Cisapride	20 mg	TID AC MEALS
Entrophen	325 mg	OD

Table 31

Vital Signs, Oxygen Saturations, Fluid Balance and Neecham Scores

Hospital Day	ADMISSION												1				2				3			
Post. Op. Day																	OR				1			
Hour	0200	0600	1000	1400	1800	2200	0200	0600	1000	1400	1800	2200	0200	0600	1000	1400	1800	2200	0200	0600	1000	1400	1800	2200
Temp. (o)					36 ⁵	36 ⁶	36 ⁶					37 ⁵		38	37 ⁴			36 ⁶		37 ³		37 ⁴	36 ³	37
Pulse					75	68	90	104		76		76		81	90	0	0	78		86		98	90	70
Resp.					16		18	8		18		18		16	16	R	R	16		18			20	20
B.P.			S		155	148		167	182	153		153		174	190			179		158		157	186	140
			D		67	70	79	62		67		67		64	92			67		70		66	78	76
O ₂ sats (RA)					86			47											92					
O ₂ sats (I. / O ₂)										(4)		(4)		(4)	97				(3)					
Neecham Scores										96					97									
																								**

**Indicates Confusion - No Scores Available

Table 31cont'd

Vital Signs, Oxygen Saturations, Fluid Balance and Neecham Scores

Hospital Day	4				5				6			
Post. Op. Day	2				3				4			
Hour	0200	0600	1000	1400	1800	2200	0200	0600	1000	1400	1800	2200
Temp. (o)	36°	36°	35°	37°	36°	36°					36°	
Pulse	76	76	72	70	70	66					71	
Resp.	18	18	22	20	20	20					20	
B.P.		163	139	155	156	156					167	
	S										184	
	D	77	69	74	80	80					81	
O ₂ sats (RA)				92							96	
O ₂ sats (I. / O ₂)	(3) 94		(3) 96	(2) 98								
Neecham Scores	**											

**Indicates Confusion - No Scores Available

Table 32

Laboratory Results

Hospital Day	ADM	1	2	3	4	5	6
Post Op Day			OR	1	2	3	4
Hemoglobin	137.0	132.0	120.0				
White Blood Count	7.1	8.2	7.2				
Potassium	4.8	4.3					
Sodium	140.0	10.1					
Glucose	5.2	3.9					
Urea	5.4	92.0					
Creatinine	97.0						

Table 33

Administration of Nonroutine Medications

Hospital Day	ADM	1	2	3	4	5				
Post Op Day	OR				1	2	3			
Drug (Route)	Time	Amt.	Time	Amt.	Time	Amt.	Time	Amt.	Time	Amt.
Morphine (IV)	1350	5.0	0100	5.0						
	1435	5.0	0530	5.0						
	1600	2.5								
	1630	2.5								
	1715	2.5								
	2320	2.5								
Lorazepam (o)	2200	0.5			1030	.5	2200	.5		
					1630	.5				
Promethazine (IV)			0530	12.5						
Acetaminophen Plain (o)			1715	650.0	0400	650	0900	325	0415	325
					0930	650	1700	325	0900	325
					1935	650	2330	325	1915	325
										2145 325
Meperidine (IM)					2040	25	0435	25		
Naloxone (IV)			0930	.4						
			1335	.4						
			1410	.4						
			1540	.8						

Table 34

Routine Medications

Drug	Hospital Day Ordered	Hospital Day Discontinued
Heparin 5000 units (sc) BID	Admission	9
Paroxetine HCl 20 mg (o) OD	3	--
Diltiazem SR 120 mg (o) OD	3	--
Zopiclone 7.5 mg (o) OD HS	3	--
Trazedone 120 mg (o) OD	3	--
Cisapride 20 mg (o) TID AC Meals	7	--

unable to empty her bladder. A Foley catheter was inserted for 650 ml. clear amber urine, and left in situ. At 2200, progress notes state that Mrs. Klassen settled well, and lorazepam .5 mg. (oral) was administered at her request as an evening sedation. The nursing flow sheet documented the participant's cognition as "alert and oriented".

Hospital Day 1

During the night, the participant's complaints of pain were noted and morphine 5 mg. IV was administered @ 0100 and 0530. Additionally at 0530, promethazine 12.5 mg. IV was provided, although no reason was documented. The participant's cognitive status was listed as "alert and oriented".

At 0900, a physician documented that Mrs. Klassen was "fast asleep". At 0925 the day nurse (new to the participant) entered the room to find the participant cyanotic and unresponsive, with respirations of 8/minute, oxygen saturation of 47%, blood pressure of 186/62 and pulse 104. Pupils were pin point. An oral airway was inserted and 100% oxygen was administered via ambubag. An EKG showed normal sinus rhythm and a stat blood glucose was 10.6. ABG's collected during this period revealed a pCO₂ of 78, pO₂ of 329, a pH of 7.16 and HCO₃ of 26.9. The attending physician diagnosed "hypoventilation secondary to morphine" and treated with intravenous naloxone 0.4 IV push.

Mrs. Klassen became more reactive and was noted to be restless, moaning, and able to nod her head in response to command, but could not open her eyes. As the morning progressed she was responsive to pain and verbal stimuli but would immediately return to sleep. Additional treatment with naloxone @ 1335, 1410, and with a larger dose

of 0.8 mg. administered at 1540, eventually reversed the effects of the morphine. Orders for morphine were discontinued and replaced with acetaminophen plain. The participant's severe respiratory acidosis was allowed to correct itself over the course of the day. Surgery was cancelled.

At 1830 progress notes described the participant as "fully awake", and indicated that an acetaminophen plain given at 1715 had been effective in controlling hip pain. The flow sheet for the shift recorded Mrs. Klassen's mental status as "alert and oriented", and there were no further comments in the progress notes. Oxygen saturation readings hovered around 96% with 4 liters of oxygen, and vital signs were stable, with respirations 18, pulse 76 (regular), blood pressure 153/67 and temperature now mildly elevated from 36.5 to 37.5. Two of the participant's sons were at the bedside for several hours. The second bed in the room was as yet unfilled.

Hospital Day 2, Day Of Surgery

At 0100, the nurse documented that the participant was alert and oriented, complaining of some discomfort and requesting to be turned. Acetaminophen plain (ii) were administered at 0400. A note by the surgeon at 0745 observed the participant to be "bright and cheerful- back to her old self". Surgery was rescheduled for the later afternoon.

A subsequent note from the family physician @ 1010 recorded that the participant was "very anxious, but willing to have left hip surgery today". Her two sons were at the bedside during this interview, and remained throughout much of the day. Lorazepam .5 mg. oral was ordered (and administered) at that time and 1/2 hour preoperatively. At 1230

diltiazem 120 mg. were administered for a blood pressure of 192/90. The day nurse (new to the participant) recorded the participant's mental status as alert and oriented. No additional observations were recorded.

Surgical reduction of the hip fracture, using four Knowles pins, was carried out at 1700. Spinal anaesthesia was administered successfully. The procedure lasted less than one hour and there was minimal blood loss. In addition to the lidocaine used for the spinal anaesthetic, the participant received fentanyl 20 mcg. IV as sedation. Ephedrine 5 mg. IV was administered twice at approximately 1730 for intraoperative hypotension, in which the participants blood pressure dropped from 180/90 to 78/40. The ephedrine increased blood pressure to 100/70, at which time the procedure was complete. In recovery, the participant's blood pressure was stable, ranging from 136/49 - 173/59. All other vital signs were stable and oxygen saturation readings between 95% - 97% on 3 liters O₂. She was observed to be alert and oriented during this time and was discharged to the surgical unit at 1915.

On return to the ward, Mrs. Klassen complained of ++ operative pain and was administered acetaminophen plain (ii) at 1935, followed by meperidine 25 mg. IM at 2040. She was observed to be alert and oriented, then "sleeping", with all physiologic parameters within the normal range. An intravenous of D 1/2 S ran at 75/hr and oxygen was administered via nasal prongs @ 3 liters/ minute. There were no comments about the participant's condition in the nurse's progress notes.

Hospital Day 3. Postop Day 1

Night staff administered meperidine 25 mg. IM @ 0435, subsequently noting (at

0630) that the participant was "now wanting to return to her own bed", with "oxygen on at intervals only". She made several attempts to get out of bed and tearfully requested to go home.

The day nurse (who had admitted the participant three days previous) documented at 0800 that the participant was "alert and responsive". The nurse recorded that the participant, referring to her pain, stated "When I move - it comes". Plain acetaminophen was administered. The nurse informed the researcher that the patient was "pretty wingy", crying intermittently, trying to get out of bed and pulling out her intravenous. She recounted that the participant demanded that she "go and get the sewing machine". When the nurse indicated that she "didn't even know how to sew", the participant looked at her knowingly, "Ah, but I know that you do!". The nurse observed that as the morning progressed, the participant was quiet and pleasant, but also wary and evasive in her responses, looking for cues in the environment to answer questions appropriately. For example, the nurse asked if she had eaten her breakfast already. The participant appeared to look around the room for evidence of a tray, and answered whimsically, "What do you think?". This evasiveness is consistent with the participant's later admissions that she was aware of her confusion and found it "sooo embarrassing". "I just didn't want anyone to know". None of the participant's behaviors were documented in the nurse's notes.

During morning care the participant's glasses and hearing aid were provided, and the participant was assisted into a gerichair to change her position and to immobilize her sufficiently to guard against further attempts to get up. At 0920 a physician's note documented earlier attempts to get out of bed but stated that "at present, conversing

pleasantly". The orders for meperidine were discontinued, and staff were directed to restrict analgesics to plain acetaminophen for pain control. Antidepressant medication was reordered (see Table 34).

At 1105 the physiotherapist noted that the participant was "alert and oriented times 3". Teaching was initiated, and the participant was noted to be able to complete a return demonstration of the required exercises. (The therapist would discover several days later that none of the exercises were ever attempted, due to the participant's processing and memory problems.)

Midday, the participant called out to the researcher, who was passing by the room, asking for help to return to bed. Staff indicated to the researcher that the gerichair afforded better restraint than bed, and that the participant should be encouraged to remain up. A spontaneous conversation between the researcher and participant occurred at this time, revealing the participant's insight into her confusion.

"I close my eyes and I see my sons talking but I can't talk to them. It scares me... It happens at night but even now if I close my eyes for a minute- that's the most frightening thing". She shared her recollections of other hallucinations, which were described in vivid detail (see Interview). Several times during the conversation, the participant asked whether she could "go home soon" and was provided with explanation of her condition. Requests to "go to the bathroom" were also met with explanation and reminders re the presence of the urinary catheter. Mrs. Klassen was occasionally tearful, lamenting that "I hate having to ask for help- at home I'm used to doing everything myself". Her tearfulness was consistent with her sons reports of past behavior. The

participant's responses during much of the discussion were meaningful and appropriate, and her generally bright affect and cooperative behavior belied her intermittent processing and memory problems.

Vital signs were stable, with a mild elevation of temperature (37.4) and pulse (98), and oxygen saturation on room air was 92% and 96% on 3 liters O₂. No attempts were made by staff to maintain supplemental oxygen while the participant was in the gerichair. Antidepressant medications were resumed in the afternoon and administered for the duration of the hospitalization.

At 1630, nurses notes state "son phoned- concerned re confusion". No further expansion of this concern was documented and there were no further entries in the nurse's progress notes on this date. Friends of the participant and her family visited during the early evening, reporting to family members that the participant "seemed to be doing quite well".

Hospital Day 4 - Postop Day 2

Surgically, Mrs. Klassen continued to progress satisfactorily, and physiologic parameters remained stable. Fluid balance was adequate, and the Foley catheter remained in situ. Acetaminophen was administered for pain control @ 0415, 0900 and 1915, although no note was made regarding the intensity of pain or the analgesic's effectiveness.

During the early morning the participant was observed to be tearful and distressed, although unable to articulate the cause. Mrs. Klassen recalled the nurse firmly directing her "Don't you cry once more", and Mrs. Klassen attempted to comply. (The participant later commented to the researcher "But she didn't know [what was prompting me to cry]").

Morning care was provided early, and the participant was up in the gerichair for breakfast, groomed and with hearing aid and glasses in place. A physician's progress note recorded Mrs. Klassen's anxiety and distress, and her reports of nighttime hallucinations. The hallucinations were confirmed by the participant's roommate, who had also observed her frequent restlessness and agitation, particularly during the night. An experienced occupational therapist, this woman provided emotional support and reorientation to the participant both day and night. "When I would talk to her during the night she would come back briefly [to reality] and then be off again".

A lengthy midday visit from a supportive son settled Mrs. Klassen's distress. When she tentatively announced that she would be going home the following day, he gently but firmly indicated that she was not ready to go home yet, and that he would not allow her to go home until he was satisfied that she was "absolutely ready". Moreover, he indicated that he would sit at her bedside until she was better "if need be". Mrs. Klassen responded well to this demonstration of concerned authority, acquiescing and visibly relaxing.

In the early evening, the Mrs. Klassen called her son on the bedside phone to tearfully report that his sister, currently with her family in Hawaii on vacation, had just separated from her husband. The story was so convincing in its detail that her son later phoned Hawaii to check on his sister. During this time, the participant pulled out her urinary catheter, although documentation of the event was confined to the flow sheet ("catheter pulled out"). There is no evidence that nursing staff witnessed any of these behaviors, and the flow sheet recorded Mrs. Klassen's cognition as "alert and oriented".

Physiologic parameters remained stable.

Hospital Day 5- Postop Day 3

The physician's note states that the participant was now "alert- no longer confused". A midday contact between the researcher and the participant supported this observation. In the company of her son, she shared her distress over her hallucinations and recounted some of the episodes. She was reassured by the observation that the frequency of the episodes had steadily diminished, and that her quiet and restful night was a good prognostic sign.

Epilogue

Mrs. Klassen was unexpectedly transferred to a geriatric rehabilitation unit at suppertime, postop day three, amid a flurry of activity, and with much distress and some tears. Her cognition remained intact throughout the remainder of her 40 day stay. Subsequent episodes of insomnia, sadness and frustration were consistent with her pre-admission personality, and not inappropriate, given the ordeal of hip fracture and her prolonged recovery. Mrs. Klassen's recovery was delayed by nutritional problems (the result of her hiatus hernia), leading to weight loss, weakness and fatigue. A TIA , suffered at Day 32, left no residual effects. Weekly visits by the researcher found Mrs. Klassen to be fully aware of her situation, and able to provide detailed and accurate accounts of her care, and the hospitalization experience. She was discharged Day 40 to her apartment, with Home Care and Meals on Wheels.

Interview

A formal interview with Mrs. Klassen was conducted one week after resolution of her confusion. Her Neecham Confusion score just prior to interview, and in two previous contacts was 29, indicating no confusion. Mrs. Klassen was given several hours to consider what she would like to share in the interview, and was composed and thoughtful throughout. Her remembrances were vivid, detailed and surprisingly consistent with her accounts of problems during the confused episode.

Mrs. Klassen began the interview by recounting her fear of experiencing confusion. "My husband and my girlfriend in their later years had surgery, and they were confused. I was very scared of it...and when I fell... I thought 'that's going to happen to me'." She was eager to accept spinal anaesthetic, believing that this would prevent her from suffering the same fate - "...since when the doctor told me I would have a spinal... I thought, 'All right! So I won't get [confused]."

Mrs. Klassen recounted hallucinations that would occur "as soon as I closed my eyes"; "I heard my family talking there, and without opening my eyes I spoke to them". At other times, she could see her sons talking to her but was unable to respond. Mrs. Klassen elaborated several complex and intense dreamlike sequences involving friends and family.

During the night...this part of the hospital was on wheels and we were going on a trip and I saw such dressed up ladies (pause), my friends from the church, and I

thought "what am I going to do? What with my gown open and no shoes on"... and I yelled "when are we going to get there"... it took soooo long... I said "I've got to go to my bed"...I got so restless...

The next night I was on a ship... and there was water, and I thought " How could I get to my bed? (pause) and I screamed, but not too often. But anyway, this was a very dreadful thing. I wasn't lying on a bed...just like sacks, full, but there I have to lie. And I think, this is it.

So the next day my daughter, and her husband and boys are in Hawaii and I see her walk there...I know her dress and exactly what clothes she was wearing. ..She had on her beach clothes...her green striped shorts...and she had no ring on..."He said 550 dollars for me and the boys and that was it...And then I was crying"...Oh I was crying because they had separated...

These episodes created terrible fear and distress for Mrs. Klassen. "That was hooooorrible experiences". Moreover, she was "sooo embarrassed" [at experiencing this confusion]..."you can't imagine... And then when I was on the toilet, they would say 'this is the lady that always wants to get up' and I couldn't help it! And it was very embarrassing".

At time Mrs. Klassen's inner experiences were often more vivid than those events around her. She noted that she remembered little of her visits from friends in the days following surgery.

Mrs. Klassen remembered some attempts by her roommate to orient her. "And my partner said 'No. You are here in the hospital'. ..She was trying to help me all the time". Mrs. Klassen indicated that she found the presence of others comforting and "very much" helpful. However, the hallucinations did not stop... "when I closed my eyes it just came". "I was just lucky they didn't tie me down...I had tried to get out of bed the first days. You have no idea, and I got so tired and I couldn't get out this way and I couldn't get out that way...I'm just lucky [they didn't tie me down]".

Throughout the interview Mrs. Klassen expressed the belief that the episode was behind her now. "These things [my health problems] will go away and I will be well again...I have to erase that slate...I'm glad I'm over it". She emanated a spirit of determination and the desire to move on with her life, after having laid to rest her feelings about the confusion experience.

Key Points For Discussion

Table 35 provides a synopsis of the central aspects of the case as they relate to acute confusion. These points will be explored more thoroughly in the discussion chapter to follow.

TABLE 35

SUMMARY OF KEY POINTS
<p>Acute confusion began during the night following surgery, shortly after administration of meperidine and promethazine, and lasted 48 hours.</p> <p>Factors which may have contributed to onset included:</p> <ul style="list-style-type: none"> • TIA, suffered 6 months prior to hospitalization • History of ECT, and longterm treatment with psychoactive medication • Family's description - a very "sensitive" and "nervous" woman • Reported history of extreme "sensitivity" to drugs • Oxygen saturation of 86% on admission. • Morphine -induced severe respiratory depression with associated hypoxia, hypercarbia, and acidosis. However, there were no signs of acute confusion noted during this episode or in the following 24 hours. • Episode of intraoperative hypotension. <p>Physiologic parameters stable throughout confused period, although oxygen saturation was 92% on room air during this time.</p> <p>Signs included:</p> <ul style="list-style-type: none"> • Anxiety, restlessness, and general distress • Attempts to get out of bed • Removal of tubes • Hallucinations "as soon as I close my eyes"; delusions • Periods of lucidity • Processing and memory problems • Hallucinations and delusions were vivid and lifelike; many elements linked to her life and past experiences. These events were terrifying to her. • Often inner experiences became more vivid than external events; recalled little of visits from friends • Reported fear of experiencing confusion, of being restrained. • Embarrassment over her behavior, with attempts to conceal her symptoms • Staff recognized some of the most overt confused behaviors, but were unaware of much of her experience. Processing and memory problems were overlooked. • Minimal documentation of confused behaviors, and except by physician • Main interventions: <ul style="list-style-type: none"> • Kept up in gerichair within view of staff • Reality orientation • Strong presence of a supportive family • Family presence "sooo helpful", but couldn't stop hallucinations from "coming" • Roommate important source of information and a resource to the participant

Case # 5- Mrs. Willett

Mrs. Annie Willett, age 89, is a pale, angular and forlorn looking woman who has lived in a senior's apartment block with her younger brother Wilf (age 84) for the last year and a half. Described by her family as a "fiercely independent woman", Annie has managed the housekeeping and meals for she and her brother with no outside help until one month before this admission.

Annie arrived at the Emergency Department via ambulance at 0200, shortly after a fall in her apartment. She explained that she had "jumped out of bed to go to help my brother", after hearing him coughing and choking in the other room. "I didn't trip. I was just hurrying".

Health History And Medical Background

Mrs. Willett described herself as having been in generally good health over her life. Medical history included a mastectomy for breast cancer approximately 20 years ago, and a diagnosis of valvular heart disease, from which she claimed to have been asymptomatic. Medications prescribed prior to hospitalization are listed in Table 36.

Mrs. Willett suffered a fracture of her left hip approximately 8 years ago, making a full and swift recovery. An active woman, her family stated that she mowed the lawn of the house she shared with her brother until it was sold two years ago. Until her most recent fall, Mrs. Willett had been mobile without the use of aids, although she later admitted feeling a "little off balance sometimes".

Family observed that Annie's primary motivation in life had been to take care of

Table 36

Prescribed Home Medications

Drug	Dose	Frequency
Nifedipine SR	10 mg	OD
Furosemide	40 mg	OD
Slow K	i	OD

Table 37

Vital Signs, Oxygen Saturations, Fluid Balance and Neecham Scores

Hospital Day	ADMISSION						1						2						3						
Post. Op. Day	OR																								
Hour	0200	0600	1000	1400	1800	2200	0200	0600	1000	1400	1800	2200	0200	0600	1000	1400	1800	2200	0200	0600	1000	1400	1800	2200	
Temp.	36 ³		37 ⁶	37	37	37 ⁶		37 ³	36 ³			37		37	36 ⁴			36 ²		36 ⁴	36 ⁵		36 ⁵	36 ⁴	
Pulse	75		80	82	83	83		80	74		80	82		82	82	85	O	78		73	92		91	78	
Resp.	18		18	18	18	18		18	14		18	14		20	12	16	R	22		18	20		18	18	
B.P.	S	167		110	138	152	123		152	177		183	142		157	173	159		174		153	138		145	162
	D	57		60	47	57	44		60	48		56	58		46	63	62		73		38	50		34	47
O ₂ sats (RA)				97					97			95		93	93			93			89			95	
O ₂ sats (31. / O ₂)																									
Fluid Balance																									
	IN			--					1002						2200						1525				
	OUT			--					1150						1750						475				
Neecham Scores																									
	AM			--					21						20						11				
	PM			25					20						11						18				

Table 37 cont'd

Vital Signs, Oxygen Saturations, Fluid Balance and Neecham Scores

Hospital Day		4						5						6						13					
Post. Op. Day		2						3						4						11					
Hour		0200	0600	1000	1400	1800	2200	0200	0600	1000	1400	1800	2200	0200	0600	1000	1400	1800	2200	0200	0600	1000	1400	1800	2200
Temp.				36 ²		36 ³	36 ⁴			37		36 ⁴						36				37 ⁵			
Pulse				77	72	78	72			69		70						76				68			
Resp.				16	18	18	18			20								18				18			
B.P.	S			116	155	148	167			144		143						179				148			
	D			39	47	43	40			33		30						56				43			
O ₂ sats (RA)				90						96												94			
O ₂ sats (31. / O ₂)				98		100	100																		
Fluid Balance																									
	IN			820						--							--					--			
	OUT			450						--							--					--			
Neecham Scores																									
	AM			14						--							--					19			
	PM			26						21							--					--			

Table 38

Administration of Nonroutine Medications

Hospital Day	ADM		1		2		3		4		5		6	
Post Op Day					OR		1		2		3		4	
Drug (Route)	Time	Amt	Time	Amt	Time	Amt	Time	Amt	Time	Amt	Time	Amt	Time	Amt
Lorazepam (sl)	0250	5mg	0400	5mg							0200	5mg		
Acetaminophen With Codeine 30 mg (o)	0350 1230	ii ii	0310	i	0015	i	2015	ii						
Morphine (IV)							0005	2.5mg D/C						
Acetaminophen Plain (o)									0600 2100	ii ii	1230	ii	0515	ii

Table 39

Routine Medications

Drug	Hospital Day Ordered	Hospital Day Discontinued
Nifedipine 10 mg. (o) OD	Admission	Admission
Furosemide 40 mg. (o) OD	Admission	--
Heparin 5000 units (sc) BID	Admission	--
Digoxin 0.5 mg. (o)	Admission	1
Digoxin 0.25 mg. (o)	1	--
Potassium Bicarbonate (i) OD	Admission	--
Ampicillin 1 gm. and Gentamycin 80 mg (IV) X 1 Preop	Admission	
Cefazolin Sodium 1 gm. (IV) OH6X3	2	3
Ferrous Fumarate 300 mg. OD	9	--

Table 40

Laboratory Results

Hospital Day	ADM	1	2	3	4	5	6	13
Post Op Day			OR	1	2	3	4	11
Hemoglobin	101*	95.0*		85.0*			73.0*	78.0*
White Blood Count	8.0	7.4		7.6			4.9	9.4
Potassium	4.0							3.7
Sodium	141.0							143.0
Glucose	5.5							
Urea	11.8							11.6
Creatinine	110.0							

*Indicates Result Outside Normal Range

her brother Wilf. Never an outgoing person, she found companionship with her widowed brother and a younger sibling John and his wife, Dorothy. Annie was described as devoted to family, and this devotion was returned in kind. Annie was somewhat wary and distrustful of "outsiders", with an anxious and suspicious nature that her sister in law laughingly suggests "must be a family trait". Annie generally deferred decision making to her brothers, although she had lived and functioned independently for many years following the death of her husband, retiring at age 68 from her job as a secretary and bookkeeper in the service and repair department of a large department store. Annie's personality characteristics were evident when approached to participate in this study. She asked if she could "have some time to think about it" and only agreed at the encouragement of her family. Mrs. Willett admitted to having "a bit of trouble remembering things sometimes", and "finding words" when she needed them. Family agreed with her self assessment, although they were adamant that she had "never been confused".

Day Of Admission

On admission to emergency at 0200, Mrs. Willett was noted to be alert and oriented by both the ambulance attendants, nursing and medical staff. Vital signs were stable, with a temperature of 36.3, pulse 75 (regular), respirations 18 and blood pressure 167/57 (see Table 37). She did not complain of pain, and it was noted that there was "minimal tenderness, even on gentle movement". However she expressed that she was "still in shock that this happened". The nurse administered lorazepam 0.5 mg. SL for her distress (see Table 38).

An hour later, Mrs. Willett has "not settled" and two acetaminophen with 30 mg. codeine were administered for complaints of pain. This produced a "sound sleep", and at 0915, the progress notes indicated that she "enjoyed" her breakfast tray. The remainder of the morning appeared to have been uneventful, and Mrs. Willett was transferred to a semi-private room on the surgical unit around 1430. Orders included bedrest with 5 pounds Buck's traction, resumption of prehospitization medications, acetaminophen with 30 mg. codeine, i tab OH3 for pain, and lorazepam 0.5mg. sl OH3 PRN (see Table 39). Surgery (a Richard's Ambi hip nailing under spinal anaesthesia) was planned for the following afternoon, with orders to be NPO at midnight.

Admission to the surgical unit was hurried and brief, with little chance for the admitting nurse to spend time with the participant. A tall, thin woman, Mrs. Willett's weight was estimated at 50 kg. and height 170 cm. It was noted that she used prescription glasses "for reading" and hearing aides for both ears, "although they're just a nuisance". (Family later confirmed that she rarely used her glasses and that her hearing was "OK, as long as people speak clearly)". Vital signs were stable and blood work was within normal limits, with the exception of a hemoglobin of 101 (see Table 40). Oxygen saturation was 95% on room air.

The nurse and an aide set up the traction. Mrs. Willett was noted to be appropriate but quiet, and the nurse informed the researcher that the patient "could probably benefit from having someone to talk to because she is quite worried and upset about her situation". She was noted to have no complaints of pain.

On initial contact with the researcher, the participant was subdued, and somewhat

sluggish in her responses. This was attributed to the analgesics and sedative administered in Emergency, as well as a questionable hearing deficit. However, Mrs. Willett was able to engage or "connect" with the researcher, commenting that her neighbour shared the same name, then using her name later in the interview. In response to the researcher's laments over her own problems with memory, she commented "and you're so young!". It was during this initial interview that the researcher discovered that the participant's given name, used by staff (and placed over her bed) was not a name she had ever used.

Mrs. Willett was appropriate and generally attentive during the interview, providing meaningful responses to questions. "This is the first time I've been in the Concordia Hospital, although I've been in many of the others... The last time I broke my hip I was in the Victoria Hospital". Mrs. Willett was able to describe her living arrangements clearly ("a senior's apartment block- its not a nursing home but there are two nurses you can call if you have a problem. That's who we called when I fell"). When asked her main concern surrounding this hospitalization, Mrs. Willett stated that "I'm worried about getting home to help my brother". She asked when she would be able to "touch the floor with this foot". NEECHAM score at this time was 25 (See Table 37).

Within two hours of initial interview, Mrs Willett was more lethargic, and her speech more slurred. Her mouth was dry and significant post nasal secretions seemed to compound her articulation problems. Family was not in attendance at this time. She accepted some fluids, although her family later indicated that she "drinks poorly at the best of times". Mrs. Willett had no recollection of the "day nurse" who admitted her to the unit, and after examination by an internist (who identified himself several times), asked

"That man was a doctor, wasn't he?". Since admission, she had encountered more than ten health care providers operating in different capacities.

The physician left orders to discontinue nifedipine and to initiate "Digoxin 0.5 mg. (o) now and at 2400".

Mrs. Willett lamented that she was "so tired I can't even think". After independently eating a half a sandwich and taking a small amount of fluids for dinner, she lapsed into sleep. Nursing flow sheets suggested an unremarkable evening, and the participant's cognition was recorded as "alert".

Hospital Day 1

During the night Mrs. Willett was described as "alert- slightly confused", although no elaboration was provided. Lorazepam and acetaminophen with 30 mg. codeine were both administered between 0300 and 0400.

On the researcher's arrival at 0930 the participant, who was now NPO for surgery, had a Foley catheter in situ and an intravenous of D 1/2 S infusing at 100 /hour, both ordered as routine preparations for surgery. Mrs. Willett was sluggish and slow to respond, and her speech slurred but only occasionally indiscernible. There was a flicker of recognition when the researcher arrived, although the researcher's name could not be recollected. Mrs. Willett was quiet but appropriate in her responses. Vital signs were unremarkable, aside from a diastolic pressure below the normal range (see table 37). Oxygen saturation on room air was 97%.

Mrs. Willett participated in morning hygiene, washing her face and upper torso and brushing her teeth without significant prompting. An aide arrived to assist with

completion of care, interacting primarily with the researcher. She did not call the participant by name, but provided brief, direct commands to the participant to turn and move as required. Once finished, the aide quickly left.

Mrs. Willett expressed concern about the health of her brother Wilf and wanted to phone him, but was unable to recall the phone number. A review of the chart indicated that she was unable to provide this number (ie. her own) on admission. Mrs. Willett explained this memory lapse on the fact that she "hadn't been living in the apartment for very long". Mrs. Willett was able to contact her sister-in-law, and spoke for a few moments, passing the phone to the researcher because "Dorothy can't understand me".

Mrs. Willett brightened considerably when family arrived, more alert and making increased eye contact. She conversed appropriately and noted to her sister-in-law that "you couldn't understand me on the phone". The staff nurse approached Mrs. Willett and her family for surgical consent. Mrs. Willett became anxious at the prospect of decision making and wished to "wait a while before I decide...perhaps tomorrow". It was only with strong encouragement from her family that she finally acquiesced and signed the consent. Later in the morning, Mrs. Willett hesitantly reported to the researcher:

I think there were some terrible things going on last night. There was a lot of noise and it seemed like the hospital was breaking apart. The nurses were running in the aisles all around and yelling "get me out, get me out". You told me my brother was hurt- it was John... I guess that couldn't really have happened if everyone is here today.

With no roommate, and no entries in the nurse's progress notes, and no pertinent information passed on at report, it was impossible to gather more data on the circumstances that may have surrounded these events, or the participant's behaviors at the time.

By late in the afternoon, after much uncertainty, it became clear that surgery would be delayed for another day (due to the arrival of a "more pressing case"). When the researcher arrived in the evening, family was in attendance and a young woman had been admitted in the next bed. The evening nurse commented that Mrs. Willett "seems like a good candidate for your study", suggesting that as she "seemed confused" in the afternoon, and had been crying and distressed. The nurse could not provide more detail.

On entry, the participant's room was darkened, mainly because family were concerned they shouldn't touch the lights. A clear fluid tray sat at the bedside, largely untouched. The family indicated that "Annie didn't get dinner so they gave her this tray, but she doesn't like jello much and the water for the tea was cold". They were relieved when the researcher informed them that more food could be arranged, especially when they thought she looked "poorly". With the assistance and encouragement of family, Mrs. Willett ate a half a sandwich and drank a small amount of milk.

After family left, Mrs. Willett asked for a tranquilizer twice prior to settling. She could not articulate the main source of her concern, and appeared more sedated than distressed. When asked about pain, she stated anxiously, "there's none now but there could be more later". Staff were reluctant to administer lorazepam, given its potential to further sedate the participant. Mrs. Willett's family had also noted that she "hardly ever

takes anything, and is very sensitive to any drugs". Between interactions, the participant drifted to sleep. Even while awake, her respirations were noisy (ie. snoring), although rate was adequate and oxygenation saturation within the normal range. She demonstrated no awareness of her snoring. Speech continued to be slurred and difficult to comprehend. Although Mrs. Willett's oral mucosa appeared to be dry, her foley drained a large amount of dilute urine (see Table 37), likely due to a dose of furosemide given earlier.

On departure, the researcher reviewed use of the call bell, and provided reassurance that "other nurses" would be available to help.

Hospital Day 2

During the night the participant's cognition was described on the flow sheet as "alert, confused", although no elaboration was provided.

On arrival of the researcher, Mrs. Willett looked wan and unkempt. "I called for help all night and no one came". "What kind of a den [of iniquity] am I in?" Her roommate (a concerned and friendly young woman) verified that Mrs. Willett "called and called for help, but it was so long before anyone would come that she would fall asleep and they would just leave again". During the morning Mrs. Willett was quiet, and her attentiveness and responsiveness were slow. Speech continued slurred and difficult to discern. Mrs. Willett did not acknowledge the researcher's request, "Can you wiggle your toes for me?", only responding when the request was repeated, "Are you talking to me?". She was able to complete the task after a brief delay.

Mrs. Willett "drifted" throughout the morning, with intermittent, and sometimes unexpected periods of connectedness. During bathing she noted "My hair is a mess. I

hope Dorothy brings my comb. She'd better clean it before she comes." Later in the morning, she acknowledged her roommate, asking "Are you having yours (ie. operation) today?...It's frightening isn't it?". Mrs. Willett wondered if she would be "having the operation soon". When the researcher responded that the operation wouldn't be for a while, she asked anxiously "you mean weeks?"

During this time physiologic parameters continued stable, although oxygen saturation had decreased to 93% on room air. Output was adequate, with the intravenous maintained at 100/hour. Mrs. Willett did not admit to pain and nonverbal responses during turning were consistent with this admission.

Both the researcher and family left Mrs. Willett for several hours in the early afternoon, returning shortly before the scheduled surgery. During this time the staff nurse noted that the participant had repeatedly attempted to remove her gown. Moreover, when the nurse attempted to tape her rings in anticipation of surgery, Mrs. Willett became extremely distressed, believing that the nurse was trying to "take them". Preoperative medications included intravenous antibiotics. No sedation was ordered.

When the researcher arrived, Mrs. Willett was surrounded by family, awaiting her departure. More than an hour passed beyond the slated time before it was apparent that surgery was to be delayed. During this time Mrs. Willett dozed intermittently. Her sister-in-law chatted with her, eliciting appropriate and meaningful responses. For example, when Dorothy suggested lightly that "Maybe I should get some pins put in now so that my hips won't break when I'm your age", Mrs. Willett responded by suggesting that Dorothy might not ever break her hip but "you should drink more calcium".

As time wore on, Mrs. Willett expressed uncertainty about the events around surgery..."Am I going upstairs?" When an explanation was provided that the operating room was on the main floor, she wondered "Are there stairs?" Several times explanation was provided that she would go in her bed, on the elevator. She lamented " I am so confused about what's happening". By the time the Operating room staff arrived, Mrs. Willett was expressing increasing uncertainty about proceeding with surgery- "I might die". It was only with much reassurance and encouragement from her family that she agreed to go.

Mrs. Willett waited for another 1/2 hour at the main desk of the Operating Room, before being taken into the operating theatre. During her wait she seemed much more alert and attentive to her surroundings, with little evidence of the lethargy of the previous days. She interacted with staff, telling the researcher that "you look very smart in that outfit" (operating room "greens"). Mrs. Willett was soon taken to the surgical theatre, where monitors were attached and she was readied for the administration of the spinal anaesthetic. Staff then entered abruptly to say that the surgery was to be cancelled for another more pressing case. Monitoring equipment was removed and the participant was returned to the surgical unit.

On return to the unit, Mrs. Willett was quiet, drifting into sleep, initiating no interaction with the researcher. Family could not be contacted. Several hours passed, when operating staff called to inform the unit the surgery would be going ahead "shortly". As the time approached, Mrs. Willett became increasingly anxious and agitated. "I don't think I'll have the surgery...Where will I be? Upstairs? No, I won't have it...It's been too

long now...". Only after a calm and apologetic explanation from the OR nurse, and encouragement that Mrs. Willett's family wanted her to have the surgery, did Mrs. Willett relent.

Once Mrs. Willett was transported to the operating room, it was yet another hour, waiting inside the room alone with the researcher, before staff arrived to proceed with the surgery. During this time, Mrs. Willett became increasingly frantic, asking "You and the other girl aren't doing the operation are you? ...I don't think I should do this...I want to talk to my family". When the anaesthetist arrived, he quickly informed the participant "We're going to take care of you now. I'm going to give you something to make you happy, OK?" Fentanyl 100 mcg. was administered intravenously and Mrs. Willett quickly became nonresponsive.

Spinal anaesthetic was administered without incident. Surgery proceeded uneventfully, and there were no hypotensive episodes and "minimal" blood loss. Oxygen saturation was maintained at 97-99%. Towards the latter part of surgery, as she emerged from her sedation, Mrs. Willett became restless, attempting to move her arm (and interfere with the surgical field). She initially calmed with touch, but increasingly chafed at her stockinet restraint, stating that "I need to go peel the potatoes". Mrs. Willett did not respond to attempts to orient her. Shortly after, the procedure was complete and the participant was transported to the recovery area, reiterating her need to peel her vegetables.

In recovery, Mrs. Willett was fearful and agitated, resisting attempts to apply monitoring equipment and oxygen. She told the researcher "You have an evil face.

Everyone in here is evil ...These things are evil (ie. monitoring equipment)...I want to go home...I thought you were such a nice person". In her distress, she lamented "What am I going to do?...Lord help me... I wish John was here and Wilf." When the researcher offered to call her brother, she responded "I'm afraid he would be walking into your trap... You're going to do to him what you did to me... You're a wicked women..."

Mrs. Willett continued to resist efforts at caregiving, but responded more favorably to the (unfamiliar) recovery staff, who calmly and gently attempted to dispel her fears.

Participant: I'm afraid of you.

Nurse: Why? I'm a nurse.

Participant: You're a pretty funny nurse.

Nurse: Here's my stethoscope and my thermometer...

During the recovery period, from 2100 until 2240, vital signs and oxygen saturations remained stable, with pulse between 67 and 76 (regular), respirations 16-22. Systolic pressure was elevated at 161 to 196, and diastolic pressure low, at 36-76. Oxygen saturations were 97% on room air. Dressings were dry and circulation was adequate. Mrs. Willett experienced no pain, in part due to the continuing effects of the spinal anaesthetic. Once sensation finally returned, late into the recovery period, records indicate no acknowledgement of pain. An additional noteworthy event occurred when Mrs. Willett expectorated a partially disintegrated pill (Slow K) that had been administered in the morning and which appeared to have lodged in her throat. At no time during the day, or the several hours that the researcher had been at the bedside had the participant

complained about her throat.

At 2200, when the researcher left, Mrs. Willett had drifted off to sleep. She was transferred to the surgical unit at 2300. Records indicate she was confused, restless and agitated, combative and resistive to care following return to the ward.

Hospital Day 3- Postoperative Day 1.

Morphine 2.5 mg. IV was administered at 0005. Notes suggest that Mrs. Willett was "calmer" and then "sleeping" following the analgesia. However, the day nurse commented to the researcher that the "nurses wouldn't give any more Morphine, after what happened last night". She explained that the night nurses were unable to rouse Mrs. Willett following medication, and were concerned they had "overdosed" her. Mrs. Willett received no further morphine after this incident. At 0600, two plain acetaminophen were administered "for pain", noted to be effective to "settle" her.

Mrs. Willett's fearful, combative and resistive behavior continued into the morning, refusing medications, vital signs, and general caregiving. When oxygen saturation fell to 89%, supplementary oxygen was refused.

When the researcher moved to the other side of the bed, Mrs. Willett responded as if the researcher was a different person. "There's some awful things happening here. That nurse that you think is a nurse isn't a nurse...she wants to take me to the cemetery and bury me... Would you take me to the cemetery?"

The arrival of Mrs. Willett's brother calmed her considerably . This occurred over the period of 30 minutes as John reoriented her and reassured her that she was "where she should be right now so that she can get over her operation". She eventually accepted her

medications from John and agreed to oxygen, apologizing to the researcher "I'm sorry about the trouble. You should get some rest." A short time later, she was observed glancing at a magazine provided by her brother. After settling, Mrs. Willett accepted a brief wash, and then fell into a quiet sleep.

When the researcher arrived in the early evening, Mrs. Willett was up in a wheelchair in the hallway, with Wilf (the brother with whom she lived) and his daughter at her side. Very short periods of meaningful conversation (eg. "my leg was aching - no one helped") were interspersed with repeated pleas to be taken home, doubts about whether her hip had been fixed, and general anxiety about her situation. "I can't stay here... I need to go home... Have we got the insurance to pay for this?"

Wilf became frustrated with her behavior, pointing out that she was confused. "I'm not confused, just forgetful", she responded, equally agitated. When her family offered to bring her some of her favorite foods- some "Eccles cakes"- Mrs. Willett was unable to recollect what these cakes were like. Perhaps underlining the terror of her experience, at one point she commented "You don't know what I'm going through. You can't leave me here".

Wilf later reflected on his sister's confusion. "You know, in the last year we'd be having a perfectly intelligent conversation and then all of a sudden, she'd be gone...just for a moment..."

Late in the evening, after her return to bed, Mrs. Willett pulled out her intravenous. At this time her oxygen saturation was 90%, down from 95% earlier in the evening. The nurse established 3 liters O₂ via nasal prongs. The intravenous was

discontinued, with plans to encourage fluids.

The day's blood work revealed a hemoglobin of 85. Urine output was low- a total of 475cc. for 24 hours. Vital signs were within established norms with the exception of a diastolic pressure ranging from 34 to 50.

Hospital Day 4 - Postoperative Day 2

Night staff documented the participant's cognition as "alert/confused". As ordered by the surgeon, her foley was discontinued at 0530, with returns of 100 cc. concentrated amber urine.

In the morning, Mrs. Willett despaired over about her situation. " I need to phone my father and my mother". Soon after, she realized spontaneously "No they're both gone...I need to phone my brother". When John arrived a short time later she was more focussed and calm. She (accurately) noted that John had bought "a new leather jacket- it looks smart on you. I like that color on you." She conversed with her brother and the researcher about her years in Vancouver, working in a job that she loved. "All the good things are over". She later looked at John suddenly, stating "I might die".

Mrs. Willett accepted and participated in morning care, noting to the researcher "Not too much toothpaste on the toothbrush", and demonstrating to the researcher how her hair should be correctly combed. Once up in the wheelchair, John pushed her around the ward attempting (unsuccessfully) to find a quiet and private place for a conversation. Mrs. Willett chewed the gum her brother offered her and attended to the activity on the unit, appearing more calm, focussed and "connected".

In the evening, Mrs. Willett's cognition continued to improve. When the

researcher arrived, she was sitting in bed, bright and attentive, surrounded by her family. She was able to respond meaningfully to questions about the events of the afternoon, and her speech was less slurred..."I was up in the wheelchair for dinner...." "when I stood up I put my weight on here (ie. her unaffected leg)." She observed that the wheelchair leg support was broken, and couldn't support her leg. When the researcher asked whether Mrs. Willett had need of anything, she responded "Oh no. I have my family here". She appeared comfortable, although no analgesic medication had been given since 0600.

It was not clear whether Mrs. Willett recognized the researcher, since the family provided so many cues as to the researchers identity. (Later, the family observed that "she just doesn't seem to remember you at all, even when we talk about you"). Mrs. Willett was not able to recall her distress around the time of surgery or any of her associated behaviors. She noted "I was very scared...that affected my thinking clearly". And again, the conversation ultimately returned to her central concern..."I'm confused (ie. uncertain) as to how I am going to get back home".

Nursing staff listed Mrs. Willett's cognitive status on days as "alert/disoriented"; on evenings, she was described as "alert/confused at times". Mrs. Willett was noted to use the bedpan "qs" for voiding. Vital signs were stable, although a low diastolic range (between 39 and 47) was still evident.

Prior to leaving for the evening, the researcher prepared the participant and family for her departure the following evening to attend a family matter in another city. The time frame for absence (ie. 7 days) was discussed, and a plan to followup on the participant's situation was established. It was noted that the following afternoon would be the last

contact for the week. Mrs. Willett was not distressed by this information, a response consistent with her seeming lack of connection with the researcher. Her family, however, expressed concerns for their sister's well being, and reassurance was provided that staff would ensure necessary care was provided.

Hospital Day 5 - Postoperative Day 3

At 0200, Mrs. Willett was administered lorazepam, although there was no documentation of the nature of her symptoms. One day staff nurse commented "they're pretty quick to give that stuff". No analgesia was provided.

On the researcher's arrival in the afternoon, Mrs. Willett was in bed. Two plain acetaminophen had been administered at 1200. Her appearance was more subdued, and responses more sluggish than the previous evening. Her eyes were glazed. She commented "You're back from your trip".

Mrs. Willett reported that she had been up in the wheelchair for lunch; "I didn't walk". Mrs. Willett indicated, with some hesitation, that she had eaten a grilled cheese sandwich for lunch. Nursing staff later reported that she had received some pizza for lunch, which had not been touched, and that her appetite was generally poor. Family stated, "She'd never eat pizza- she's more of a meat and potatoes person".

Mrs. Willett's efforts to drink a small glass of prune juice for constipation revealed increasing weakness and difficulty effecting purposeful motor activity. She accepted the glass very slowly and required much time and deliberation to move the glass to her lips and sip the drink. Mrs. Willett was able to identify her need to void, asking for the bed pan and identifying when she had voided. Her total void was 100 cc., and

appeared concentrated.

When Mrs. Willett's family arrived she recognized them and greeted them, but her affect remained sluggish, and she dozed intermittently. The family expressed some concern about the change in her general condition, and wondered aloud about the source of the change.

Hospital Day 6 - Postoperative Day 4

At 0500 the participant was described as "restless and confused, attempting to crawl out of bed". She was assisted to a gerichair and provided with "juice and cookies". She admitted to pain shortly after and was provided with an analgesic.

At 1110, an Occupational Therapist (who had never met the participant before) administered the MMSE as part of the assessment for longterm planning. Mrs. Willett scored 10/30, and was described as "alert, disoriented to place, unable to follow more than step by step instruction", and a determination was made that she was not a suitable candidate for longterm rehabilitation.

Midafternoon, physiotherapy made an initial contact and assessment, noting that the participant was "alert. Tries to follow directions but confused +++ . Needs reminder and direction +++ to transfer. Able to follow simple directions with +++ reminders." A Social Worker also attempted to speak with Mrs. Willett, finding her "quite drowsy and not willing to complete the interview."

Vital signs at 1800 were not extraordinary, and oxygen saturation readings were not recorded. Hemoglobin was measured at 73.

Epilogue

Throughout the remainder of the week, nurses noted that Mrs. Willett was sometimes lucid, bright, and able to interact meaningfully, and other times confused and agitated. Her confusion progressed during the last few days of her stay on the surgical unit. Mrs. Willett was restrained while in the wheelchair, because of her repeated attempts to get up. Nurses observed that Mrs. Willett was "able to get out of most of them". At times, Mrs. Willett was listed as "incontinent". At others, she used the bedpan. Mrs. Willett was listed as a "complete" for morning care, which was carried out by the aides (or a staff nurse and an aide) in as quick and efficient a manner as possible. Appetite was documented as "fair" to "poor", and Ensure was added to her diet.

Three days after Mrs. Willett's hemoglobin was noted at 73, three units of packed cells were ordered. On Day 8, at 2300, nurses attempted to administer the blood. Mrs. Willett was agitated and distressed, and "is quite upset that it (ie. the blood) will be given against her will". The three units of blood were withheld, and the participant encouraged to "eat better to increase her hemoglobin". The family were not informed of this event, and later indicated to the researcher that they "would have convinced her to take the blood and stayed with her until it was done, had they known." Mrs. Willett's hemoglobin eventually rose to 79 during her stay.

On Day 10, Mrs. Willett was "found sitting on the floor beside her bed, holding the handrail with her hand". Followup X-ray found no permanent injury. Family later reported that they believe Mrs. Willett might have sustained a "small stroke" at the time because they observed that she developed "drooping on one side of her mouth and now

she drools". There was no documentation of these observations in the chart.

The researcher made a followup visit on postoperative Day 11. Mrs. Willett was in bed, and appeared pale, weak, and lethargic. Her gown was in disarray, exposing her chest, although she appeared oblivious to this fact. Mrs. Willett's speech was difficult to understand, and at times communication was "disconnected". For example, when the researcher introduced herself (as there were no signs of recognition), Mrs. Willett responded, "My bowels are bad". The participant frequently closed her eyes, drifting. And when the researcher, sitting at the bedside, asked about her pain, she hesitated before asking "Are you talking to me?". When an aide entered the room briefly, Mrs. Willett referred to her, saying "She's been a good friend over the years". Later, she asked the researcher if she knew "that woman's name". Mrs. Willett's previous concerns about her family remained a theme; "I've got to get better to take care of my brother". Physiologic parameters were consistent with previous data, with a slightly elevated systolic pressure and a low diastolic pressure. Oxygen saturation was 96%.

Mrs. Willett was transferred to Riverview Health Center for long term care after 16 days. Her family expressed "relief" at her placement, and noted "there seems to be a lot more staff". Mrs. Willett's cognition continued to fluctuate- "one day she's clear as a bell- other days she's just sleepy and withdrawn". The family anticipate that she will require permanent longterm care.

During the course of her stay in acute care, Mrs. Willett had 19 caregivers, in addition to three physicians, the researcher, the occupational therapist, the social worker, and approximately six aides.

KEY POINTS FOR DISCUSSION

Table 41 provides a synopsis of the central aspects of the case as they relate to acute confusion. These points will be explored more thoroughly in the discussion chapter to follow.

Table 41

SYNOPSIS OF KEY POINTS
<p data-bbox="257 380 1373 531">Mrs. Willett's cognitive decline was evident within 18 hours of admission. Her symptoms "peaked" immediately after surgery and the following morning, with some improvement evident on postoperative day 2. Cognitive performance subsequently declined again and was erratic for the remainder of the recovery period.</p> <p data-bbox="257 573 769 606">Acute confusion was characterized by :</p> <ul data-bbox="257 611 1397 1066" style="list-style-type: none"> <li data-bbox="257 611 1295 720">• lethargy, delayed responses, slurred, sometimes unintelligible speech which occurred shortly after admission- drifting and a lack of engagement with the external environment- "are you talking to me?" <li data-bbox="257 724 1354 800">• a single "dreamlike" episode in which the hospital was "breaking apart" and "my brother was hurt" <li data-bbox="257 804 1397 913">• episodes of agitation, paranoia, delusions, verbal aggressiveness, and resistance to caregiving following surgery- "You have an evil face... he might be walking into your trap..." <li data-bbox="257 917 1345 951">• reduced perception- eg. Slow K lodged in throat for 12 hours without complaint <li data-bbox="257 955 1376 1066">• processing and memory problems, increased as surgery became imminent eg. repeated questions about the location of the operating room and how she would be transported. <p data-bbox="257 1108 1373 1218">Content of verbalizations understandable in the context of her personality, hospital experiences, feelings of betrayal. "You don't know what I'm going through. You can't leave me here".</p> <p data-bbox="257 1260 1373 1369">Suspiciousness of those outside the family circle, and unwillingness to form relationships outside the family a longstanding trait. This may have contributed to the participant's inability or unwillingness to form a relationship with the researcher.</p>

Table 41 (continued)

SYNOPSIS OF KEY POINTS
<p>Factors which may have contributed to acute confusion include:</p> <ul style="list-style-type: none"> • possible undiagnosed preexisting mild cognitive impairment- ie. "...we'd be having a perfectly intelligent conversation...and then...she'd be gone...just for a moment". • delays of surgery over two days, increasing period of immobility, exposure to medication • fear and anxiety, prolonged by rescheduling and delays in surgery, and compounded by sense of abandonment and inability to control her situation (eg. "I called and called..."). She confided..."I might die"; "I was very scared...that affected my thinking clearly". • administration of lorazepam to relieve anxiety, perhaps exaggerated by a sensitivity to sedative medications- "she hardly ever takes anything, and is very sensitive to drugs". • fatigue- "I'm so tired I can't even think". • limited fluid and nutritional intake for the two days prior to surgery • a low preoperative hemoglobin, further depleted by surgery (85 postop and decreasing to 73 by Day 4 postop). However, symptoms of diminishing cognition appeared prior to postoperative drop in hemoglobin. • a low diastolic blood pressure, between 34 and 50. • an oxygen saturation which decreased to 89% Day 1 postoperatively. However, onset of acute confusion occurred prior to changes in oxygen saturation levels. • large number of frequently changing staff in contact with the participant; interactions brief, task oriented; staff sometimes talking to one another "over" the participant. <p>Presence of family members reduced Mrs. Willett's "drifting", and increased her engagement with the external environment. Some family members, such as John, were able to respond effectively to reduce Mrs. Willett's anxiety and agitation, and increase her compliance. Others, such as her brother Wilf, were uncertain how to respond to her confusion and increased her agitation. In the latter case, nursing intervention was required to address the needs of both parties.</p> <p>At times, the participant's roommate was the only reliable source of information regarding her condition, particularly at night.</p> <p>Staffing, particularly at night, was insufficient to meet Mrs. Willett's needs for care.</p>

Conclusion

The cases of the five hip-fractured women have been presented. Despite the intended homogeneity of the group, each case reflects a unique array of interacting events and a unique response to these events. The following chapter explores the interrelationships between cases and compares findings to the current literature.

CHAPTER V

DISCUSSION

Introduction

The research literature has portrayed acute confusion as a complex phenomenon with multiple, possibly cumulative etiologies, diverse, shifting manifestations and a varying course (Foreman, 1993; Inouye, 1994; Trzepacz, 1994). Some researchers have gone further to suggest that the diverse manifestations of acute confusion represent more than a single disorder, with correspondingly distinct etiologies and outcomes (Mori and Yamadori, 1987; Treloar and MacDonald, 1997).

In part, the complexities of acute confusion have been attributed to the use of assorted study populations, as well as an over reliance on the "outsider's perspective" to understand a "powerfully subjective phenomenon" (Foreman, 1990, p.12). This study addressed weaknesses in the research by selecting a homogenous study population (ie. elderly hip fractured women) , and using participant observation and personal interview to strengthen the data base. The qualitative, case oriented approach attempted to portray acute confusion in its fullest context, and to reveal individual factors contributing to acute confusion that may have been lost in the aggregated data of quantitative studies.

Despite these efforts, the picture of acute confusion that has emerged from this study is as diverse and multifaceted as the personalities, values and life experiences of the participants. The case studies reveal the unique response of each individual to an equally unique array of interacting physiologic and psychologic stressors. A review of each case allows readers to make their own determinations about the applicability of the findings to

specific clinical situations.

In this chapter, the researcher will analyze and discuss the five cases already presented, looking for patterns in the data and comparing the findings with information available in the literature. The three research questions which guided the study will be addressed using the expanded version of the Human Response to Illness Model (Heitkemper and Shaver, 1989) as an organizing framework. The discussion includes all four perspectives of the model - the physiologic, pathophysiologic, behavioral, and experiential- as well as the person factors and environmental factors contributing to the individual's response. The chapter will conclude with some evaluative comments on the usefulness of the Human Response to Illness Model, the researcher's reflections on the research process, and recommendations for practice, education, and research.

Physiologic/ Pathophysiologic Perspectives

The Human Response to Illness Model distinguishes between the physiologic and pathophysiologic perspectives of the human response, in this case, acute confusion. However, the distinction between these two perspectives became unclear during the process of data collection. The researcher came to appreciate that the "normal" or usual biologic functioning of the physiologic perspective and the "disordered" biologic functioning of the pathophysiologic perspective existed on a continuum and could not be addressed in isolation. The lack of a clear relationship between physiologic parameters and the manifestations of acute confusion may have contributed to this perception. For the purposes of this discussion, the physiologic and pathophysiologic perspectives will be addressed together, examining direct and indirect measures of biologic functioning.

Direct Measures

As expected, most direct measures of brain structure and function, such as the EEG, CAT scan, and MRI were not conducted on the participants as part of their care. CAT scan results were only available for one participant, Mrs. Klassen, who had undergone the scan 6 months prior to admission to investigate a transient ischemic attack. The scan indicated "ischemic demyelination of the frontal lobes".

Ironically, outside the time frame of her acute confusion, Mrs. Klassen was a bright, articulate, youthful and active woman with keen powers of observation, good problem solving, and a sharp memory. In other words, the physiologic deterioration within her brain was not evident in her everyday functioning. It is possible that more sophisticated or sensitive testing might have revealed evidence of decompensation. However, the scan evidence also lends support to the theory that acute confusion results from a mismatch between metabolic supply and demand, (Jacobson, 1997; Neelon & Champagne, 1992) and the associated concept of a functional brain reserve (Francis & Kapoor, 1992; Jacobson, 1997; Reyes-Ortiz, 1997). Using this theory, Mrs. Klassen had sufficient resources to process and respond to incoming stimuli under "normal" circumstances, but had insufficient reserve to cope with the cumulative stress of her low oxygen saturation on admission, her episode of hypoventilation (with hypoxia, hypercarbia and acidosis), hypotension during surgery, and the administration of meperidine postoperatively. Thus, the evidence in Mrs. Klassen's CAT scan would support the proposal by Francis and Kapoor (1992) that acute confusion is a marker of impaired brain reserve, unmasked by acute illness.

Indirect Measures

In the absence of any direct measures of cerebral function, indirect measures of underlying biologic processes were examined. These included vital signs, oxygen saturations, hemoglobin, blood chemistries and fluid balances. Of these measures, fluid balance records provided the least reliable data, due to incomplete recording of oral fluid intake, and discontinuation of fluid balance records in the early days postoperatively.

Table 42 provides a summary of selected data.

Table 42 Summary of Selected Data

EVENT**	Rempel	Kopp	Robertson*	Willett*	Klassen*
Systolic pressure below 80mm Hg	yes	no	no	no	yes
Oxygen saturation below 93%	yes	yes	yes	no	yes
Temperature greater than 38 C	no	no	yes	no	no
Hemoglobin less than 90	yes	yes	yes	no	no
Hypokalemia	no	no	no	no	no
Hyponatremia	no	yes	no	no	no
Other events	severe tachycardia			low diastolic pressure	severe respiratory depression with acidosis

* individuals experiencing acute confusion

** For those with acute confusion, events were listed only if they preceded acute confusion.

The literature on the physiologic perspective underlined the importance of circulating oxygen and glucose in cellular metabolism, as well as the role of potassium and sodium in nerve cell transmission. It was hypothesized that without sufficient energy for metabolic processes, the production of neurotransmitters, enzymes, and the maintenance of the sodium-potassium pump would be compromised, ultimately leading to impaired cerebral function (Frances, 1992; Lipowski, 1990; Vogel, 1996). An insufficient supply of sodium and/or potassium could contribute further to such decompensation.

As evidenced in the table, most of the research participants experienced some reduction in the amount of circulating oxygen. This was most severe in two of the cases- Mrs. Robertson, and Mrs. Klassen. Both of these women developed acute confusion, suggesting a relationship between oxygenation and acute confusion that has been reported elsewhere in the literature (Rockwood, 1989). However, the relationship between oxygen saturation and acute confusion was not clear cut, as further analysis of the cases demonstrates.

Mrs. Robertson's confusion was mild and transient, resolving before oxygen saturation was substantially improved. This suggests that other factors may have also acted, alone or in combination with oxygen depletion, to create the cognitive deficits. These factors include temperature elevation (which increased metabolic demand), a significantly depleted hemoglobin, and exhaustion.

Mrs. Klassen's confusion was not evident during the period of her most profound

hypoxia, emerging instead 36 hours *later* (ie. postoperatively), when oxygen saturations were closer to an acceptable range (ie. 92%). Again, other variables interceded before onset of acute confusion, including intraoperative hypotension, and administration of meperidine. In the absence of these interceding variables, questions are raised about the time relationship between triggering events and evidence of decompensation.

The third participant who developed acute confusion, Mrs. Willett, also experienced a decrease in oxygen saturations; however her cognitive decline began *prior* to the depletion in oxygen saturation, and continued after saturations had improved. There was no evidence that fluctuations in her cognitive status correlated with similar fluctuations in her oxygen saturation.

Finally, the two participants who remained cognitively intact, Mrs. Kopp and Mrs. Rempel, also experienced some decrease in their oxygen saturations for brief periods, with no measureable effects. Thus, the relationship between oxygen saturation and acute confusion, if any exists, could not be demonstrated in this admittedly small group of participants.

The research literature has also examined the relationship between hemoglobin and acute confusion. This has been based on the premise that since 97% of oxygen is transported in combination with hemoglobin, a depletion of hemoglobin would reduce the oxygen carrying capacity of the blood, leading to cerebral hypoxia and, ultimately, acute confusion. Neither Foreman (1989), or Gustafson (1988) were able to find a correlation between depletion of hemoglobin and acute confusion.

In this study, all but one of the participants (Mrs. Klassen) experienced a

significantly depleted hemoglobin at some point during their hospitalization. Lows ranged from 73 to 86. However, the relationship between hemoglobin level and acute confusion could not be clearly demonstrated. The two participants who did not experience confusion both suffered low hemoglobins and appeared exhausted and pale. Two of the confused participants suffered a significant decline in hemoglobin; in only one of these cases (Mrs. Robertson) did changes in hemoglobin correlate with cognitive impairment and subsequent improvement. Mrs. Willett's cognitive decline began before her hemoglobin dropped below 90, although it could be argued that her continuing cognitive decline paralleled a postoperative decrease in hemoglobin. Thus, the findings of this study do little to clarify the relationship between anemia and acute confusion.

The role of electrolyte balance and acute confusion was also examined in the study. None of the participants demonstrated hypokalemia at any time during hospitalization. Thus the impact of this variable on acute confusion could not be investigated. Only one participant, Mrs. Kopp, experienced a significant hyponatremia (such that the anaesthetist requested treatment preoperatively). She suffered no apparent cognitive impairment as a result of this depletion.

Vital signs, as a measure of circulatory efficiency and metabolic demand, were considered for each of the participants. From a cardiovascular standpoint, these women managed remarkably well. Their pulses were regular and full, despite some varying pathologies revealed in their EKG's. Rates varied with differing stressors, but aside from the tachycardia experienced by Mrs. Rempel (who did not develop acute confusion), at no time did pulse rate correlate with onset or diminishing of acute confusion. It is

noteworthy, however to consider that Mrs. Rempel's memory lapse regarding medication change occurred in association with her tachycardic and hypotensive episode. This memory lapse could be attributed to insufficient cerebral perfusion, or alternatively to the stress and anxiety associated with the event.

The literature suggests a possible relationship between hypotension and acute confusion (Gustafson, Berggren, Brannstrom, et al., 1988). The topic has been examined mainly in relation to surgical patients undergoing anaesthesia. Mrs. Klassen suffered an intraoperative hypotensive episode, with subsequent onset of confusion. However, the delay between the event (which was minor and shortlived) and the onset of symptoms, as well as the introduction of additional confounding variables (eg. pain, administration of meperidine) precludes judgement.

These findings suggest that no single event or change in body chemistry could account for the cognitive decline of the affected participants. In each case, the relationship of cause and effect was clouded by a host of confounding variables. Moreover, participants who remained cognitively intact experienced many of the same and sometimes more intense physiologic stressors than their counterparts.

Behavioral Perspective

Within the behavioral perspective the researcher collected data on the observable and measureable motor and verbal behaviors manifested by the participants throughout their participation in the study. This was a central component of the study, consistent with Foreman's (1990) observation that acute confusion is conceptualized and operationalized by its behavioral manifestations. It was suggested by Mitchell et al. (1991), that behaviors

might be an overt indication of the experience of the individual. This was particularly evident in the case of Mrs. Willett, and will be addressed later in this discussion.

The behavioral perspective will be discussed within three broad areas. These include an overview of the symptoms or behaviors manifested by the participants, identification of common threads or themes, and an exploration of the relationship between baseline characteristics of the participants and their behavioral manifestations.

Overview of Symptoms Or Behaviors

The type, frequency and clustering of behaviors, and the course of symptoms manifested by the affected participants were as diverse and variable as the literature suggested (Rudberg, Pompeii, and Foreman, 1997; Sirois, 1988). This occurred despite the selection of a fairly homogenous population, who, on the surface, shared a "common" experience (ie. hip fracture). Table 43 outlines the course, duration and behavioral manifestations of the three participants who experienced acute confusion.

Table 43 Behavioral Manifestations of Acute Confusion

PARTICIPANT	Mrs. Robertson	Mrs. Willett	Mrs. Klassen
COURSE AND DURATION OF SYMPTOMS	Symptoms first observed the evening of postoperative day 1, hospital day 3. Fully resolved within 24 hours.	Symptoms first observed within 18 hours of admission, peaked during the evening of hospital day 2, immediately postop. Some resolution within 48 hours, but fluctuations continued for the remainder of the hospital stay, and were still present while in longterm care one month later.	First identified within 12 hours of surgery, during the early hours of hospital day 3 and postoperative day 1. Symptoms resolved fully within 48 hours.
KEY BEHAVIORAL MANIFESTATIONS	<ul style="list-style-type: none"> • Primarily "quiet" manifestations, including vagueness, inattentiveness, and decreased ability to maintain a conversation. • Eye contact was markedly decreased from previous patterns. • Memory erratic (eg. forgot teaching regarding deep breathing and coughing, location and use of call bell). • Thought processes diminished (eg. removed teeth for bed, and then observed that this was not her usual practice). • Later, singing, talking and waving arms. 	<ul style="list-style-type: none"> • A mixture of quiet and agitated manifestations • Characterized by lethargy, delayed responses, slurred and sometimes unintelligible speech • Drifting and a lack of engagement with the external environment; "Are you talking to me?" • A single dreamlike episode in which the hospital was "breaking apart" • Occasional tearfulness and distress, with admissions of anxiety and fear, increasing as surgery approached • Reduced perception of internal stimuli; eg. pill lodged in throat • Processing and memory problems, particularly in the immediate preoperative period • Period of agitation, paranoia, delusions, verbal aggressiveness and resistance to caregiving for the first 12 hours following surgery 	<ul style="list-style-type: none"> • Hallucinations "as soon as I close my eyes"; delusions. • Anxiety, restlessness and tearfulness • Attempts to get out of bed, dislodge tubes • Periods of lucidity • Processing and memory problems, even in seemingly "lucid" intervals (eg. teaching by physiotherapist) • Attempts to conceal symptoms

In the early literature, Lipowski (1987) described three "forms" of delirium or acute confusion- the hyperactive, the hypoactive and the "mixed variant". These three cases could be considered representative of the various forms described by Lipowski.

Mrs. Klassen's episode of acute confusion represented the hyperactive form, with more florid symptoms readily identified by nursing staff - agitation, distress, hallucinations and delusions. On the other end of the continuum, Mrs. Robertson manifested the quieter, hypoactive form of acute confusion, with symptoms Treloar and Macdonald (1997) ascribe to a form of cognitive dysfunction they have labelled "reversible cognitive dysfunction". As predicted by these researchers, Mrs. Robertson's symptoms reversed quickly, and were so subtle that nursing staff were unaware of the event.

Mrs. Willett's behavior represented a mixture of both hypoactive and hyperactive behaviors. While presenting primarily as hypoactive, with lethargy, slurred speech and a quiet disengagement from her environment, Mrs. Willett also displayed periods of anxiety and distress, and, postoperatively, agitation, paranoid delusions, and resistance to care. The more overt symptoms which Mrs. Willett demonstrated postoperatively receded after 24 hours. However cognitive functioning did not return to preadmission levels even after discharge to a longterm care facility. This outcome is consistent with the findings of several studies that indicate a significant number of individuals suffering from acute confusion do not have full resolution of symptoms (Francis & Kapoor, 1992; Levkoff, Evans, Liptzin, Cleary, et al., 1992). The symptoms of both Mrs. Robertson and Mrs. Klassen resolved within 48 hours, concurring with the results of Rogers, Liang, Daltroy, et al. (1989) and Williams-Russo, Urquhart, Sharrock, et al. (1992), who studied similar

orthopedic populations.

Onset of symptoms was also variable, and analysis was confounded by differing lengths of hospitalization prior to surgery. (It should be noted that all three participants who experienced acute confusion waited more than 24 hours for surgery, while the two participants who did not develop confusion had surgery within 24 hours of admission.) Both Mrs. Klassen and Mrs. Robertson manifested symptoms in the postoperative period, the former within 12 hours of surgery, and the latter within 36 hours. Mrs. Willett began her cognitive decline shortly after admission, although the nature of her symptoms varied dramatically in the immediate postoperative period.

In summary, the behavior of the three acutely confused participants demonstrated the variability suggested in the literature. Yet, despite this variability, it was possible to identify common threads or themes.

Common Threads

Three common threads emerged in the analysis of participant behavior. These have been labelled by the researcher as "disengagement", "disorganization" and "disinhibition". The threads represent qualities demonstrated in the behavior of the acutely confused women, and echo Foreman's (1992) description of the acutely confused individual as "incoherent, illogical, undirected and unconnected". Of equal importance in the analysis, the three qualities identified in the behavior of the acutely confused women were not demonstrated by either Mrs. Rempel or Mrs. Kopp, the two participants who remained cognitively intact. Each of the threads will be addressed in turn.

Disengagement

Disengagement is a term that has been used in the gerontologic literature to describe "a mutual withdrawal...between the aging person and others in the social system to which he belongs" (Matteson, McConnell & Linton, 1997, p.593). In the context of acute confusion, however, a different meaning is intended. Here, the term has been selected to represent the psychological detachment or withdrawal of the affected individual from events in the immediate environment, and sometimes extending to events occurring within the individual's internal environment.

All three women demonstrated some evidence of disengagement from the external environment, although the degree of disengagement varied among the participants. This quality was most evident in the behavior of Mrs. Willett, who appeared to quietly "drift" into her own thoughts, returning only when those around her attempted to elicit a response. Her responses were delayed and slow, and her eye contact poor. Mrs. Willett's disengagement with the external world was best exemplified when, alone with the researcher, she responded to a question (repeated twice by the researcher) by asking "Are you talking to me?" Mrs. Willett's disengagement and retreat from the external world was most effectively penetrated by her family, whose presence stimulated her "return". At times, Mrs. Willett was even disengaged from the signals of her own body, failing to identify a large pill lodged in her throat for many hours. Disengagement was most extreme when, immediately postoperative, Mrs. Willett announced that she needed to "go peel the potatoes".

Mrs. Robertson, whose acute confusion was the mildest, also evidenced some

disengagement. During the evening, her eye contact diminished, as did her ability to follow a conversation. She drifted in and out of meaningful conversation, shifting to topics with no apparent relationship to the subject at hand, but to subjects clearly of concern to her. Her disengagement was far from complete. For example, when the subject was raised by the researcher, she was able to provide a detailed description of her attempts to void as well as the various nursing interventions. It is noteworthy that this was a topic of great concern to her at the time, providing some motivation for her to attend.

Mrs. Klassen's disengagement from external reality was more extreme and at times more complete. Her hallucinations were vivid, detailed and frighteningly real, replacing external events with events created in her own mind. In contrast to the vividness of her hallucinations, Mrs. Klassen had little recollection of visits from her friends during this time.

Mrs. Klassen's hallucinations and delusions created terrible fear and anxiety, and stimulated episodes of crying. At times, Mrs. Klassen recognized the breach between her reality and those around her. In responding to a nurse's directive to "stop crying right now", she observed that the nurse "didn't understand".

Thus, all participants experienced some degree and form of disengagement. This could sometimes be bridged through specific interventions, and at other times not. Disengagement contributed to apparent mental disorganization and also to the disinhibition demonstrated by the acutely confused participants. Disorganization was the second thread identified.

Disorganization

Disorganized and illogical thought processes were observed in all participants who experienced acute confusion. References to disorganized thought appear frequently in the nursing literature (Foreman, 1992, Rasin, 1990, Wilson, 1993), and include references to delusions that are fleeting, poorly systematized (Lipowski, 1987) and paranoid (Trzepacz, 1997). Again, each participant who experienced acute confusion manifested disorganized thought in different ways and to different degrees.

Mrs. Willett's thought patterns became increasingly disorganized as surgery approached. Her repeated questions about the location of the operating rooms "Am I going upstairs?... Are there stairs?...How will I get there?" and her inability to understand and retain the researcher's simple explanation evidenced this chaos. Her mounting anxiety during this time was equally apparent. She acknowledged "I'm so confused about what's happening".

After surgery, mental disorganization continued in a different form, with paranoid delusions about the researcher and staff, who Mrs. Willett viewed as evil and plotting. The changeable nature of these delusions was apparent the following day. At first the participant responded to the researcher, saying "you're nuts...she's nuts, this girl" and asking "...please don't hurt my brother". However, once the researcher moved to the other side of the bed, Mrs. Willett responded, as if to a different person "There's some awful things happening here...". While the delusions receded, disorganized thought patterns remained, impeding Mrs. Willett's ability to follow direction (eg. the physiotherapist's directions for transfer to the wheelchair). This slowed her progress and rehabilitation, an

outcome predicted in much of the literature (Cole & Primeau, 1993; Gustafson, Berggren, Brannstrom, et al., 1988; Levkoff, Evans, Liptzin, et al. 1992; Pompeii, Foreman, Rudberg, et al., 1994).

Mrs. Robertson's disorganization was less pronounced, but still present. During the evening, she removed her teeth in preparation for bed, with the later realization that she "never" removes her teeth for bed. Memory disturbances contributed to her problems, when she couldn't retrieve previous teaching about the location of the call bell or her deep breathing exercises; "no one ever told me". During her first postoperative night, Mrs. Robertson attempted to get out of bed to stop an alarm from ringing, apparently oblivious to the potential dangers of such an action.

Mrs. Klassen began her first postoperative morning asking for her sewing machine, and insisting that her nurse could sew. She rejected efforts by staff to reason with her, instead believing that the nurses were trying to trick her. Repeatedly, Mrs. Klassen attempted to get out of bed unattended. Once she was transferred to a gerichair by staff, she asked "Can I go home tomorrow?", apparently unconcerned that she was as yet unable to walk.

During more lucid intervals, Mrs. Klassen did not appear disorganized in her thinking. However, her ability to make eye contact and follow command belied her processing and memory capabilities. Postoperative exercises "taught" to the participant by the physiotherapist were never implemented, since Mrs. Klassen had no recall of the teaching.

In sum, while the differences in the manifestations of each participant are clear,

the unifying theme of disorganization can be applied.

Disinhibition

The third thread identified in the acutely confused group was disinhibition. This is a descriptor that rarely appears in the literature on acute confusion. The term is intended to represent the confused person's tendency to behave without the usual constraints of social expectation and/or personal values- that is, the ability to act impulsively on one's innermost thoughts and feelings.

It was a comment by Mrs. Kopp, who remained cognitively clear, that suggested this trait might differentiate the groups. Mrs. Kopp shared concerns about her pain with the researcher, expressing the worry that she might cry out or scream when moved, upsetting roommates and antagonizing nursing staff. This concern about the responses and needs of others was not apparent in the confused group, at least during their confused intervals. Examples of disinhibited behaviors follow.

Mrs. Robertson, a responsible and civic minded person, was able to talk, sing and wave her arms about, late into the evening, despite the presence of a roommate who had just undergone surgery. Her comment later "I was just writing my book, only I was doing it out loud". She was apologetic with her roommate.

Mrs. Willett removed her gown, waving it in the air. In the same vein, later in the postoperative period, she was oblivious to her slipping gown and exposed chest, a surprising contrast to her previous attention to such matters. In the postoperative period Mrs. Willett's accusations that the researcher was "evil" and "nuts", and her rejection of all caregiving, may be viewed as reflecting her uncurbed anger at the circumstances of her

surgical experience.

Mrs. Klassen also demonstrated disinhibition with her repeated attempts to get out of bed, and her removal of tubes. Unconstrained by logical thought, she wanted to "get up and get better... right now". As she later stated "I don't like to stay in bed- even when I have the flu, I just have to be up".

The theme of disinhibition has not appeared in the literature. However, clinical observations outside this study, which include patients screaming during turning and skin care, pushing away their trays, or hitting out to protect themselves, are consistent with this behavioral characteristic.

To conclude, three threads or themes recurred in the behaviors of the acutely confused participants- disengagement, disorganization, and disinhibition. However, these commonalities must be balanced by an appreciation of the unique personal and situational characteristics impacting on behavioral response. While many person and environmental factors will be addressed elsewhere in this chapter, analysis of participant behavior cannot exclude examination of some specific aspects of the participants' personalities and situations. Andersson, Knuttson, Hallberg et al. (1993) express the belief that "all behavior is simply an expression of the experience of the human being". Thus, to arrive at an understanding of the individual's behavior, it must be viewed against the background situation in which it occurs.

Unique Personal/ Situational Characteristics

Perhaps the most striking aspect of the researcher's observations of participant behavior, was the relationship of some aspects of the participant's behaviors to premorbid

personality and life experience, and / or to the circumstances experienced by the individual.

For example, at the height of her confusion, Mrs. Robertson began to sing, talk and wave her arms about. During interview, the researcher had noted that Mrs. Robertson had a whimsical sense of humor, providing numerous anecdotes of times past, and embellishing these with bits of rhyme or song that she had learned "as a young girl". A woman who was accustomed to public speaking, she later explained her behavior as "just writing my book, only this time I was doing it out loud". Thus, the behavior represented a more disinhibited form of her personality and past practice.

Mrs. Willett had been described by her children as somewhat withdrawn and quiet, slightly suspicious of those outside her family network, and strongly committed to the welfare of her brothers. Thus Mrs. Willett's withdrawal and seeming disengagement from external events, particularly in the absence of family, (as well as her apparent inability to form a relationship with the researcher) was consistent with her premorbid personality. Mrs. Willett's behaviors in the early postoperative period, with accusations that the researcher was "evil" and "setting a trap" for her brother, may also be explained within the context of the events of her hospitalization and surgery. For example, the researcher had reassured Mrs. Willett upon departure one evening that other staff would be available to help her during the night. As it happened, this was not the case and the participant's calls for help went largely unanswered.

The researcher had also provided information about the time of surgery and a description of how the surgical experience would unfold. The several delays of surgery

(especially when the participant was already in the operating theatre) and her emergence from sedation restrained and unable to move her arms, could easily have created her perception of the researcher (a nurse) as untrustworthy, and capable of further betrayal.

Mrs. Klassen manifested signs of anxiety, with frequent crying and distress. These behaviors were not unique to the time frame of the acute confusion, but simply an exaggeration of her previously "nervous" personality. Even the content of her hallucinations had meaning in the context of past experience; her fears that her daughter was being divorced and left with no means of support echoed her own similar difficult life experiences.

Thus, the participant's personality, life experience, and the events surrounding hospitalization and surgery must be considered when examining the behavioral responses of those experiencing acute confusion. Such individualistic factors are likely to have contributed to the specific behavioral responses manifested by the participants. At present the research literature is quiet on the topic.

To conclude, behaviors manifested by the acutely confused individual have some unifying elements that may be useful in developing strategies for care. However, recognition of the unique or individualistic elements of each situation provide the necessary insight for truly effective intervention.

Experiential Perspective

The experiential perspective of the HRI Model directed the researcher to focus on the personal experience of acute confusion, as described by the participants during formal and informal interview. The findings are discussed first in a general overview, and then

more specifically in relation to the introspections of Mrs. Klassen.

Overview of the Findings

The findings in the study were, in some measure, disappointing, not in their quality, but in the quantity of data obtained. Only one of the three affected participants, Mrs. Klassen, was able to complete a formal interview. The two other participants, Mrs. Robertson and Mrs. Willett could not be formally interviewed. The reasons for this will be explored.

Mrs. Robertson experienced a mild and brief episode of acute confusion. In discussing the event with the researcher the following morning, Mrs. Robertson denied that the episode occurred. Instead she explained her actions as an extension of her usual behavior and past practice. This explanation can be viewed from several perspectives.

First, Mrs. Robertson's perception of the events could have been an accurate portrayal of her experience. As discussed previously, several of her behaviors were consistent with the researcher's observations of her personality and past practice. Since she suffered no apparent hallucinations or delusions (ie. no extreme manifestations) during the episode, there may have been no basis for Mrs. Robertson to conclude that she suffered acute confusion.

The literature provides no insights into Mrs. Robertson's view of her experience. This may be attributed to patient selection criteria for previous studies, where participants suffered more extreme manifestations such as hallucinations and delusions (Andersson, Knutsson, Hallberg, et al., 1993; Schofield, 1997; Wilden & Howling, 1994), and had not experienced the quieter form of acute confusion.

Another possible explanation for Mrs. Robertson's response is that she used denial to suppress anxiety or fear that might have been created by conscious acknowledgement of the event. Or, alternatively, Mrs. Robertson may have been embarrassed by her behavior, a theme identified by Mrs. Klassen. It was the researcher's decision not to challenge Mrs. Robertson's response, in the event that her denial served as protection from further stress/distress.

Physician progress notes show that on Day 10 postoperatively Mrs. Robertson asked to change her codeine to another analgesic, in part because the codeine "makes my thinking fuzzy". In retrospect, an interview conducted at this time about cognitive problems experienced during the perioperative period might have elicited a different response from the participant.

The acute confusion experienced by the third participant, Mrs. Willett, did not resolve sufficiently to allow for formal interview. During a more lucid interval, Mrs. Willett acknowledged having no memory of the previous days events or her behavior during that time. In response to her families' account of her behaviors, she stated simply "I was very scared... That affected my thinking clearly". Mrs. Willett was not able to provide any additional insights into her experience. The theme of anxiety and fear alluded to by Mrs. Willett was also evident in Mrs. Klassen's reflections.

Mrs. Klassen's Experience

Mrs. Klassen's introspections touched on three topic areas. Two of these topic areas focus on the feelings Mrs. Klassen experienced in relation to her confusion, including fear and anxiety, and embarrassment. The third topic area includes her reflections on intervention. Each will be addressed in turn.

Fear and Anxiety

One of the first themes to emerge from Mrs. Klassen's interview was her fear of suffering acute confusion. "My husband and my girlfriend in their later years had surgery, and they were very confused. So I was very scared of it." Mrs. Klassen found the confusion of her husband and girlfriend very frightening, made more so because restraints were used to control unmanagable behavior. Another participant echoed Mrs. Klassen's sentiments when she stated that she prayed each day "for God to keep my mind clear...".

Fawdry and Berry (1989) suggested that "one of the greatest fears of older adults is senility and the resultant loss of control and independence (p.17)". The fear expressed by Mrs. Klassen had two sources. The first source of her fear was the episode itself, with its threat to her dignity and to her independence during hospitalization. The second source of her fear was a belief that the confusion signalled the "beginning of the end" (of her mental competence). Mrs. Klassen's behavior reflected her fear, and in her lucid moments she required frequent reassurance that the episodes were diminishing and that her clarity was returning.

Mrs. Klassen's expressed fears were in contrast to the findings of Schofield (1997). Of the 19 patients interviewed in that study, only two expressed a concern that

their acute confusion signalled progressive senility. This might be accounted for by the fact that Schofield's data was gathered retrospectively from participants whose confusion had resolved; thus, any fears of permanency may have also been resolved.

The feelings of fear and anxiety generated during Mrs. Klassen's confusion episode were heightened by the nature of her hallucinations and delusions. The vividness and reality of these episodes made her feel "verrry scared". "Then I was crying...oh I was crying because they had separated [in her imaginings, her daughter and son-in-law had separated]".

All of the perceptual disturbances experienced by Mrs. Klassen provoked similar feelings of anxiety. These feelings were evoked when she closed her eyes and saw her sons talking to her, "because they were separated from me and they couldn't hear me even though I tried to talk to them...and I was crying and crying..." The theme of forced separation was also recorded by Schofield (1997), whose participants described a similar inability to interact or communicate with their loved ones.

Thus, fear and anxiety were a central aspect of Mrs. Klassen's experience. These feelings contrast with the suggestion by Lipowski (1990) that some hallucinations might be pleasant and comforting; Mrs. Klassen's perceptual disturbances contributed to her anxiety. What remains unclear to the researcher is whether the nature of Mrs. Klassen's hallucinations and delusions were a byproduct of her underlying emotional distress. An affirmative answer to this question would underscore the need for anxiety reduction interventions for the newly admitted hip-fractured patient, even before onset of acute confusion.

Embarrassment

Mrs. Klassen found her dreaming episodes not only very frightening but also "soooo embarrassing...you can't imagine". She "didn't want people to know", and tried to disguise her symptoms when interacting with others such as staff and friends. At times, these deceptions were successfully maintained. Mrs. Klassen expressed relief when visitors (friends from church) told her son that she "seemed to be doing so well". Some staff, such as the physiotherapist, completed routine teaching unaware of the participant's limitations. Other staff with more ongoing contact recognized that her evasive responses to questions were intended to mask memory and thinking problems.

Mrs. Klassen was aware of many of her behaviors, such as her repeated attempts to get out of bed. " You have no idea, and I got so tired and I couldn't get out this way and I couldn't get out that way." Andersson, Knutsson, Hallberg, et al. (1993) noted that "although these patient's have a distorted view of reality, they also experience a frustrating insight into their present inabilities, and this causes them embarrassment (p.242)". "I was just lucky they didn't tie me down. And then when I was on the toilet, they would say "this is the lady that always wants to get up" and I couldn't help it! Oh, and it was embarrassing". In Mrs. Klassen's view, the only fate worse than her confusion would have been restraint, partly because of a further loss of control, but also because a restraint device would have announced her mental impairment to those around her. Thus, Mrs. Klassen's awareness of her situation (and of the comments of health care providers), contributed to her distress.

Response to Nursing Intervention

In her more lucid moments, Mrs. Klassen was eager to please staff. "I tried very hard [to follow medical advice and not take analgesia]...Like this sitting here bothers me. But I say to myself... try as long as you can [to avoid analgesia]". Mrs. Klassen's desire for approval was evident in the comments of several other participants. (Mrs. Kopp, for example, shared her concern that she would "upset" staff if she cried out during caregiving.) However, despite Mrs. Klassen's best intentions, she was not always able to follow the direction of caregivers. As a result of her chaotic thought processes, she repeatedly attempted to climb out of bed or dislodge tubes.

Mrs. Klassen viewed most staff interventions positively, acknowledging that "they were only trying to do what was best for me". She remembered their frequent attempts at reality orientation, and said that these efforts helped "much...much...very much". On exploration, Mrs. Klassen observed that while reality orientation did not stop her hallucinations "from coming...as soon as I close my eyes", short reminders about where she was "still helped me remember for a few moments".

These comments support the assertions by Fawdry and Berry (1989) and Schofield (1997) that simple, clear and repeated reality orientation may benefit some patients experiencing acute confusion. However, other literature presents an opposing view. Wilden and Howling (1994) reported that attempts at reorientation were ineffective and angered the patient. Instead, the patient in their case study stated "I think I needed implicit understanding and reassurance from staff that they knew I was somewhere else... but that

I could, and would come back"(p29). This difference in response could reflect contrasting personalities, depth of the confusion, timing of the intervention or the level of agitation experienced by the confused person.

Mrs. Klassen also remembered one nurse's firm commands to stop crying..."Now don't you cry once more". When the researcher observed that this nurse was "very firm with you", she responded "Oh and so good...oh and so good". Thus, Mrs. Klassen responded well to short commands, which may have helped her gain a sense of control in the situation (Schofield, 1997).

Mrs. Klassen also reinforced the importance of family presence during her confusion. As in the case of Mrs. Willett, some family members were more helpful than others. One of Mrs. Klassen's sons was able to take charge of the situation, providing her with the reassurance and support necessary to reduce her anxiety. She remembered his comments, "I'll sit here as long as you want me to." This was the same son who indicated to her that she would not be discharged until he was satisfied that she was "completely ready". Thus, when the researcher asked Mrs. Klassen if it was helpful to have familiar faces at the bedside, she responded "well...his face". Again, she observed that family presence did not stop her hallucinations but that their presence was comforting, and helped her to cope with the distress she was experiencing. This topic will be addressed again in the discussion of the social environment.

To summarize, Mrs. Klassen's experience of acute confusion was filled with fear, anxiety and embarrassment. She found support in the firm direction provided by staff and in the reassuring presence of family members. Her revelations helped to explain some of

the behaviors witnessed by observers, and provide the foundation for nursing intervention.

Factors Affecting Individual Vulnerability to Acute Confusion

As directed by the expanded version of the HRI Model, person factors and environmental factors influence individual vulnerability to acute confusion. Person factors are further classified as non-modifiable and modifiable, and environmental factors are subdivided into the physical environment and the social environment. These factors are discussed in relation to the findings of the study.

Person Factors

Non-Modifiable Risk Factors

The nonmodifiable risk factors for acute confusion identified through literature review included age, gender, preexisting dementia and prehospitalization activity levels. (It should be noted that such classification was somewhat arbitrary, since prehospitalization activity levels are only considered nonmodifiable within the context of this study.) One factor, gender, was excluded as a variable in this study to focus on the elderly (mainly female) hip-fractured population. Each of the remaining factors are addressed in turn.

Age

Advancing age has been cited in the literature as an important predictor of acute confusion (Elie, Cole, Primeau, et al., 1998; Gustafson et al., 1989; Rockwood, 1989; Schor, Levkoff, et al. 1992; Williams-Russo, Urquhart, Sharrock et al., 1992). Theorists have hypothesized that age related changes in the brain lead to a reduced ability to

process incoming stimuli (Albert & Moss, 1996; Bissett, 1996; Lipowski, 1990; Vogel, 1990), lowering the threshold at which cognitive breakdown occurs (Neelon & Champagne, 1992). The study population was selected, in part, because the incidence of acute confusion was predicted to peak in those over 80 years (Schor, 1992).

The findings in this study are significant for three reasons. First, they support the stance that acute confusion is a frequently occurring problem in the elderly hip-fractured population. As evidenced in Table 44, three of the five participants suffered some form of acute confusion during their hospitalization. This incidence falls in the range reported previously for the hip-fractured population (Gustafson, Berggren, Brannstrom, et al., 1988; Williams, et al 1985), perhaps slightly higher due to the older age range of the participants in this study.

Table 44- Overview of age and incidence

NAME	AGE
Mrs. Rempel	88
Mrs. Kopp	95
Mrs. Robertson*	90
Mrs. Klassen*	80
Mrs. Willett*	89

• denotes acute confusion occurred

The findings are also significant because of the variability demonstrated within the group. It is noteworthy that the most senior participant, Mrs. Kopp, remained cognitively intact, while the youngest participant, Mrs. Klassen, succumbed to acute

confusion. Discussions of age related changes in neuroanatomy and physiology might lead reader to conclude that cognitive function in the 95 year old will be predictably less than that of the 80 year old, with an associated increase in susceptibility to acute confusion. Mrs. Kopp exemplifies the potential for high functioning that may occur within the old old group.

This leads to the third point of significance in the data. Within this small group, age could not be used to predict acute confusion. While in the whole population, age has clearly emerged as a predictor of acute confusion, review of the literature indicates that the correlation between age and incidence of acute confusion in the over 80 cohort has not been carefully examined. A study of acute confusion by Francis, Martin and Kapoor (1990) found no significant correlation between age and incidence. This may be attributed to the older population (ie. over age 70) examined in the study. It is possible that a "hardiness factor" (ie. the effects of selective survival) as described by Butler, Ashford & Snowdon (1996) and Perls, Morris and Ooi (1993) may influence outcomes in those over 80 years.

Pre-Existing Dementia

The correlation between dementia and susceptibility to acute confusion has been well established (Francis, Martin & Kapoor, 1990; Inouye, Viscoli, Horwitz, 1993; Levkoff, Evans, Lipzin, et al., 1992; Schor, Levkoff & Lipsitz, 1992). This study excluded those with a diagnosed cognitive impairment to avoid the difficulties of distinguishing symptomatology and to increase the likelihood of meaningful dialogue. While no formal testing was administered on admission to the study (aside from the

NEECHAM Scale), cognitive function was assessed through history taking and discussion with family.

On first interview, all candidates were lucid, appropriate, and gave a clear account of their past medical history as well as recent events. No overt deficits were observed. Cognitive functioning was further confirmed when staff administered the MMSE later in the hospital stay.

One participant, Mrs. Willett, was administered the MMSE during her acute confusion. She performed poorly, achieving a score of 10/30. This score was consistent with observations of her functioning at the time, and attributed by the researcher to the effects of the acute confusion episode. However, it is also possible Mrs. Willett's performance on the MMSE reflected additional cognitive impairment that was previously undiagnosed and undetected on admission. An undiagnosed dementia could account for her rapid decline so shortly after admission, as well as her lack of resolution of symptoms (Francis & Kapoor, 1992). Mrs. Willett's inability to recite her telephone number on admission, and a later observation by her brother that "at home sometimes she would kind of drift off in the middle of a conversation", support this contention.

Thus, while the researcher still questions the benefit and appropriateness of formal cognitive testing on admission in this highly stressed group, more comprehensive cognitive assessment and careful admitting histories solicited from family members might have some predictive value.

Prehospitalization Activity Level

A low level of pre-injury activity was identified by Williams, Campbell, Rayor, et al. (1985) as a predictor of acute confusion. While their published report did not indicate how activity was measured, the findings of this study do not correspond with their results.

In this study, all participants maintained a degree of physical activity as a function of light housekeeping and cooking chores. A number of the women expressed frustration with the limitations of their physical capabilities. Mrs. Kopp spoke for the group when she lamented that her "feet can't go as fast as my mind".

As seen in Table 45, Mrs. Kopp was the least physically active of the participants, due to her problems with arthritic back pain. Mrs. Rempel was most active, swimming several times a week and riding her exercise bike in addition to regular activities of daily living. Neither of these women experienced acute confusion. The three women affected by acute confusion all scored in the middle range for activity.

Table 45- Physical Activity

NAME	DEGREE OF ACTIVITY (0-4)**
Mrs. Rempel	4
Mrs. Kopp	2
Mrs. Robertson*	3
Mrs. Klassen*	3
Mrs. Willett*	3

* denotes acute confusion occurred

** 1 point assigned for each of the following:

- light housekeeping
- cooking
- regular excursions outside home
- formal exercise

Thus, in the study group, prehospitalization activity level did not predict cognitive outcome. This finding may have resulted from the effects of small sample size or crude measurement. Alternatively, the finding suggests that the underlying reasons for diminished activity, such as stroke or impaired cardiac or respiratory or cerebral function, may be more crucial variables in prediction of outcomes.

Modifiable Risk Factors

Modifiable risk factors discussed in the literature included vision and hearing deficits (Inouye, Viscoli, Horwitz, et al., 1993; Lipowski, 1987; Roberts & Lincoln, 1988), severity of illness or comorbidities (Frances, Martin & Kapoor, 1990; Inouye, Viscoli, Horwitz, 1993; Rockwood, 1989), stress, anxiety and coping (Lipowski, 1990; Rockwood, 1989; Sirois, 1988), pain and fatigue (Bowman, 1992), immobilization (Inouye & Charpentier, 1996), and medication (Gustafson, Berggren, & Brannstrom, 1988; Marcantonio, Juarez & Goldman, 1992; Rogers, Liang & Daltroy, 1989). Study findings are reviewed within each category.

Vision and Hearing Impairment

The role of sensory perceptual systems in the processing and interpretation of incoming stimuli has been well described by Wolanin and Phillips (1981). Subsequently researchers have revealed correlations between impaired vision and hearing and acute confusion (Roberts & Lincoln, 1988, Inouye, 1993). In this study, all participants experienced some impairment of both hearing and vision.

All participants wore glasses. Four of the five used their glasses primarily for reading. Only Mrs. Robertson required vision correction for normal activities of daily

living. She reported a history of cataracts with corrective surgery twenty years prior, and explained that without corrective lenses, she could only see shapes and colors (but no definition and detail).

With correction, Mrs. Robertson could recognize the researcher as she entered the room, a distance of approximately four meters. During surgery, and without her glasses, Mrs. Robertson was aware of the staff around her and stated that she could recognize (vaguely) the anaesthetist and the researcher. It is noteworthy, however that Mrs. Robertson's confusion did not occur until 24 hours after surgery, when both her glasses and her hearing aide were in place.

One participant, Mrs. Kopp, reported a visual "distortion" during recovery, asking the researcher "Is that a mouse up there [on the ceiling]?" However, the participant was immediately able to recognize the improbability of such an event, and attributed her misperception to her "eyes playing tricks". Her comments attest to the role of higher cognitive functions in interpretation of incoming stimuli.

All participants owned hearing aides. None relied heavily on these aides, often choosing to leave them in the bedside drawer because they were "a nuisance". All participants were able to hear the researcher when moderate tones were used and speech was clearly articulated in a quiet environment. However, the researcher questioned the adequacy of hearing in one participant, Mrs. Willett. There were several instances where the participant's responses were sluggish and she appeared bewildered by the researcher's comments. Yet, at other times, and in similar conditions, Mrs. Willett had no difficulty hearing, as evidenced by the promptness and appropriateness of her replies. Thus, what

occasionally appeared to be a hearing deficit was better explained as a problem of attention and processing.

In this group, vision and hearing deficits could not be used to explain acute confusion. However, it may be that in the predisposed individual, such as Mrs. Willett, poorer vision and hearing facilitated the disengagement process caused by the confusion episode.

Severity of Illness

No formal classification system was used to determine severity of illness in the research group, as this was not the central focus of the study. Moreover, classification systems such as the APACHE II (Knaus, Draper, Wagner & Zimmerman, 1985) required data that was unavailable for these participants. Instead, judgements of illness severity were based on the clinical judgement of the researcher, supported by the assessments of medical and nursing staff. This approach has found support in the literature (Charlson, Sax, MacKenzie & Field, 1986) and was deemed sufficient for the purposes of the study.

As a group, the participants were exceptionally hardy, describing their health prior to admission as good. On admission, each was diagnosed with traumatic hip fracture. Otherwise examinations were generally unremarkable, with no evidence of severe cardiac or respiratory insufficiency. The participant's conditions were stable, although hypertension was common. A significant hyponatremia was noted for Mrs Kopp, and treated, with limited success, prior to surgery.

Of the three participants affected by acute confusion, both Mrs. Robertson and Mrs. Klassen showed evidence of some respiratory compromise. Mrs. Robertson had only

recently recovered from pneumonia, and Mrs. Klassen had a diagnosis of (a longstanding) mild COPD. Correspondingly, each had oxygen saturations below 93%. Neither woman demonstrated any respiratory distress, and supplemental oxygen increased oxygen saturations to acceptable levels. Mrs. Klassen's respiratory status was further compromised prior to surgery by a narcotic induced respiratory depression. This was acute and serious, but was treated successfully 24 hours before surgery.

The only other participant to suffer a serious medical complication during the research period was Mrs. Rempel. Her episode of tachycardia, with associated hypotension and diminished oxygen saturation, slowly resolved with conservative treatment over 24 hours. Mrs. Rempel remained cognitively intact, with the exception of a small memory lapse noted following resolution of the episode.

Overall in this study, acuity of illness, and number of co-morbidities did not clearly impact on cognitive outcomes. This finding conflicts with the results of several studies (Inouye, 1993; Francis, 1990; Rockwood, 1989), but may be explained by the overall lack of severe illness in the study group. As well, studies identifying severity of illness as a predictor of acute confusion have focussed on medical populations. These cohorts have been admitted to hospital primarily because of the severity and complexity of their medical conditions, and vary significantly in their defining characteristics from those in this study.

Stress and Anxiety

Stress and anxiety have been postulated to play a role in the onset of acute confusion through a variety of mechanisms (Kral, 1975; McIntosh, Bush and Yeston,

1985; Lipowski, 1990; Sirois, 1988). This hypothesis is particularly pertinent to the hip-fractured elderly, whose confusion frequently cannot be explained by detectable pathologic changes (eg. Rockwood, 1989; Sirois, 1988). Bowman (1992) studied the relationship between anxiety and acute confusion, but found no correlation between the two. She observed that episodes of acute confusion often occurred after surgery, when anxiety was decreased, and that higher levels of trait and state anxiety did not predict incidence of acute confusion.

In this study, two of the three participants who experienced acute confusion demonstrated significant anxiety- Mrs. Klassen and Mrs. Willett. Each case is addressed.

Mrs. Klassen was described by family as a "nervous" woman, who occasionally required a small amount of lorazepam to calm her nerves or to sleep. Her longstanding history of depression, treated by ECT in the 1950's and more recently with medication, further complicated her emotional needs. Prior to surgery Mrs. Klassen expressed her anxiety about the impending surgery to her physician, and was treated with lorazepam. However, Mrs. Klassen's confusion did not emerge until eight hours after surgery, when anxiety was predicted to be lower. During this time, Mrs. Klassen's more pressing complaint was pain. Administration of meperidine just prior to onset of confusion further clouded the identification of relationships between variables.

Mrs. Willett's anxiety may have played a more clear role in her confusion. She attributed her behavior in the perioperative period to anxiety. "I was very scared..That affected my thinking clearly". On admission to the hospital, Mrs. Willett expressed her shock and disbelief that she had fallen. Lorazepam was administered for her distress.

Throughout the course of hospitalization, Mrs. Willett identified several sources for her anxiety. She worried about the health of her brother who she live with and cared for. She worried about the outcome of her surgery- "I could die", and begged her family not to "leave me in this place". The delays in surgery and the uncertainties surrounding her care ("I called and called and no one came") served to escalate her anxiety and confirm some of her worst fears.

Symptoms of Mrs. Willett's acute confusion presented shortly after admission, intensified as surgery approached, and peaked in the early postoperative period. Few other intervening variables could be identified, although the role of drugs will be addressed shortly. Thus, contrary to Bowman's (1992) findings, anxiety appeared central to Mrs. Willett's chaotic thought processes and contributed to the nature of her delusions.

It must be noted, however, that all participants experienced considerable stress with their injuries, hospitalization and treatment. Yet two participants, Mrs. Kopp and Mrs. Rempel, avoided cognitive impairment. This raises the question of coping capacity, and its influence on outcome (a question also posed by Bowman, 1992).

Clearly, the stressors that Mrs. Willett experienced overwhelmed her ability to cope. Little is known about her past coping style or her success in coping with new and stressful situations. This data would have been useful in examining current behavior. Likewise, more information about Mrs. Klassen's coping capacity might have helped predict her response to injury and hospitalization.

It is noteworthy that both participants who remained cognitively intact were women with strong religious faith. More than once, these participants referred to their fate

being in God's hands, and used silent prayer as a means of coping with their fear and distress. Their beliefs provided a calming influence, and positively influenced coping.

The findings in this study support the need for more focussed research on the impact of anxiety and coping on cognitive outcomes.

Pain and Fatigue

The literature on pain and its relationship to acute confusion is sparse, and results contradictory (Bowman, 1997; Duggleby & Lander, 1994). The findings of this study did not support the contention that pain was a predictor of acute confusion. The researcher evaluated pain through self report of participants as well as observations of nonverbal behavior and the participant's response to turning and moving. The two participants who experienced the most pain preoperatively and postoperatively remained cognitively intact. The remaining participants had fewer complaints of pain, described a lesser severity of pain, and moved more freely. While Miller, Moore and Schofield (1996) suggested that reports of pain might be influenced by cognitive capacity, the pain experiences observed here seemed to reflect the normal variation seen in the hip-fractured population. Moreover, there was no difference in reporting of pain before onset of confusion. In summary, no relationship between pain and acute confusion could be isolated here.

The literature also identifies sleep deprivation as a contributor to acute confusion (Inouye, Bogardus, Charpentier, et al., 1999), although findings are not consistent (Bowman, 1997). In this study participants were sleep deprived due to nighttime admission, pain, general distress, and the interference of REM sleep due to medication.

Nursing interventions such as vital signs, administration of medication and skin care, as well as early morning housekeeping routines (ie. 0530) further disrupted normal sleep patterns. Resulting fatigue was exacerbated by the physical and psychological stress of emergency surgery, and anemia due to intraoperative blood loss.

In two of the cases in this study, fatigue appeared to correlate with cognitive impairment. In the words of one participant whose cognitive function was diminishing, "I'm just so tired I can't even think any more". The confusion of a second participant, Mrs. Robertson, began after a lengthy afternoon of visitors, and an evening of uninterrupted nursing intervention (voiding problems, medication and blood administration). Mrs. Robertson's roommate observed- "Its no wonder she had problems- she looked just exhausted after her visitors left and didn't get a moments rest all evening". Mrs. Robertson's cognitive function was improved by the following morning. However, a full recovery didn't occur until after a lengthy nap the following evening.

Thus, while Bowman (1997) was unable to identify an association between sleep satisfaction and acute confusion, subjective reports in this study suggest the need for further investigation.

Immobilization

The impact of immobilization on perception has been effectively demonstrated by Wolanin and Phillips (1981). Recent studies have identified immobilization as a predictor of acute confusion (Inouye & Charpentier, 1996). However, the exact relationship between immobilization and acute confusion is unclear (Jacobson, 1997).

All participants in this study were immobilized, sharing a common preoperative

and postoperative experience. All were placed in traction prior to surgery. Each had an indwelling urinary catheter and an intravenous for hydration and medication administration. On the first postoperative day, all were assisted to sit at the bedside. With the exception of Mrs. Willett (whose order for physiotherapy was misplaced), activity was progressively increased by the second postoperative day. Catheters and intravenous lines were discontinued by the third postoperative day.

However, variation did occur between participants in the length of time spent awaiting surgery. It is noteworthy that the two participants who remained cognitively intact (Mrs. Rempel and Mrs. Kopp) were immobilized for the shortest time, undergoing surgery within 24 hours of admission. The remaining three participants, who all experienced acute confusion, waited 36-48 hours for surgery. Although these findings do not explain the nature of the relationship between prolonged surgical waits and acute confusion, they support the need for early surgical intervention in the treatment of hip fractured patients.

The researcher also observed that confused participants were more oriented and appropriate when upright, particularly when assisted out of bed and into a chair. The restless and agitated behaviors of both Mrs. Klassen and Mrs. Willett were reduced when staff assisted them into gerichairs. This change in position likely provided each participant with additional visual cues that assisted in orientation, as well as stimulating circulation to the brain. The move from bed to chair often corresponded with an increase in environmental lighting (Kolanowski, 1992) or more contact with staff or roommates. Thus, it is likely that improvements in the participant's function were attributable to a

combination of these factors. Regardless of the difficulties in attributing causality, early mobilization was seen as essential to the physical and psychological recovery of the participants.

Hydration and Nutrition

The relationship between hydration and acute confusion has not been clearly established, although Foreman's 1989 study, using a medical population, identified a positive correlation between the two variables. Inouye, Bogardus, Charpentier, et al. (1999) targeted dehydration as a key focus of intervention for their medical population.

In this study, all participants evidenced a similar pattern of fluid balance, and no correlation between hydration and acute confusion could be identified. All participants complained of a very dry mouth, and oral mucosa was extremely dry. Urine output in the preoperative period was sufficient in quality and quantity. Postoperatively, urine outputs were poor for the first 24 -48 hours, ranging from 10-15 cc./hour. The output of one participant, who remained cognitively clear, measured 75cc. for the night shift following surgery. These low outputs (in part, affected by stress related changes in fluid balance hormones) were also associated with low postoperative blood pressures, suggesting a general fluid volume depletion. No changes were made in intravenous flow rates to address postoperative changes.

Intravenous therapy was initiated on all participants on admission. However, solutions and rates seemed more closely associated with the ordering physician than body weight and cardiovascular condition. In one case, a participant's IV remained TKO for the entire preoperative period while the participant remained NPO. The intravenous

contained no dextrose (ie. normal saline), thus providing no caloric intake for this period.

Both oral fluids and food were withheld from participants after midnight, despite the likelihood of surgery late in the day (ie. usually 1600-1800 hours, or later for Mrs. Willett). For three of the participants this practice extended for more than 24 hours, due to the unpredictability of operating room availability. (They were offered a sandwich and juice late in the evening if surgery was delayed.)

Oral fluids, once ordered, were most available to participants if family were present to assist them. Staff were rarely able to provide this type of ongoing support. Moreover, recording of oral fluid intake was commonly incomplete and inaccurate.

In summary, dehydration and inadequate nutritional intake were problems for all participants. Fluid balance, and its relationship to acute confusion in the surgical patient, warrants closer scrutiny.

Medication

The literature cites medication as a leading cause of acute confusion (Foreman, 1993, Frances, Martin & Kapoor, 1990; Inouye, Viscoli, Horwitz, 1993). The three drug classes most frequently implicated are the narcotics, anticholinergics and the sedative-hypnotics (Frances, 1992; Marcantonio, Juarez, Goldman, et al., 1994; Tune, Carr, Hoag, et al., 1992), although findings are inconsistent across studies (Elie, Cole, Primeau, et al., 1998). Two of these groups will be addressed- narcotics and sedative-hypnotics. The third group, anticholinergics, presented problems with identification and measurement of anticholinergic activity and was deemed to exceed the boundaries of the study.

Narcotics

In this study, the relationship between narcotics and acute confusion was an important topic. This was due, in part, to the nature of the setting (ie. surgical). As well, medical and nursing staff held strong (and often divergent) views about the potential effects of narcotic administration on the cognitive function of the participants. These beliefs had an impact on willingness to order and/or administer analgesic medication to control pain.

Three narcotic analgesics were administered to the study participants- morphine, meperidine and codeine. Fentanyl was administered to all participants intraoperatively for its anaesthetic effects.

Morphine was administered to three participants. As seen in Table 46, Mrs. Rempel received substantially more morphine than any other participant. She remained cognitively intact. Morphine was also administered to Mrs. Klassen on her first day of hospitalization. The total amount she received was sufficient to cause a serious respiratory depression. However, once conscious, she was lucid, oriented and appropriate, showing no evidence of acute confusion. Morphine was discontinued and replaced with plain tylenol for pain management. Mrs. Klassen's confusion did not emerge until more than 36 hours later, on her first postoperative night.

Table 46

Overview of Narcotic Administration

Hospital Day	ADMISSION		1	2	3	4
	Drug	Total Rec'd (mgm)	Total Rec'd	Total Rec'd	Total Rec'd	Total Rec'd
Mrs. Rempel	Demerol	175	-	-	-	-
	Morphine	42.5	35	20	7.5	-
	Codeine	120 (o)	240 (o)	180 (o)	240 (o)	300 (o)
Mrs. Kopp	Demerol	75	-	-	-	-
	Morphine	15	-	5	-	-
	Codeine	60	180 (o)	180 (o)	120 (o)	60 (o)
Mrs. Robertson*	Demerol	-	50	-	-	-
	Morphine	-	-	-	-	-
	Codeine	-	60 (IM)	60 (IM)	30 (IM)	30 (IM)
Mrs. Klassen*	Demerol	-	-	25	25	-
	Morphine	20	10	-	-	-
	Codeine	-	-	-	-	-
Mrs. Willett*	Demerol	-	-	-	-	-
	Morphine	-	-	-	2.5	-
	Codeine	120	30 (o)	30 (o)	60 (o)	-

Mrs. Kopp also received several doses of morphine in the preoperative period. She remained attentive, lucid and appropriate. In the postoperative period, Mrs. Kopp's physician directed staff to avoid morphine "because I don't want her getting confused". Postoperative day 2, morphine was ordered and administered for severe pain. This was again discontinued after administration of a single dose because staff noted the participant was "drowsy". The researcher did not observe any signs of acute confusion, observations shared by family.

In sum, there was no evidence in the study to indicate a relationship between morphine and acute confusion, a finding consistent with Marcantonio, et al (1994).

Meperidine was identified by staff as the cause of confusion in one case- Mrs. Klassen. Her symptoms were first noted on the first postoperative night, one hour after intramuscular administration of meperidine 25 mg. (A similar dose had been administered 8 hours earlier). Symptoms continued for the next 48 hours, despite the discontinuation of the medication. While there were other confounding factors, such as a history of depression (Gustafson, et al., 1988), an episode of intraoperative hypotension (Gustafson, et al. 1988), as well as pain and anxiety, the anticholinergic properties of meperidine and its metabolite may have contributed to Mrs. Klassen's response (Marcantonio et al, 1994).

Intraoperatively, fentanyl was administered to all participants, although in differing doses. No undesirable cognitive effects were observed in four of the participants. However, fentanyl may have contributed to the exacerbation of Mrs. Willett's symptoms of acute confusion in the immediate postoperative period. Mrs. Willett received the largest single dose of fentanyl (100 mcg.), and emerged from the fentanyl sedation agitated and delusional. These symptoms did not resolve for approximately 18 hours after the fentanyl was administered. As discussed in the behavioral perspective, situational factors likely also contributed to her symptoms.

Sedative-Hypnotics

The recent intervention study reported by Inouye, Bogardus, Charpentier, et al., (1999) identified use of sedative hypnotics as a predictor of acute confusion.

In this study two of the confused participants - Mrs. Klassen and Mrs. Willett- received lorazepam prior to onset of symptoms. Dosages were small and infrequent. Mrs. Klassen used lorazepam for "nerves" intermittently prior to admission, and tolerated the drug well. However, Mrs. Willett, by her family's account, was unaccustomed to the medication.

On two days, Mrs. Willett's sluggishness and slurred speech were attributed to nighttime doses of lorazepam. The relationship was not clear, since symptoms fluctuated and did not appear to correspond with the half life of the drug. Regardless of the veracity of the relationship, comments by staff were pertinent- "They're pretty quick to give that stuff". Mrs. Willett was anxious, and her anxiety escalated during the night. No other intervention strategy was evident in managing this anxiety. Given the capacity of benzodiazepines to contribute to cognitive disturbance in the elderly, non-pharmacologic interventions should be the preferred "first response" in the management of anxiety.

Predicting the Susceptible Individual

Frances (1992) points out that nearly all classifications of drugs may contribute to delirium in the susceptible individual. The findings of this study support his statement. The difficulty lies in predicting which individual is susceptible. Two factors deserve consideration here. First, Mrs. Klassen and Mrs. Willett (who each experienced acute confusion) were described as "very sensitive to medication". Mrs. Willett's family observed that she rarely took medication and that it "always really knocks her out". Mrs. Klassen noted that "you never know what I'll react to". This type of sensitivity was not described by any other participant.

A second noteworthy observation relates to the body size of the participants. Data on weight was estimated by self report and observation of overall body size. Despite the crudeness of measurement, there was a clear difference in body size between those who experienced acute confusion and those that remained cognitively intact. All three women who experienced acute confusion were small in stature, and thin, at least 10 to 20 kg. smaller than their unaffected counterparts. The nature of the relationship between body size and susceptibility to acute confusion is open to conjecture. While the finding is not supported in the literature (Inouye, viscoli, Horwitz, et al., 1993), this variable has received limited attention and warrants further investigation.

Environmental Factors

Factors in the Physical Environment

The hospital environment presents the patient with a barrage of new and unfamiliar visual and auditory stimuli (Foreman, 1989; Williams, 1985; Wolanin & Phillips, 1981). Upon hospitalization, familiar patterns and orienting cues are lost, creating additional demands on neural structures for processing and interpretation of information (Lipowski, 1990). The literature assigns environmental factors a contributory role in the development of acute confusion (Easton & MacKenzie, 1988; Lipowski, 1990).

There was little evidence in this study that the physical environment played a central role in the onset of acute confusion. All participants were assigned to 2 or 4 bed rooms. These rooms were well lit, with large windows to provide normal diurnal patterns of light and dark (Kolanowski, 1992). There was limited equipment at the bedside-

intravenous pumps were used infrequently. Even overbed frames and trapezes (which may have been useful in caregiving) were rarely observed. Efforts were made by staff to ensure cards and flowers were within visual range, although few other personal objects or time pieces were observed (Evans, Kenny & Rizzuto, 1993; Miller, 1996). The location of call bells presented some difficulty for participants. Unlike traditional call bells, these were built into the bed rails. Obscured from view, the bells were easily overlooked, and participants required extra direction to learn their location.

Overall, rooms were fairly quiet. Overhead paging was kept to a minimum, and the enclosed nurse's station reduced staff noise.

There were only isolated situations in which a participant misinterpreted environmental stimuli. Twice, Mrs. Willett mistook overhead pages for live conversation. Occasionally, she responded to conversations taking place at the adjacent bedside. While these events may have triggered misperceptions, Mrs. Willett showed prior evidence of mental disorganization.

Events in the physical environment also triggered some misperceptions for Mrs. Robertson. During her second postoperative night, Mrs. Robertson became disoriented and distressed after the alarm sounded on her intravenous pump. Her attempts to get out of bed to "find out what is wrong" were foiled by the timely arrival of the nurse.

The nighttime environment created problems for other participants. Both Mrs. Klassen and Mrs. Willett experienced their hallucinations at night. As well, the night time created fear for Mrs. Willett. Her calls for help went unanswered for long periods, heightening her distress. Such nighttime problems call into question the practice of

maintaining a skeleton staff during the night shift, based on the premise that patients will require less frequent and skilled nursing intervention.

Factors Related to the Social Environment

There are several aspects of the social environment that must be addressed here. These include the effects of staffing patterns and staff interaction, family presence, and the informal role of roommates.

Staff

The literature acknowledges the benefits of caregiver continuity, although studies have been equivocal in their findings (Miller, 1996; Williams, Campbell, Raynor, et al., 1985b). For the patient, consistency in caregivers has been postulated to reduce anxiety and increase sense of predictability and control. For staff, continuity allows greater knowledge of the patient, more accurate assessments and more individualized caregiving. Ongoing contact between caregiver and care recipient has been suggested to encourage bonding, increasing the satisfaction of both parties (Miller, 1996).

Overall, staffing on the research unit did not provide for consistency in caregiving. For example, in the first three days after admission, Mrs Klassen encountered at least 16 caregivers, excluding emergency, medical, lab, physiotherapy, and x-ray staff.

Limited and frequently changing staff, heavy patient loads with acute surgical patients, and the use of aides to supplement professional staff meant that care was fragmented and rushed. For the majority of time outside the immediate postoperative period, hip-fractured patients were considered low priority, and time allocated to their needs was minimal.

Staff interaction with participants was of necessity rushed, brusque, and task oriented, although not uncaring. Sometimes this led to misunderstandings by participants. For example, when the staff nurse hurriedly took Mrs. Willett's hand before surgery to tape her wedding ring, Mrs. Willett became very distressed, thinking that the nurse was attempting to remove her ring against her wishes.

More than once, staff indicated that they didn't "know how care would have been done" without the assistance of the researcher. To increase efficiency, care such as bathing, skin care or turning was sometimes completed by more than one staff person. Staff were generally attentive to the needs of the participant during such caregiving. However, on more than one occasion, staff conversed with each other to the exclusion of the participant. Given this context of care, Mrs. Willett's surprised response to a question by the researcher ... "Are you talking to me?" took on new meaning.

In summary, staffing patterns and practices were detrimental to the participants' overall sense of well being. These patterns and practices did not allow for knowledgeable assessments or for the anticipatory intervention required to prevent or detect early signs of acute confusion.

Family and Significant Others

Family and significant others played a crucial role in the management of all participants, an observation consistent with the literature. They acted as caregivers, supporters, and sometimes advocates for the study participants. During one evening visit, the researcher asked Mrs. Willett if she needed "anything right now". Her response spoke volumes and reflected the feelings of all participants when she responded "Oh no. I don't

need anything. I have my family with me".

All participant's were attended by family on a daily basis. Within the study group, there was no relationship between degree of family support and incidence of acute confusion. However, the impact of family presence on the experience of the confused participants was substantial. This was particularly evident in two cases- Mrs. Klassen and Mrs. Willett.

Mrs. Klassen's anxiety surrounding hospitalization and her acute confusion was evident in her frequent tearful episodes. One of her sons spent hours at the bedside during the days surrounding surgery. His presence calmed her, and allowed her to verbalize her fears about her injury and subsequent hallucinations and delusions. Mrs. Klassen visibly relaxed when her son took charge of her care. "Mother, I won't let you go home until you are absolutely ready". Mrs. Klassen indicated that her son's presence did not stop her hallucinations but "helped very much, very much [provided comfort and reassurance]".

Mrs. Willett's family was equally supportive, and responded to her need for guidance and support. She looked to her brother John (and his wife Dorothy) in all her decisionmaking, and was inclined to refuse interventions except upon his urging. As Mrs. Willett became more disengaged from her environment, John was consistently able to stimulate her attention, and increase her interaction. When Mrs. Willett was resistive and combative, John was able to calm her, reorient her, and coax her to accept medication and nursing intervention. In sum, family presence did not stop the onset of acute confusion. However, it motivated Mrs. Willett's attention, reduced the severity of her symptoms, and facilitated care.

The topic of family presence deserves additional comment. Not all family members were equally effective in providing support to the participants. For those who experienced acute confusion, particularly Mrs. Klassen and Mrs. Willett, specific family members emerged who were more accepted by the participant and more successful in intervention. Some family members had difficulty in responding to the confused participant to reduce their agitation and distress. Mrs. Willett's brother Wilf clearly loved his sister and wanted to help her. However, his frustration with her behavior, and aggressive manner of interaction provoked her agitation. Nursing intervention was required to defuse emotions in both parties. This suggests the need for nurses to identify key (ie. influential) family members to act as resource and to provide teaching and support to those whose efforts are less effective.

In one case, endless visits from family and close friends exhausted the participant and were implicated in the onset of her confusion. The participant did not find these particular visits comforting. Instead, she seemed to take responsibility for "entertaining" her guests, acting as the "gracious host". These visits were well intended, but the outcome illustrated that visitors, including family and friends, may at times need monitoring and control to serve the best interests of the patient.

A final observation about the role of family relates to the concept of "rooming-in" (Wells and Baggs, 1997). None of the families of the participants expressed a desire to stay at the bedside during the night. This was not suggested to them as an option. There were some situations, however, where rooming-in would have been helpful. Mrs. Willett found the nights difficult and anxiety provoking. Her needs were not always met by staff,

and the presence of the family was especially comforting to her. Rooming-in may have been effective in reducing her symptoms, and avoiding the need for sedation. Thus, while the needs and capabilities of family members would be important in determining the viability of such an approach, the concept of rooming-in is worthy of further exploration.

To summarize, family and significant others played an important role in supporting the women in this study. Their role was even more crucial to the well-being of the participants who experienced acute confusion. Staff have a responsibility to encourage family support, and to monitor and intervene to ensure family presence is therapeutic for the patient.

The Role of Roommates

One unexpected finding in this study was the important role of roommates as resources to the participants. In many cases the roommates provided emotional support to the women in the study, called staff to their aid, and even intervened to provide reality orientation as required. Roommates often provided the researcher with the most accurate and complete account of the participant's experiences between observation periods. In one case, the only person who could attest to a participant's confusion was her roommate.

At times, the participant's disruptive behavior suggested the need for a private room. This would have been in the best interests of the roommates. However, given the evidence in this study, a move to a private room would have further isolated the affected individual, eliminating helpful social stimulation. Thus, any move to a private room would need to be coupled with a plan to provide additional social contact for the confused person.

Summary

In summary, study findings regarding individual vulnerability factors for acute confusion often challenged the reports in the literature. In part, this may have reflected the small sample size. However, studies of larger populations have revealed similar inconsistency in their results (Elie, Cole, Primeau, et al., 1998). Comparison of cases within this study suggests that successful identification of those at risk of acute confusion cannot be based only on the aggregated data of large studies. A more thorough knowledge of each individual and her situation must be combined with knowledge of the literature to best predict cognitive outcomes.

Reflection and Reflexivity

This project provided a rich and meaningful experience, allowing the researcher an intimate glimpse into the lives of five hip-fractured elderly women and their families. Participant observation, in which the researcher took on the additional role of caregiver (ie. nurse), was effective in achieving the prolonged engagement and persistent observation necessary to ensure the trustworthiness of the data (Guba & Lincoln, 1989). A strong relationship evolved between researcher, participant and family within hours of contact. This may have resulted from the neediness of the participants, the intensity of the situation, as well as the availability and committedness of the researcher to addressing their needs.

The researcher's belief in the centrality of caring and her ability to effect that belief in interaction with the participants was an important element of the study.

One issue that arose from the participant observer strategy was the impact of the researcher on the outcomes of research. This became a central question after the first two participants remained cognitively intact throughout their ordeal. As counterpoint, a third patient on the unit at the time, who had not been enrolled by the researcher, developed an acute confusion.

Planned two hour, twice daily observation periods had frequently extended to several additional hours of contact, based on the participant's needs for care and the chaotic and frenzied pace of the unit. From the perspective of one family member, "the only time my mother received any care was when you (ie. the researcher) were there". One morning, the researcher was greeted by a participant's roommates in chorus, "Thank heavens you're here- she's had a terrible night. She's been waiting for you." On a subsequent morning, another participant was in acute distress when discovered by the researcher and promptly returned to bed. The researcher was able to provide a level of care beyond that offered by ward staff. Advocacy for pain control, an individualized approach to progressive activity after surgery, and a slower and more measured intervention strategy all contributed to the actual experience of the participants.

Thus, the presence of the researcher contributed to the emotional and physical well being of the first two participants entered in the study, and may have contributed to their successful outcomes.

After much deliberation, and examination of conscience (in which the nurse as researcher and the nurse as caregiver provided differing viewpoints), the research protocol was followed more closely, limiting contact to the prescribed intervals. The two

participants subsequently enrolled in the study, and subject to the more revised interventions of the researcher, became acutely confused.

Regardless of the difficulties created by the participant observer role, the researcher's privileged role at the bedside allowed an insight into the participant's experience that would have been impossible to attain by other means. This was particularly true of Mrs. Willett, whose confusion failed to resolve fully, and whose insights into her condition were only briefly and sporadically shared.

In sum, participant observation strategy may have altered some of the outcomes of the research. This must be considered by the reader who seeks to understand the full meaning of the data set.

The Value of the HRI Model

The extended version of the HRI model was originally chosen as a framework for the study of acute confusion because of its conceptual fit with the phenomenon, and its few explicit assumptions and propositions. The researcher believed that its broad and loosely organized structure would allow the data to take its own shape, unconstrained by excessive limitations and presumptions.

Overall, the model was a good choice. It's multiple perspectives directed the researcher to examine physiologic, behavioral and experiential aspects of acute confusion, placed within the context of person factors and environmental factors. These areas of study were fruitful, and contributed to a complete picture of the phenomenon for each individual.

One difficulty emerged in the application of the model during the research

process. The distinction between the physiologic and pathophysiologic perspectives became blurred as data collection and analysis proceeded. Ultimately, the researcher viewed these two perspectives not as discrete entities, but as a single variable existing on a continuum from "normal" biologic function to disordered biologic function.

While the model indicated that interaction would occur between its different perspectives, the nature or degree of interaction was not explicated. This ambiguity was well suited to the findings. In all cases, some interaction between the perspectives could be identified. However, the degree of impact between each element varied between cases.

For example, environmental factors exerted more effect on some participants than others, based on individual vulnerability (ie. person factors). In some cases, factors such as medication or blood composition appeared to impact on behavior while in other cases no effect was observed. For this reason, a single diagrammatic representation of acute confusion using the HRI model is not possible based on current findings.

Perhaps the greatest challenge of the model was its expansiveness. Used in its totality, the model required the collection and analysis of a vast amount of data. At times in the project, the researcher sacrificed detail to arrive at a more comprehensive overview of the phenomenon. In part, this was necessary to meet time constraints for completion of the study.

In summary, the HRI model is an ideal vehicle to achieve a holistic view of human response. Within the educational sector its experiential component offers an important and often overlooked perspective essential to empathetic caregiving. In research, the HRI model can be used in its totality to explore phenomenon, either

qualitatively or quantitatively. It may also serve as an organizational framework for a entire body of research, allowing for the identification of gaps in the knowledge base, and the creation of a "master plan" for future exploration.

Nursing Recommendations

This study, though limited by its numbers, provided an opportunity to gain a more holistic view of the experience of acute confusion in elderly hip-fractured women.

Insights gained through analysis of each case study, and the case studies as a whole, lead to the following recommendations for practice, education and research.

Practice

Changes in nursing practice are intended to facilitate the nurse patient relationship that is essential to supportive, informed intervention for this group of care recipients.

1) Staffing levels on all shifts must be increased to allow nurses to move beyond the trouble shooting and crisis intervention strategies that currently typify caregiving in the acute setting. In addition, the practice of reducing professional staff on night shift should be reexamined, given the high needs of the acutely confused patient at night.

2) Care delivery systems that emphasize consistency and continuity of care must be established. Primary nursing care is seen as the most likely way to accomplish this goal.

To achieve this end requires:

- *more professional staff and a shift away from nursing assistants for direct care giving
- *an increased number of nurses working permanent shifts
- *a decrease in the use of casual staff and agency "temps"

3) Nursing must facilitate a strong family presence at the bedside. Family are a key

resource for:

- *accurate assessment of cognitive function**
- *reality orientation**
- *anxiety reduction**
- *assisting the patient with decisionmaking**
- *ensuring safety and avoidance of restraints**

Effective use of family requires the nurse to identify and work with key family members (ie. those most trusted by the patient, and most effective in responding to the behaviors manifested in the acutely confused state). Nurses are responsible to monitor family intervention and to provide the teaching and support necessary to ensure good outcomes. In some circumstances, rooming-in may be a viable option to meet the needs of selected patients and their families.

4) More complete assessment of cognitive function should be initiated on admission, and maintained throughout caregiving. This includes a focus on attention and memory as well as orientation. Any assessment tool should be unobtrusive and minimize stress/ distress in the patient. As well, the tool should address patients with quiet forms of acute confusion as well as the more readily identifiable agitated forms. The NEECHAM scale meets these requirements.

5) Nurses must recognize the importance of meaningful interaction with patients in promoting a sense of engagement with the external world. More personalized communication that moves beyond task-oriented directives, and the inclusion of the patient in all communication that occurs at the bedside would help achieve this goal.

6) A greater emphasis on teaching and emotional support for the acutely confused patient would accomplish two goals. First, fear and anxiety would be reduced. The patient would have a greater understanding of the experience, and feel less alone. Secondly, more open communication between patient and nurse would reduce attempts to disguise symptoms out of a sense of embarrassment.

7) More clear documentation of acute confusion must be encouraged to inform all health team members. Symptoms of acute confusion may fluctuate and /or include subtle changes in attention and memory. These changes may not be detected during brief or infrequent contacts, affecting the appropriateness and/or effectiveness of interventions of uninformed caregivers.

8) There are many reasons for the delays in surgical intervention following hip fracture, including the low prioritization afforded this group. Nurses must advocate for early intervention, identifying potential negative outcomes of delay, as well as costs to the patient and to the system as a whole.

Education

Nursing curricula need to:

1) provide content on the cognitive needs of the elderly within the acute care setting, while emphasizing the variability of this group.

2) increase emphasis on cognitive assessment (using a validated tool) to detect acute confusion.

3) help students to value the important role of skilled nursing intervention in improving outcomes for the acutely confused elderly.

4) incorporate a framework (such as the HRI model) which encourages a holistic approach to patient responses such as acute confusion. Use of the experiential perspective is especially indicated to foster the development of insight and empathy in potential caregivers.

Continuing education must increase staff awareness of acute confusion, its prevalence and meaning in the acute care environment, as well as methods for detection, prevention and intervention. A focus on surgical pain management for this vulnerable group is also an important and much needed topic.

Research

The findings of the study provided a number of future directions for research. These are identified as follows.

1) This study was intended to examine acute confusion from multiple perspectives, arriving at a new or more complete understanding of the response. Given time constraints, the limited number of participants, and the time intensive methodology, some important aspects of the method were never fully realized. In particular, Mrs. Klassen's behavior was not observed by the researcher during the peak of her symptoms. This limited the effectiveness of the interview and impeded analysis of the relationship between the experiential and behavioral aspects of Mrs. Klassen's experience. A repeated and more complete application of the methodology using larger numbers is warranted to achieve intended goals.

2) The hip-fractured group were distinctive in their characteristics and experiences. Findings suggest the continued need to focus on homogenous populations to reduce the

number of confounding factors in analysis. Once a data base is achieved for single populations, commonalities between populations can be examined.

3) Additional qualitative research examining the experiential aspects of acute confusion and their relationship to behavioral manifestations would help nurses to develop more insightful and empathetic intervention strategies.

4) Findings in this study suggested that even during "lucid" intervals, some participants experienced deficits in attention and memory. Continued investigation of this topic is warranted.

5) Two participants in this study did not develop acute confusion despite exposure to many of the risk factors experienced by their affected counterparts. Further investigation of this group (ie. the unaffected group) is warranted to identify factors that protect against acute confusion.

6) Intervention studies on the following topics would enhance the knowledge base and provide support for necessary changes in practice. These include intervention studies on the outcomes of:

- *consistent caregiving
- *orientation techniques vs. general support (or a combination of both)
- *family participation in care (including rooming in)
- *routine use of a confusion assessment tool
- *early surgical intervention (ie. less than 24 hours)
- *differing pain management protocols

In summary, the potential research opportunities on all the facets of acute

confusion are limited only by the researcher's imagination and expertise. Targeting homogenous populations offers the greatest likelihood of producing meaningful and interpretable results.

Conclusion

This case oriented, qualitative study explored the experiences of five elderly hip-fractured women. Three of these women developed acute confusion. The case studies presented here attempted to recreate the experiences of these women, and to provide greater insight into the phenomenon of acute confusion as it occurred in this group.

Despite the selection of a "homogenous" study population, findings illustrate the diverse and unique cognitive and behavioral responses of each individual to the hip-fracture experience. The description of acute confusion as a "syndrome of heterogeneity" is as applicable to the female hip-fractured group as to the greater population of acutely confused patients. Few of the risk factors identified in the literature could be used to predict outcomes in this group.

Some common themes emerged in relation to the behavioral manifestations of acute confusion. The confused group, as a whole, were disengaged, disorganized in their thoughts, and disinhibited in their actions. Within the experiential perspective, feelings that predominated were fear and anxiety, as well as embarrassment over compromised function.

The HRI Model facilitated the exploration of acute confusion. The use of multiple perspectives, and the examination of person factors and environmental factors, created a more comprehensive view of the response. One limitation of the model was its

expansiveness, requiring some compromise in depth of detail and analysis in order to meet time constraints for completion of the study.

The study has been rewarding for the researcher, providing insight into a diverse group of women, rich in life experience and willing to share their stories. Their "cases" have been recreated through the eyes of the researcher. Readers are left to determine the applicability of findings to patients in their care.

Some recommendations for practice, education and research have been identified.

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Appendix A

NEECHAM CONFUSION ASSESSMENT TOOL

LEVEL I - PROCESSING	
PROCESSING - ATTENTION: (Attention-Alertness-Responsiveness)	
<u>4</u>	<u>Full attentiveness/alertness:</u> responds immediately and appropriately to calling of name or touch - eyes, head turn; fully aware of surroundings, attends to environmental events appropriately.
<u>3</u>	<u>Short or hyper attention/alertness:</u> either shortened attention to calling, touch, or environmental events or hyper alert, over-attentive to cues/objects in environment.
<u>2</u>	<u>Attention/alertness inconsistent or inappropriate:</u> slow in responding, repeated calling or touch required to elicit/maintain eye contact/attention; able to recognize objects/stimuli, though may drop into sleep between stimuli.
<u>1</u>	<u>Attention/alertness disturbed:</u> eyes open to sound or touch; may appear fearful, unable to attend/recognize contact, or may show withdrawal/combatative behavior.
<u>0</u>	<u>Arousal/responsiveness depressed:</u> eyes may/may not open; only minimal arousal possible with repeated stimuli; unable to recognize contact.
PROCESSING - COMMAND: (Recognition-Interpretation-Action)	
<u>5</u>	<u>Able to follow a complex command:</u> "Turn on nurse's call light". (Must search for object, recognize object, perform command.)
<u>4</u>	<u>Slowed complex command response:</u> requires prompting or repeated directions to follow/complete a complex command. Performs complex command in "slow"/over-attending manner.
<u>3</u>	<u>Able to follow a simple command:</u> "Lift your hand or foot Mr...". (Only use 1 object.)
<u>2</u>	<u>Unable to follow direct command:</u> follows command prompted by touch or visual cue - drinks from glass placed near mouth. Responds with calming affect to nursing contact and reassurance or hand holding.
<u>1</u>	<u>Unable to follow visually guided command:</u> responds with dazed or frightened facial features, and/or withdrawal-resistive response to stimuli, hyper/hypoactive behavior; does not respond to nurse gripping hand lightly.
<u>0</u>	<u>Hypoactive, lethargic:</u> minimal motor/responses to environmental stimuli.
PROCESSING - ORIENTATION: (Orientation, Short-term Memory, Thought/Speech Content)	
<u>5</u>	<u>Oriented to time, place, and person:</u> thought processes, content of conversation or questions appropriate. Short-term memory intact.
<u>4</u>	<u>Oriented to person and place:</u> minimal memory/recall disturbance, content and response to questions generally appropriate; may be repetitive, requires prompting to continue contact. Generally cooperates with requests.
<u>3</u>	<u>Orientation inconsistent:</u> oriented to self, recognizes family but time and place orientation fluctuates. (Uses visual cues to orient. Thought/memory disturbance common, may hallucinations or illusions. Passive cooperation with requests (cooperative cognitive protecting behaviors).
<u>2</u>	<u>Disoriented and memory/recall disturbed:</u> oriented to self/recognizes family. May question actions of nurse or refuse requests, procedures (resistive cognitive protecting behaviors). Conversation content/thought disturbed. Illusions and/or hallucinations common.
<u>1</u>	<u>Disoriented, disturbed recognition:</u> Inconsistently recognizes familiar people, family objects. Inappropriate speech/sounds.
<u>0</u>	<u>Processing of stimuli depressed:</u> minimal response to verbal stimuli.

Appendix A (cont.)

LEVEL 2 - BEHAVIOR

BEHAVIOR - APPEARANCE:

- 2 Controls posture, maintains appearance, hygiene; appropriately gowned or dressed, personally tidy, clean. Posture in bed/chair normal.
- 1 Either posture or appearance disturbed; Some disarray of clothing/bed or personal appearance, or some loss of control of posture, position.
- 0 Both posture and appearance abnormal; disarrayed, poor hygiene, unable to maintain posture in bed.

BEHAVIOR - MOTOR

- 4 Normal motor behavior; appropriate movement, coordination and activity, able to rest quietly in bed. Normal hand movement.
- 3 Motor behavior slowed or hyperactive; overly quiet or little spontaneous movement (hands/arms across chest or at sides) or hyperactive (up/down, "jumpy"). May show hand tremor.
- 2 Motor movement disturbed; restless or quick movements. Hand movements appear abnormal – picking at bed objects or bed covers, etc. May require assistance with purposeful movements.
- 1 Inappropriate, disruptive movements; puffing at tubes, trying to climb over rails, frequent purposeless actions.
- 0 Motor movement depressed; Limited movement unless stimulated; resistive movements.

BEHAVIOR - VERBAL:

- 4 Initiates speech appropriately; able to converse, can initiate and maintain conversation. Normal speech for diagnostic condition, normal tone.
- 3 Limited speech initiation; responses to verbal stimuli are brief and uncomplex. Speech clear for diagnostic condition, tone may be abnormal, rate may be slow.
- 2 Inappropriate speech; may talk to self or not make sense. Speech not clear for diagnostic condition.
- 1 Speech/sound disturbed; altered sound/tone. Mumbles, yells, swears or is inappropriately silent.
- 0 Abnormal sounds; groaning or other disturbed sounds. No clear speech.

LEVEL 3 - PHYSIOLOGIC CONTROL

PHYSIOLOGIC MEASUREMENTS:

Recorded Values:

- ___ Temperature (36-37°)
- ___ Systolic BP (100-150)
- ___ Diastolic BP (50-90)
- ___ Heart Rate (HR) (60-100)
- Regular/Irregular (circle one)
- ___ Respirations (14-22) (Count for one full minute)
- ___ O2 sat (93 or above)

Normals:

- ___ Periods of apnea/hypopnea present?
1=yes, 0=no
- ___ Oxygen therapy prescribed?
0=no, 1=yes, but not on, 2=yes, on now.

Appendix A (cont.)

VITAL FUNCTION STABILITY: (Count abnormal SPB and/or DBP as one value; count abnormal and/or irregular HR as one; count apnea and/or abnormal resp. as one; and abnormal temp. as one.)

- 2 BP, HR, TEMP, RESPIRATION within normal range with regular pulse
- 1 Any one of the above in abnormal range
- 0 Two or more in abnormal range

OXYGEN SATURATION STABILITY:

- 2 O2 sat in normal range (93 or above)
- 1 O2 sat 90 to 92 or is receiving oxygen
- 0 O2 sat below 90

URINARY CONTINENCE CONTROL:

- 2 Maintains bladder control
- 1 Incontinent of urine in last 24 hours or has condom cath
- 0 Incontinent now or has indwelling or intermittent catheter or is anuric

—	Level 1 Score: Processing (0-14 points)	Total Score:	Indicates:
—	Level 2 Score: Behavior (0-10 points)	0-19	Moderate to Severe confusion
—	Level 3 Score: Integrative Physiologic Control (0-6 points)	20-24	Mild or Early Development of Confusion
—	TOTAL NEECHAM (0-30 points)	25-26	Not Confused, but at High Risk
		27-30	Not Confused

Taken with permission
Miller, Neecham, Champagne et. al. (1997)

Appendix B

Terms identified in the literature by Foreman (1993) that share common characteristics with acute confusion:

-acute brain failure, acute brain syndrome, acute cerebral insufficiency, acute mental status change, acute organic psychosis, acute organic reaction, acute organic syndrome, agitated confusional state, altered mental status, cerebral insufficiency syndrome, delirium, dystergastic reaction, exogenous psychoses, intensive care unit delirium, intensive care unit psychosis, metabolic encephalopathy, organic brain syndrome, postcardiotomy delirium, postcardiotomy psychosis, pseudosenility, reversible cognitive dysfunction, reversible dementia, reversible toxic psychosis, subacute befuddlement, sundown syndrome, toxic confusional state, toxic delirious reaction, toxic encephalopathy, toxic-metabolic encephalopathy, toxic psychosis, transient cognitive impairment.

Appendix C

GUIDELINES FOR STAFF INTRODUCTION OF RESEARCHER

STUDY NAME: The experience of acute confusion in older women with hip fracture.

INVESTIGATOR: Daryl Brooks, graduate student, University of Manitoba Faculty of Nursing.

Thank you for assisting me to inform patients about my study!

Patients are potential candidates for my study if they meet the following criteria:

- age 80 or over
- female
- newly admitted for treatment of a fractured hip or femur
- lucid, coherent and responsive
- no documented history of dementia or mental illness
- no history of alcohol abuse
- able to understand and communicate in English

If, on initial assessment, a patient fulfills this criteria, please inform the patient and significant others of my study , using the script provided.

"Daryl Brooks, a Master of Nursing student at the University of Manitoba, is conducting a research study on the experiences of older women with hip fractures. She is looking for people who might be interested in participating. Would you be willing to have her explain the study to you? If you talk to her you are under no obligation to participate. Whatever decision you make, it will in no way affect your care. Feel free to first discuss this with your family, if you wish."

If the patient agrees, have the communication clerk contact me.

If the patient refuses, thank her for her time.

Appendix D

OBSERVATION GUIDE

PHYSIOLOGIC/ PATHOPHYSIOLOGIC DOMAINS

Blood work- WBC,hgb.

Serum chemistry- glucose, Na, K, BUN, creatinine

EKG

CXR

Vital signs

Oxygen saturation

Fluid balance

BEHAVIORAL DOMAIN (also see NEECHAM tool)

Attention

LOC (alert, hyperalert, lethargic, stuporous...)

Orientation- time (season); place (name of hospital); person (identifying children, close friends or family); self

Cognitive processing- ability to respond meaningfully and purposefully to verbal commands, questions, comments

- ability to follow instruction

- memory of events or new learning after five minutes

Perceptual distortions- presence of illusions, delusions, hallucinations

Changes in sleep-wake cycle

EXPERIENTIAL DOMAIN (see interview guide)

PERSON FACTORS

Age

Severity of illness, presence of co-morbid conditions

Vision

Hearing

Presence of anxiety/ stress- nature, identified sources

Coping style

Level of mobility- presence of immobilizing devices (eg. urinary cath, traction, restraints)

Medication regime- routine, PRN meds including drug, dose, route and frequency of administration (narcotics, sedative hypnotics...); anaesthetic agents

and route

Level of pain- scale using verbal descriptors

ENVIRONMENTAL FACTORS

Characteristics of room- lighting, distorted or unrecognizable sounds, presence of roommate(s)

Presence of familiar and /or orienting objects

Presence of significant others, character of interactions and participant response

Familiarity of staff, nature of interactions and response

Appendix E

GUIDE FOR SEMISTRUCTURED INTERVIEW

Grand tour question-

Can you share with me as much as you can remember about your episode of -----
(participant's own word)?

Probes-

Can you tell me more about how you felt when...

Can you remember what happened after...

You talked about seeing (hearing) ... Did these things have any special meaning for you?

Focussed questions (to be used if the participant did not address these topics)-

Sometimes people in your situation remember hearing or seeing things and wondering if they were real. Do you remember seeing or hearing things which seemed unusual or strange?

Do you remember feeling any strange sensations?

Can you recall having what seemed like very vivid dreams?

Did you have any strong feelings that people were trying to purposefully hurt you?

Questions derived from investigator observations during the episode (with consent of the participant)-

eg. During your confusion you thought your daughter was with you and that she had been divorced. Can you tell me about that?

Additional questions-

What was the most difficult aspect of your experience?

Is there a single word or phrase that you think captures the experience you've had?

What would you want to tell health care workers about your needs during this episode?

Is there anything else at all that you would like to share before we finish the interview?

Appendix F

EXPLANATION OF THE STUDY (FOR STAFF)

My name is Daryl Brooks. I am a graduate student in the Master of Nursing Program at the University of Manitoba. I am carrying out a study titled "The experience of acute confusion in older women with hip fracture". Acute confusion occurs in approximately 50% or more of the elderly patients admitted with hip fracture, and creates significant problems in caregiving. There is limited knowledge about the patient's experience during the episode, and about the predisposing factors in this group. I intend to study these topics.

The main focus of my study is the patient's experience of acute confusion. In order to learn about the experience I will spend time at the bedside, assisting you to provide basic care to the patient for several hours, at two intervals during each 24 hours. Basic care will include hygiene, feeding, skin care/comfort measures, mobilization (following medical orders). I will begin to work with the patient before confusion occurs, ie. as soon as possible after admission to the unit , and continue caregiving throughout the episode of confusion or for up to five days following onset. I may accompany the patient to the operating room and recovery if this can be arranged.

During my study you will continue to be responsible for the patient's care. I will be analyzing all the patient's responses, including her response to your caregiving. I will make written notes, and may at times use a tape recorder to assist my memory of events and observations. I will gather information from the patient's chart regarding her general condition, including vital signs, lab data, fluid balance records, medical and nursing history and chronological notes. At times I will rely on significant others (ie. close friends and family) to help me interpret the patient's behaviors.

Your participation in the study involves giving care as per your normal practice, and allowing me to analyze the patient's responses during this time. Your identity is completely confidential and will never be revealed in the study. Participation is voluntary. You may withdraw from the study at any time without penalty by informing me of your wishes. I will then not record events in which you are involved. If necessary, I will drop the patient from the study.

There may be no direct benefit to your participation. I hope that the study will provide useful information about acute confusion in order to facilitate caregiving to this group.

If you *do not* wish to be a part of this study, please inform me as soon as possible by calling me at home at XXX-XXXX, or by leaving a note addressed to me with the ward clerk. If you have questions or concerns please contact me at the number provided. My thesis supervisor, Dr. Barbara Naimark can also be reached at XXX-XXXX.

Appendix G

INVITATION TO PARTICIPATE- TO THE PARTICIPANT

My name is Daryl Brooks. I am a master of nursing student at the University of Manitoba who has worked in surgery and orthopedics for many years, as a staff nurse and teacher. I am carrying out a study which looks at the experiences of older women who have fractured a hip.

Some patients who break their hip experience a period of sudden and unexpected confusion. There is no way to know whether you will experience the problem, or , if so, exactly how long it will last. As a nurse, I am interested in learning more about the experience of confusion, to improve care during this time. My study is titled "The experience of acute confusion in older women with hip fracture". Approval for the study has been obtained from the Ethical Review Committee of the Faculty of Nursing, University of Manitoba.

In order to understand the experience of confusion, I need to spend time with you before any confusion occurs, and then remain until symptoms disappear. Remember that you may not experience this confusion. If after 48-72 hours you have no symptoms, your participation in the study is complete.

My study involves spending several hours each day at your bedside, assisting staff to provide care such as bathing, turning, and comfort measures. The amount of time spent will vary depending on your needs and the severity of any symptoms. During this time I hope to get to know you better, and will use your chart to gather health information such as vital signs, blood test results, x-rays, medical and nursing history. I may also be present during your surgery and in recovery.

If you experience confusion, I will continue to spend several hours daily at your bedside until you become more lucid (or up to five days). During this time I will assist with care, but will also make observations of your symptoms and try to learn as much as possible about what you are going through, and what things make the problem better or worse.

With your permission, I may ask close family or friends to provide information to help me better understand your behaviors or statements.

As you become more lucid, and health is improved, I will interview you for approximately 30 minutes (or as long as you wish to talk) to discuss memories of the episode, and to learn more about your views on the experience.

Information will be recorded in hand written notes and the interview will be tape-recorded. Sometimes during care I may use a hand held tape recorder to record events. This will help me remember as many details as possible so that I can be accurate in recounting your experience. The tape recorder can be turned off at your request.

Your identity will be protected at all times. Written and recorded information will be assigned a code number, so that your name will be known only to me. Only coded information will be shared with a transcriber and the four members of my thesis committee, who are also bound to maintain confidentiality. Any published results will disguise your identity- no real names will be used and some details will be changed to ensure confidentiality. The recorded and written details of your experience will be kept in a secure, locked file (for at least seven years) until it is destroyed.

Your participation in the study is completely voluntary. There are no known risks or direct benefits to this participation. If you give consent, you may still withdraw that consent at any time with no penalty. Nursing care by staff will not be affected.

Please feel free to ask questions. I can be reached in the hospital by asking your nurse to page me, or at my home at XXX-XXXX. My thesis supervisor, Dr. Barbara Naimark, can also be contacted at XXX-XXXX.

I encourage you to discuss the study with those family or friends who are important to you. Should you wish to participate, I can be reached by contacting your staff nurse or by calling the phone number listed above.

Appendix H

INVITATION TO PARTICIPATE- FAMILY/SIGNIFICANT OTHERS

My name is Daryl Brooks. I am a master of nursing student at the University of Manitoba who has worked in surgery and orthopedics for many years, as a staff nurse and teacher. I am carrying out a study which looks at the ordeal of older women who have fractured a hip.

Some older patients who break their hip experience a period of sudden and unexpected confusion. There is no way to know exactly who will experience the problem, or, if so, exactly how long it will last. As a nurse, I am interested in learning more about acute confusion, to improve care during this time. My study is titled "The experience of acute confusion in older women with hip fracture".

The study involves spending several hours each day assisting the staff to provide the participant with basic care such as hygiene, feeding, and comfort. I may also accompany the participant to the operating room and recovery room. During this time I will be getting to know the participant and observing for signs of confusion. I will also be looking for factors that make the symptoms of confusion better or worse. If after 48-72 hours, the participant remains lucid, her participation in the study will be concluded, and hospital staff will resume all care. If acute confusion develops, I will continue my daily care and observations until the participant becomes more lucid or for up to five days following onset.

With the consent of the participant, I am inviting you to assist in the study. Your input is important because of your longstanding knowledge of the participant- her personality, behavior, and life history. Significant *changes* in behavior are often a sign of acute confusion; these are easier to identify by those closest to the individual. Moreover, some behaviors are more readily understood and interpreted by those who know the individual and her life history.

Your main involvement in the study is to informally share with me your perceptions of the participant and her behaviors when you are in attendance at the bedside. This does not include any formal interviewing, and does not require you to alter your plans to be with the participant during her hospitalization. I may also record the participant's response to your presence at the bedside.

Any information you share with me would be strictly confidential. The information will be recorded in my written notes, and names and details will be altered to preserve anonymity. The only people with access to these notes are the members of my thesis committee, who are also bound by confidentiality guidelines. I will store the information

Appendix H (cont.)

from the study in a locked file for seven to ten years until it is destroyed. Any publications or presentations that result from my study will also protect your identity.

You are under no obligation to participate, and a decision to participate can be reversed at any time without penalty. There may be no direct benefits to you, although the information gathered will be used to further understanding of acute confusion in this group of older women.

Please feel free to ask questions at any time. I can be reached by contacting the ward clerk or by calling XXX-XXXX. My thesis supervisor, Dr. B. Naimark, can also be contacted at XXX-XXXX.

You can indicate your desire to participate by signing this form. A signed copy will then be provided to you.

SIGNATURE:

DATE:

Appendix I

CONSENT FORM

STUDY NAME:

The experience of acute confusion in older women with hip fracture.

INVESTIGATOR:

Daryl Brooks, graduate student, University of Manitoba Master of Nursing Program.

If I decide to sign this consent form, my signature means that:

- 1. I have read the explanation of the study given in the "Invitation to Participate", and have had my questions answered satisfactorily.**
- 2. I agree to participate in the study.**
- 3. I agree to have Daryl assist staff with my care and record her observations of my experience, using written notes and a tape-recorder.**
- 4. I agree to participate in an interview to share my remembrances of the confused episode when I become more lucid.**
- 5. I agree to have Daryl discuss my condition with significant others.**
- 6. I agree to Daryl's use of the chart to collect information.**
- 7. I am not obliged to answer any questions that I do not wish to answer.**
- 8. I can withdraw from the study at any time without any penalty or effect on my care.**
- 9. I understand that all information will immediately be assigned a code number and that my identity will be protected.**
- 10. I understand that all information, collected from any source, will be kept confidential.**
- 11. I understand there may be no direct benefits from participating in the study.**
- 12. If I have questions at any time during the study, I can reach Daryl Brooks at XXX-XXXX, or her thesis supervisor, Dr. Barbara Naimark, at XXX-XXXX.**
- 13. I will be given a copy of the consent form and the invitation to participate to keep.**

SIGNATURE:

DATE:

If you wish to receive a summary of the study results, please write your name and permanent address below. A copy of the summary will be forwarded to you on completion of the study.

NAME:

ADDRESS: