

Quality of Care and Mortality among Long-term Care Residents with Dementia

by

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We accept this dissertation as conforming  
to the required standard

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### Abstract

This study assesses the effect of care quality on the risk of mortality among long-term care residents with dementia using secondary data. Data were drawn from the Intermediate Care Facility Project, conducted by the Centre on Aging, University of Victoria. The study involved 510 residents in 77 facilities throughout British Columbia. Mortality data were obtained from BC Vital Statistics for the twelve month observation period, which were collected as part of the Intermediate Care Facility Project. Care quality was measured along six dimensions: physical environment; non-use of physical restraints; non-use of pharmacological restraints; staff education and training; flexibility of care; and pre-admission and admission procedures. Data for these dimensions were collected at admission and again after twelve months. Statistical analyses involved cross-tabulations, bivariate correlations, logistic and Cox regressions. Substantively, the study found that resident characteristics such as age, gender and physical disability were more important than social causation variables (such as staff education and physical environment) in explaining risk of death. Among the social causative factors hypothesized to affect mortality, only facility use of physical restraints was important. Residents in facilities that used more types of physical restraints tended to be at higher risk of death than residents in facilities that used fewer or no physical restraints. It is concluded that more research into measurement of the social causative factors is required before making any definitive conclusions about what influences mortality among those persons with dementia who live in long-term care facilities in British Columbia.

**Examiners:**

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## Table of Contents

Title .....	i
Abstract .....	ii
Table of Contents .....	iv
List of Tables .....	vii
List of Figures .....	ix
Acknowledgments .....	x
Dedication .....	xii
Introduction .....	1
Chapter 1: Literature Review .....	6
Introduction .....	6
Statement of the Problem .....	8
Mortality among Residents of Long-term Care Facilities .....	13
Defining Quality of Care .....	17
Quality of Care: What Works? .....	27
Quality of Care and Outcomes: Empirical Evidence .....	48
Quality of Care and Mortality .....	52
Hypotheses .....	58
Chapter 2: Methodology .....	60
Introduction .....	60
Sample .....	61
Measures .....	64

Dependent Variables .....	64
Independent Variables (Covariates) .....	68
Statistical Analyses .....	75
Chapter 3: Results .....	84
Introduction .....	84
Sample Description .....	84
Deaths Among Residents During the 12 Months Following Admission: A Preliminary Analysis .....	85
Bivariate Correlations .....	100
Multicollinearity Tests .....	106
Logistic Regressions .....	108
Cox Regressions .....	114
Predictors of Facility Physical Restraint Use .....	125
Chapter 4: Discussion .....	128
Introduction .....	128
The Shape of the Survival Curve .....	129
An Important Dimension of Care: Physical Restraint Use .....	132
Which Facilities Use Restraints? .....	135
Restraint Use and Quality of Life .....	141
Important Resident Characteristics and States .....	143
Variables the did not Appear to Influence Mortality .....	145
Social Causation or Social Selection? .....	147

Chapter 5: Conclusions .....	148
Introduction .....	148
Study Limitations .....	149
Other Study Limitations .....	155
Policy and Practical Implications .....	158
Future Research .....	160
Literature Cited .....	161
Appendix A .....	182

List of Tables

Table 2.1	Variable Descriptions .....	82
Table 3.1	Deaths per 1,000 per Year .....	86
Table 3.2	Deaths per 1,000 per year by age group .....	89
Table 3.3	Deaths per 1,000 per year by age group and sex .....	90
Table 3.4	Deaths per 1,000 per year by Cognitive Function Score .....	92
Table 3.5	Deaths per 1,000 per year by Physical Dependency .....	93
Table 3.6	Deaths per 1,000 per year by Number of Physical Restraints Used in Previous Year for the Purpose of Behavioural Management .....	94
Table 3.7	Death per 1,000 per year by Chemical Restraint Use .....	95
Table 3.8	Deaths per 1,000 per year by Flexible Care Routines .....	96
Table 3.9	Deaths per 1,000 per year by Specialized Environment .....	97
Table 3.10	Deaths per 1,000 per year by Assessment Procedures .....	98
Table 3.11	Deaths per 1,000 per year by Staff Training and Education .....	99
Table 3.12	Bivariate Correlations: Dimensions of Care and Panel Selection .....	102
Table 3.13	Bivariate Correlations: Dimensions of Care, Panel Selection and Death Status .....	104
Table 3.14	Bivariate Correlations: Dimensions of Care, Panel Selection, Resident Characteristics/Status and Death Status .....	105
Table 3.15	Logistic Regression Summary Results for Six Competing Models .....	107
Table 3.16	Logistic Regression: Constant Only (Beginning Block) .....	109

Table 3.17	Logistic Regression: Effects of Dimensions of Care and Panel Variable on Risk of Death (Block 1) . . . . .	109
Table 3.18	Logistic Regression: Effects of Dimensions of Care, Panel Selection and Resident Characteristics on Risk of Death (Blocks 1 and 2) . . .	110
Table 3.19	Logistic Regression: Effects of Dimensions of Care, Panel Selection, Resident Characteristics and Facility Characteristics . . . . . on Risk of Death (Blocks 1, 2 and 3)	111
Table 3.20	Statistics for Time Dependent Cox Model for Gender . . . . .	119
Table 3.21	Statistics for Time Dependent Cox Model for Age Groups . . . . .	120
Table 3.22	Cox Regression: Dimensions of Care and Panel Selection Variable (Block 1) . . . . .	121
Table 3.23	Cox Regression: Dimensions of Care, Panel Selection Variable and Resident Characteristics (Blocks 1 and 2) . . . . .	122
Table 3.24	Cox Regression Results . . . . .	123
Table 3.25	OLS Multiple Regression with Dependent Variable Physical Restraint Use . . . . .	126

## List of Figures

Figure 3.1	Proportions Dying by Month and Gender .....	88
Figure 3.2	Log-Minus-Log Plot of Hazards Function for Gender .....	115
Figure 3.3	Cumulative Survival Functions for Males and Females .....	116
Figure 3.4	Log-Minus-Log Plot of Hazards Function for Age .....	117
Figure 3.5	Cumulative Survival Functions for Age Groups .....	118

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Dedication

For my wife, Dawn, and my sons, Silas and Eli.

## Introduction

As the Canadian population ages, and as the average age of seniors continues to increase, incidence and prevalence rates for dementia will rise accordingly. Given the difficulty of caring for an individual with moderate to severe dementia in general, an increase in number of persons with the disease will place ever greater demands on long-term care facilities to provide effective care. Previous research has identified essential indicators of quality of care, and subsequent research has attempted to establish the effects of quality of care on key quality of life outcomes. Length of survival of the institutionalized dementia sufferer is conspicuously under-researched, yet survival time is considered an important indicator of quality of care for persons with late stage dementia, one that may be affected by treatments and health service interventions. Survival time is among the 13 outcomes recommended for study by Teno et al. (1997) of persons with end-stage dementia. They write, "Patients with dementia are a vulnerable population at risk of both under- and over-treatment. The impact of treatments and interventions on survival time must be examined." (Teno et al., 1997: 26). Previous research has established that persons with dementia entering long-term care facilities experience excess mortality when compared to similar demented individuals remaining in the community. However, the reasons for this excess mortality are not fully known: It is only *partially* due to the selective admission of persons at higher risk of death. According to Aneshensel et al. (1995: 262), "Institutionalization per se is substantially associated with the risk of dying over and above the effects of poor physical health." This study has as its focus one central concern: to determine whether quality of institutional care influences

the risk of death among long-term care residents with moderate to severe dementia. The guiding theoretical framework is a social selection versus social causation perspective.

Evidence does exist at all levels that quality of care and risk of mortality are related in the long-term institutionalized population. Empirical results, however, remain ambiguous. This ambiguity appears to be rooted primarily in the difficulty of measuring quality of care. This study seeks to improve upon previous studies by employing measures of care quality that are state-of-the-art, and cover a broad base of what theoretically should “work”. It seeks further to describe the shape of the survival curve during the first 12 months after admission, and then to explain the contribution of care quality to the shape of that curve.

This study makes use of secondary data from the Intermediate Care Facility (ICF) Project (described below). Studies linking care quality and mortality for persons with dementia in long-term care, are lacking. The data from the ICF Project provide an opportunity to address the question raised in the present study, not least because that project’s main purpose was to assess the link between care quality and outcomes for those persons expected to live for the 12 month study period following admission. That is, it is because the persons that comprised the subjects of the present study were expected to live - and not to die - for the 12 months following admission, that they would have been initially provided with care for continued life - rather than another form of care, such as palliative - and therefore that deaths occurring could be considered to be the outcome of that very care. This is not to state that type of care (very crudely stated: living versus dying care) would not be altered from one to the other type of care as any given resident’s

health status is recognized as being closer to or further from death. It is to state, however, that if all residents participating in the study were expected to live for a year following admission (this was the expectation: see details below), care plans and routines would be based explicitly on this expectation. When some of those expected to live actually died, a link to initial (as well as ongoing) care becomes a concern. The screening out of those expected to die, then, could actually serve to strengthen any conclusions arrived at in the present study, since it is known that initial care planned for participants in the ICF study was for continued living, but that subsequently, a significant number of these individuals died. The findings, of course, are restricted to such individuals (i.e. to those individuals with advanced dementia admitted to ICFs and who were expected to live).

Prior to collection of outcome data, all long-term care facilities in the province that cared for persons with dementia completed a comprehensive survey. In addition to data on facility characteristics such as number of beds and number and severity of dementia of residents, information on the six dimensions of care identified in this study was gathered from DoNs: staff training and education; flexibility of care; admission and pre-admission procedures; specialized environment; use of physical restraints; use of pharmacological restraints. For the outcomes phase, a representative sample stratified by unit (SCUs and non-SCUs) was obtained on the two dimensions that the expert steering committee judged to be the most important of the six dimensions (staff education and flexible care), excluding far north facilities due to cost. Death data were provided by the BC Vital Statistics Agency. All residents enrolled in the ICF Project were tracked by Vital Statistics, and death by month/year, and cause(s) of death were provided.

Permission to collect these data was obtained from relatives of the ICF Project resident participants.

This study consists of 5 chapters. Chapter 1 consists of an introduction to, and statement of, the problem. It provides a literature review that situates the study question in the context of previous research. Chapter 2 sets out the methods used, including correlations, logistic regressions, Cox regressions and ordinary least squares multiple regression. Chapter 3 reports the results from these analyses. Essentially, it was found that of the six dimensions of care measured, only facility use of physical restraints were associated with resident mortality. The more types of physical restraints reported using for the purpose of behavioural management, the greater the risk of death among residents. Chapter 4 discusses these findings. From the evidence uncovered in the present study, it appears that social selection is more important than is social causation in determining who will die and who will not, at least during the first 12 months in a long-term care facility. As is the case in the general population, men are at higher risk of death than are women, and older persons are at greater risk than are younger. Likewise, greater levels of physical dependency are related to greater probability of death. This fact is not, of course, surprising in and of itself. Very old, frail men with moderate to severe dementia who reside in a long-term care facility can be expected to die with relative frequency. Nonetheless, a very small percentage of the variation in the occurrence of death is explained by resident characteristics and behaviour states despite their relative importance when compared to the dimensions of care. That is, social causation is important but it does not explain the lion's share of the variance. This leaves open the

question of what does explain that variance. Chapter 5 outlines the major study limitations, the most important of which is effective conceptualization and measurement of quality of care.

## **Chapter 1: Literature Review**

### **Introduction**

As the Canadian population continues to age, the number of persons with dementia grows apace. Of equal concern is the projected increase in the number of persons with advanced dementia due largely to the increase in the size of the old old (85+) population (Hill et al., 1996). One-half of all people currently living in long-term care institutions have Alzheimer's Disease and other dementias (Canadian Study of Health and Aging, 1994). While informal, non-institutional care is preferred by most, the reality is that long-term institutional care will be required for many more severely demented seniors than has been the case in the past. As a compassionate society, but one with differing views on the appropriate allocation of scarce public funds, the question of how best to care for such persons becomes a pressing, though complex, matter. Despite overriding cost considerations, there is a fundamental ethical concern for the maintenance of dignity, health and quality of life in general for persons afflicted with dementia who require institutional care. The issue becomes one of identifying precisely what quality of care is needed to effectively care for an increasingly frail and demented institutional population (USGAO, 1983; Shaughnessy & Kramer, 1990).

Previous research has identified essential indicators of quality of care (e.g. Holmes et al., 1994), and subsequent research has attempted to establish the effects of quality of care on key quality of life outcomes (Chappell & Reid, 2000; Phillips et al., 1997; Saxton et al., 1998). Length of survival of the institutionalized dementia sufferer is conspicuously under-researched, yet survival time is considered an important indicator of

quality of care for persons with late stage dementia, one that may be affected by treatments and health service interventions (Spector & Mukamel, 1998; Teno, Landrum, & Lynn, 1997). Survival time is among the thirteen outcomes recommended for study by Teno et al. (1997) of persons with end-stage dementia. They write, “patients with dementia are a vulnerable population at risk of both under- and over-treatment. The impact of treatments and interventions on survival time must be examined.” (Teno et al., 1997: 26). Previous research has established that persons with dementia entering long-term care facilities experience excess mortality when compared to similarly demented individuals remaining in the community (Aneshensel et al., 1993; 1995; van Dijk et al., 1992). However, the reasons for this excess mortality are not fully known: it is only *partially* due to the selective admission of persons at higher risk of death (Aneshensel et al., 2000). According to Aneshensel et al. (1995: 262), “institutionalization per se is substantially associated with the risk of dying over and above the effects of poor physical health.”

The question becomes: What is it about institutionalization that results in greater risk of death? Some research suggests that better general quality of care is linked to lower mortality among long-term care residents (e.g. Bell & Krivich, 1990; Weiler & Cooper, 1990; Zimmer, J. G., 1982), and that more aggressive care plans result in longer survival times for persons with severe dementia (Luchins et al., 1997). It is the purpose of this dissertation to determine whether mortality among institutionalized long-term care residents with dementia is dependent, at least in part, on the quality of care delivered by the institution.

**Statement of the problem: Quality of care and excess mortality**

The occurrence of excess mortality among the institutionalized elderly has been well documented. Excess mortality is often defined as actual deaths minus expected deaths (van Dijk et al., 1992). Expected number of deaths is based on the mortality of the general population for those aged 65 and over. Explanations for the excess mortality observed among long term care residents have typically focused on health differences between institutionalized and non-institutionalized older persons. In other words, frailer individuals who are at greater risk of death in the first place are more likely than healthier individuals to enter long-term care facilities, and thereafter to die at a faster rate than those remaining in the community. When the influence of dementia is considered, the picture becomes even more self-evident. Dementia is an important predictor of both initial institutionalization and death following admission<sup>1</sup> (Belloni-Sonzogni, Tissot, Teetamanti, Frattura, & Spagnoli, 1989; Branch & Jette, 1982; Diesfeldt, van Houte, & Moerkens, 1986; Greene & Ondrich, 1990; Temkin-Greener & Meiners, 1995; Vitaliano, Peck Johnson, Prinz, & Eisdorfer, 1981).

Clearly, one should expect frailer individuals to experience higher rates of death than do healthier persons. This expectation receives support in the research literature, with resident characteristics emerging as important predictors of both death and institutionalization. Severe aphasia, urinary incontinence, severe dementia, severe mental abnormality, greater comorbidity, older age, need for intense nursing care, functional

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<sup>1</sup>

To be clear, dementia is also a risk factor for death among non-institutionalized elderly persons.

impairment, physical dependence, behavioural impairment, inactivity, and low levels of physical mobility have all been shown to be related to risk of death in the institutionalized population (Bracco et al., 1994; Brauer et al., 1978; Bruce et al., 1995; Diesfeldt et al., 1986; Engle & Graney, 1993; Goldfarb, 1969; Lichtenstein, Federspiel, & Schaffner, 1985; Kelman & Thomas, 1990; Knopman et al., 1988; Shapiro & Tate, 1988; van Dijk et al., 1991, 1992; Walsh, Welch, & Larson, 1990).

Studies of the predictors of institutionalization give a similar impression. These include regular need of help, dependency in instrumental activities of daily living, cognitive disorder, emotional distress and psychotic disorder, older age, incontinence, presence of depressive symptoms, being unmarried, excessive nighttime activity, apathetic behaviour, immobility or difficulty walking, extreme forgetful behaviours, hyperactivity, and combativeness (Beland & Zunzunegui, 1999; Black, Rabins, & German, 1999; Chenoweth & Spencer, 1986; Hope et al., 1998; Jylha & Hervonen, 1999; Knopman et al., 1988; Pruchno et al., 1990; Rockwood, Stolee, & McDowell, 1996; Scott et al., 1997; Tomiak, Berthelot, Guimond, & Mustard, 2000; Trottier, et al., 2000; Verooij, Felling, & Persoon, 1997; Woo, Ho, Lu, & Lau, 2000). It comes as no surprise, then, that persons with dementia who are admitted to long-term care facilities are at greater risk of death than are those remaining in the community, and that it has been generally assumed that the higher rates of mortality (or “excess mortality”) in this population are due entirely to characteristics that residents “carry with them” at admission.

This explanation is consistent with the “social selection” hypothesis, which states

that excess mortality among newly admitted residents is the result of their greater illness and frailty (when compared to individuals remaining in the community). That is, “the elevation in mortality occurring in the immediate aftermath [usually within 6 months - see Aneshensel et al., 1995; 2000] of admission can be understood as an inadvertent consequence of the admission of persons whose deaths were imminent.” (Aneshensel et al., 2000:S159). Research has shown that such “social selection” does take place, and does account for a portion of the excess mortality observed in nursing homes, but does not explain it entirely. For example, in a four year longitudinal study of 5,151 persons aged 70 or more living in the United States, Wolinsky, Callahan, Fitzgerald, & Johnson (1992) found that the risk of death increased by a factor of 2.74 following institutionalization, even after controlling for health status and other possible causes of mortality and institutionalization (see also, Shapiro & Tate, 1988; Wolinsky et al., 1997). Among those with Alzheimer’s disease, Aneshensel et al. (1993) calculated that, controlling for health status, the risk of death doubles following institutionalization. Van Dijk, van de Sande, Dippel, and Habbema (1992) found that death rates in a Dutch nursing home specializing in dementia care were three times greater for men and 2.4 times greater for women residents than for the non-institutionalized population (some of whom had dementia). Similar findings are reported elsewhere (Nygaard & Laake, 1990; Ostby et al., 1999).

Because health status alone does not explain the excess mortality observed in nursing homes, Aneshensel et al. (1993) have suggested that “social causation” may be an effective explanation of the observed excess mortality. In other words, something

about the transfer to the institution, or something that happens following admission that is external to the resident has an effect on the survival probabilities of long-term care residents. In this view, the likelihood of survival is a function of the physical and therapeutic environment, and only partially dependent, if at all, on social selection, or resident characteristics. Addressing this possibility, they write, “this elevation in risk [of death] may reflect more on the quality of institutional care than on the transitional event per se.” (Aneshensel et al., 1993: 66).

Building on their 1993 research findings, Aneshensel et al. (1995) showed that excess mortality tends to occur within six months of admission. Similar findings are reported elsewhere (Booth et al., 1983; Costello & Tanaka, 1961; Kane et al., 1983; Porrell et al., 1998; Shah, Banks, & Merskey, 1969; Shapiro & Tate, 1988; van Dijk et al., 1992). Aneshensel et al. (1995) established that rapid declines in survival rates (i.e., rapid increases in mortality rates) were experienced, particularly during the first three months, among those admitted for poor health *and* among those admitted primarily for other reasons, including: the caregiver’s belief that the dementia patient is potentially harmful to him or herself, or to others; the caregiver’s assessment that he or she is no longer able to perform the tasks of caregiving; lack of sufficient assistance from others in performing care-related tasks (i.e., who were relatively physically healthy - all had dementia). An observed mortality increase only among those in poor health would have constituted strong support for the social selection hypothesis. However, they concluded that although it is clear that social selection is an important explanation of excess nursing home mortality, a social causation explanation remains plausible.

The hypothesis was tested quantitatively in a subsequent study by the same researchers. Aneshensel et al. (2000) again found that demented persons admitted to long-term care facilities exhibited higher rates of death, even after statistically controlling for individual characteristics that may explain the different death rates. They tested competing hypotheses, social causation and social selection, to explain the excess mortality among long-term care residents. Some support for the social selection hypothesis was found. Residents with lower levels of cognitive functioning and whose caregivers cited poor patient health as a reason for admission were at greater risk of death than were those with higher levels of cognitive functioning and whose caregivers cited nonhealth-related reasons for admission.

The authors did not find support for the social causation hypothesis, but point out that this may be due to inadequacy of the measurement of quality of care. Their measures of quality of care consisted strictly of the *informal caregiver's assessment* of quality of medical care, quality of nursing and attendant care, problems with the facility or staff, and satisfaction with the facility in general. The authors note that these variables do not represent the entire range of possible social contributors to premature death, and that they were all based on the assessment of the informal caregiver. As noted, "the conditions that trouble or dismay caregivers may not be the conditions relevant to understanding morbidity and mortality among patients" (Aneshensel et al., 2000:S161). In short, their measurement of quality of care was probably not adequate. They conclude with the following:

Finally, the most convincing reason for continuing to consider a social causation

perspective is the trajectory of mortality among those institutionalized for reasons other than poor health. Although the initial risk of death is substantially greater among those admitted for poor health, those in better health also evidence an initial elevation in mortality. Because this peak in mortality does not appear to be due to preexisting poor health, it does not lend itself to a social selection interpretation. In addition, cognitive impairment is associated with early mortality even when admission for poor health is statistically controlled. This result suggests that sources of early post-admission mortality might productively be sought in aspects of the relocation that tax or exceed the understanding of the patient, his or her ability to adapt to a new environment, and difficulties communicating one's needs, desires, or ill health. (Aneshensel et al., 2000:S161).

This leaves open the question of what it is about the experience of the move to institutional care that results in reduced survival times for residents. Quality of institutional care, if measured effectively, may yet be found to account for some portion of the unexplained increase in mortality after admission to a facility. The purpose of the current study is to determine whether mortality among demented long term care residents in British Columbia, Canada, can be explained in part by the quality of care they receive.

### **Mortality among residents of long-term care facilities**

Mortality in any population can be studied as a dichotomous variable (died or did not die during the period in question), or as "survival". This latter approach has a distinct advantage in the context of studies such as the present one: it incorporates time. A simple hypothetical example of the effect of quality of care on mortality versus survival is illustrative. In this scenario, facility A and facility B both have ten newly admitted residents in the same month. In each facility, three die within twelve months of admission. Suppose further that facility A provides what is considered excellent care, and facility B

provides inferior care. After controlling for plausible alternate explanations (e.g., resident health, age, gender, level of dementia, etc), it is found that mortality is unrelated to quality of care in either facility. The potentially critical missing piece of information is of course time.

If, for example, the residents in facility A died in the 11<sup>th</sup> month following admission, and those in facility B in the 3<sup>rd</sup> month, a different conclusion would likely be warranted. That is, the better quality of care provided in facility A will have appeared to have resulted in the extension of life for those 3 residents. Conversely, the poorer quality of care provided in facility B may have prevented those 3 residents from living longer than they did. Barring the existence of another, competing explanation, the relationship between quality of care could be claimed when time is incorporated into the model, but not when it is not.

It might be expected, given this distinction between crude mortality measures and survival, that the latter variable might have been a common object of study among researchers in this area. It might be expected further that since it has long been known that relocation of residents results in a reduction in survival probabilities of those residents (Aneshensel et al., 2000; Kowalski, 1981; Lieberman, 1991)<sup>2</sup>, research would be focused on survival probabilities following admission rather than crude mortality measures. In general, however, this is not the case. Canadian research in this area is particularly rare. Only a handful of analyses of survival rates among long-term care residents appear to have

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For a review of the full range of effects of relocation on elderly persons, see Rehfeldt, Steele, and Dixon (2000).

been conducted. None of these studies has focused on residents with dementia. The American-based literature shows quite clearly the pattern of survival among the members of this vulnerable population. That is, survival probabilities plummet during the first few months and then tend to level off. From the two published Canadian studies in the area, but which include residents with and without dementia diagnoses, a similar survival pattern has been shown. These are outlined below.

Using data from all Manitoba nursing home admissions between 1974 and 1982, Shapiro and Tate (1988) studied the effects of age, sex, care level, location prior to admission, and waiting time to entry, on length of stay. They found mortality to be highest soon after admission in each age, sex and care level group. In the other Canadian study of survivorship of newly admitted residents of long-term care facilities in Ontario (1980-1987), Haight et al (1992) found similarly that survival probabilities declined rapidly following admission for men and women of all age groups before stabilizing after several months. While these studies provide a general picture of long-term resident mortality, they are based on undifferentiated samples of residents with and without dementia. More recent, dementia-specific survival probabilities for this population do not appear to exist in Canada.

For research purposes, mortality has the advantage of being a discrete outcome, relatively easily and accurately measured. For the purposes of this study, it must be stated early that mortality will be treated as an outcome, and *not* as an indicator of quality of care. This is not to say that mortality cannot or should not be used as an indicator of care quality in other studies. The purpose of the present study is, in part, to determine whether or not

best practices quality of care, as they are currently conceptualized, have any effect on length of survival of residents with dementia. Part of the discussion that emerges from those findings will necessarily have to deal with the question of whether the extension of life during the later stages of dementia is a desired outcome. All elderly persons entering long-term care facilities, and particularly those with dementia, are at relatively high risk of death (Chappell & Reid, 2000). One must therefore ask whether extending life through the provision of generally accepted standards of care quality is a desired outcome. In short, is a greater probability of death truly a *negative* outcome for all or most individuals whose physical and mental conditions are subject to continued deterioration prior to the end of life? The question becomes one of quality of life, and the answer may vary among dementia sufferers.

Herein lies perhaps the greatest difficulty confronting researchers in this area. Quality of life cannot be directly assessed for persons afflicted with advanced dementia. Mortality has long been considered an important outcome measure of care quality, and is frequently used in empirical research into quality of life following institutional treatment, from hospital care to long-term institutional care (e.g., Bond Gregson, & Atkinson, 1989; Brandeis, Morris, Nash, & Lipsitz, 1990; Castle & Shea, 1998; Linn, Gurel, & Linn, 1977). In practical terms, mortality is among the best outcome variables available and it is important that it be studied since the long-term institutionalized population is vulnerable to over and under treatment (Leno et al., 1997). Because standards of care are evolving, the first questions to be answered must be whether and to what extent quality of care affects the propensity of individuals within this population to die. The question of whether

length of life and quality of life are one in the same cannot be addressed until this prior relationship is examined.

In addition, knowing the manner in which dimensions of care affect probability of death of a long-term care resident can have practical value to service providers and others (Brauer, Mackepreng, & Bentzon, 1978). For example, physicians require such knowledge to determine how active and aggressive they should be in providing care (Brauer et al., 1978). Likewise, families and residents can make use of such information to clarify treatment desires and other specifics of advance medical care planning (Flacker & Kieler, 1998). Knowing whether and to what extent any given dimension or combination of dimensions of care affects the life expectancy of individuals with dementia in long-term care facilities may similarly assist families, formal care providers and residents themselves (perhaps via advance directives) to decide what is best for that resident.

Before going on to discuss the research literature that addresses the quality of care-mortality relationship, it is necessary to review what is meant by quality of care. Quality of care has been studied extensively, but precisely how to conceptualize it is the topic of much debate.

### **Defining quality of care**

Quality of care is an elusive concept (Davis, 1991; Kane, Kane, & Ladd, 1998), one that lacks a universally accepted definition (Spector & Mukamel, 1998). This difficulty stems in part from the wide range of interested groups involved in the long-term care sector. Definitions and assessments of quality of care differ, for example, depending

on whether one is an informal caregiver, a care receiver, an administrator, a nurse, a care aide or a member of the general public whose tax dollars support the system of long-term care. In a study comparing “primary values” - family and visitors, caring staff, good food, affection, clean and comfortable surroundings, feeling useful, social activities, privacy, religious activities, and flexibility in daily schedule - of nursing home residents, administrators and employees, Knox and Upchurch (1992) found significant differences in rankings. For example, administrators and employees ranked “clean and comfortable surroundings” fifth, while residents ranked them second. In other words, quality of care is a value-based construct (Davis, 1991).

Once an acceptable definition is reached, the level of complexity increases further. Measurement is notoriously difficult, due to the inherent complexity of operationalizing any given definition of quality. One such definition, for example, is provided by the (US) Institute of Medicine (1986, in Castle et al., 1997: 44), which defines quality as “the degree to which health services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge.” Donabedian (1982:5) recognizes that a wide array of definitions is possible, depending on the perspective one adopts:

When the valuations of the health care practitioners take precedence, we get what I have called an “absolutist” definition of quality: one that considers, primarily, the prospects of benefit and harm to health, as valued by the practitioner, with no attention to the monetary cost. An “individualized” definition would take into account the expected benefits and dangers of care as valued by each individual patient, and would also include, under the heading of undesired consequences, the monetary cost to the client. The “social” definition of quality would rest on an assessment of the monetary cost of care, and its expected benefits and harm to health, all as incurred and valued by society as a whole. Included in this definition

is the social distribution of health care and of its consequences among different strata of the population in general.

These definitions are not, however, mutually exclusive. For example, a practitioner makes care decisions for an individual based on the desire of the individual and within the constraints that the social definition imparts (if only monetary constraints). They are also conceptually broad. Clearly, although quality of care is separable into these component parts at an analytical level, an operational definition is not so easily arrived at.

Similarly, Kane, Kane and Ladd (1998) argue that while consumer satisfaction is a critical component in the definition of quality of care, objective judgments of technical standards also must be considered. Not unlike Donabedian (1982), Kane et al. (1998) frame the problem as a paradoxical one, with the intensely private matter of long-term care being subject to the influence of public policy. Moreover, quality of care is seen as the result of two conflicting, but interrelated programs, social and medical, which ultimately complicates the task of defining quality of care. They identify seven features of long-term care (goals, role of expertise, role of consumer choice, time horizon, public roles, paradigm, and expectations), characterizing each in terms of the hybrid system that has emerged as the result of the marriage of health (therapeutic) and social (compensatory) programs. For example, the medical program has as its goals health and safety - therapeutic goals. The social program has as its goal quality of life. From this latter perspective, resident care is intended to compensate for physical and mental impairments and assist residents themselves in reaching their own goals. The resultant hybrid consists of multiple and conflicting goals, with both therapeutic and compensatory approaches

considered crucial. The difficulty it presents for a meaningful definition of quality resides in the grey area between quality of life and length of life. Quality of care cannot be simply defined as maximization of one or the other. For example, one can easily envision a scenario in which a resident is provided with the best technical care available, which results in the indefinite extension of a life that the individual in question long ago considered not worth living. This would certainly not constitute quality of care for the afflicted individual. On the other hand, one cannot experience quality of life of any sort if one is not alive to experience it. A definition of quality of care must therefore ideally take these concerns into consideration.

For the purposes of defining quality of care, Kane and associates (1998) also consider the long-term care hybrid produced when considering the time horizons of health and social programs. The health program takes a generally short-term, episodic approach, while the social program looks at the long-term, with many cases never closing. The result is a system where short-term adjustments are made within the context of a long-term framework. Because long-term care is continuous (not a discrete event) and because of the potential for major institutional impacts on residents, quality will be multifaceted and subject to change over time (see also Davis, 1991). The implications for a definition of quality are serious. For example, a long-term care facility may decide as a matter of policy and in the name of quality, to have a resident eat a particular diet regardless of what the resident desires. "A 95-year-old could be urged to forgo the current pleasures of her familiar setting for a pressured longer life expectancy in an environment where emergencies could be better handled." (Kane et al., 1998:193). The extent to which these

care decisions constitute quality of care is open to debate. On the other hand, a facility may have a program based on a philosophy that emphasizes resident independence and choice. If such a policy has as its result a greater incidence of broken hips or falls, it is uncertain what this may mean for a definition of quality of care. Once again it comes down to a balance between resident preferences and professionally determined standards of care (see also Williams & Trubatch, 1993). Any definition of quality of care must build itself directly atop these shifting sands, making the prospect of arriving at a definitive definition yet more complex.

In the absence of a standard definition of quality of care, it is generally agreed that the definition should be composed of three fundamental components: structure, process, and outcomes (Castle et al., 1997; Donabedian, 1966; 1968; 1982a; 1982b; 1988; Rantz, Miller, Popejoy, & Zwygart-Stauffacher, 1999; Slater, 1997; Spector & Mukamel, 1998). Structure refers to “general attributes of a program that need to be in place for it to be said to be of adequate or high quality.” (Kane, et al., 1998: 196). These are based on professional beliefs about what is best for the resident. Structure includes such attributes as staff ratios, staff training, organizational structures (e.g., quality assurance committees, ethics committees, etc.), the physical environment, and the record-keeping system (Kane et al., 1998). Process refers to what is done to and for the resident by the facility staff, and is also based on professional beliefs about what is necessary or appropriate for the resident. The premise underlying process criteria is that strict adherence of staff to professionally prescribed protocols will result in better outcomes. (Kane et al., 1998). Examples of process variables include catheter use, bathing techniques, and medication use. Outcomes

are conceived of as the result of the resident's exposure to structure and process factors, net of individual characteristics such as age, gender, and type and severity of illnesses. It is only by establishing the causal linkages between structure, process and outcomes that the merit of structure and process variables as indicators of quality of care can be validated. Outcomes commonly include measures of physical dependency, cognition, behaviour, and quality of life (Kane, 1997), as well as discharge and survival rates, and direct observations of the residents' physical, emotional and mental condition (Davis, 1991). Yet research has only recently begun in earnest to establish the relationships between structure, process and outcomes. Only 17 years ago, one study came to the following conclusion: "Results from long-term care research generally support the conclusion that the relationship between structural measures of quality and the process of care, and between the process of care and its outcome, is not well established" (Kurowski & Shaughnessy, 1985: 113).

The research done in this area has tended to employ structure and process variables as indicators of quality, without linking them to outcomes (Gibson, 1998). The assumption is that if structure and process factors meet professionally determined standards, optimal outcomes should follow (Davis, 1991; Kane et al., 1998). This assumption is flawed, however, for a number of reasons. Kane and Kane (1988) argue that regulations governing the industry in the United States ensure that facilities possess the *capacity* to provide adequate care rather than that they actually *do* provide the care. The emphasis is on buildings, policies, procedures, staffing levels and credentials (i.e., structural criteria). Such a regulatory system emphasizes the safety and physical health of the residents (i.e., a

therapeutic emphasis) without regard to their social and psychological well-being (more closely identified with the compensatory approach). In addition, when inspections are conducted to assess quality, information is gathered from records and staff, rather than from the residents or the families directly, and the inspections are “highly predictable” (Kane & Kane, 1988: 135). Thus, while structure and process may on paper be at a high level, there is no guarantee either that high standards are being implemented and maintained, or that they will result in better outcomes.

Researchers therefore generally agree that outcomes research is the most useful approach in the ongoing quest to define, measure and improve quality of care (Clancy & Cooper, 1997; Donabedian, 1982; Gwyther, 1997; Kane & Kane, 1988; Kane, 1997; Kane, Kane, & Ladd, 1998; Slater, 1997; Whitehouse & Maslow, 1997). Donabedian (1988: 1746) writes, “Outcomes do have the advantage of reflecting all contributions to care, including those of the patient. But this advantage is also a handicap, since it is not possible to say precisely what went wrong unless the antecedent process is scrutinized.” The antecedent process is often conceptualized as structure and process (Slater, 1997), and studies of long-term care facilities are in general agreement that resident outcomes are a reflection of the quality of care received as measured by structure and process factors or inputs (Rohrer & Hogan, 1987).

To organize the wide-ranging research literature on quality of care in long-term care institutions, some researchers have imposed a structure-process-outcome framework in their comprehensive reviews (Castle et al., 1997; Davis, 1991), but this is not without its own special problems. These problems are a reflection of the state of the art of research

in the area, which stems directly from the difficulty involved in assigning a definition to quality of care. A predictor of a quality outcome in one study may be the quality indicator in another study. For example, Linn et al. (1977) employed RN hours as a predictor of the quality indicator, mortality, while Anderson et al. (1969) studied the effect of the predictor, nursing home size, on the quality indicator, staff hours per resident.

Furthermore, many studies do not identify their quality of care indicators as structure, process or outcomes (Davis, 1991).

Nonetheless, in an attempt to impose order on the myriad of quality of care studies in the long-term institutional care area, Davis (1991) identified the type of quality indicators employed in each of 37 studies as structure, process, outcome or composite measures. He identified five major domains of nursing home quality research, which included the relationship between quality and expenditures, facility size, ownership mode, human resources, and source of payment. That is, each of these structural factors was expected to explain some of the variance in the various structure (e.g., staff hours), process (e.g., meal ratings), outcome (e.g., mortality) and composite (e.g., violations) quality indicators. Higher expenditures, larger facility size, higher staff-to-resident ratios, better staff mix, not-for-profit status, and fewer Medicaid/public pay residents were expected to result in better quality of care as measured by the structure, process, outcome and composite quality indicators. Davis' (1991) findings are inconsistent, and the relationships generally weak, when significant. Castle et al. (1997) argue that Davis' (1991) results were to be expected since facilities are typically able to meet structural compliance regulations without having an expected and appreciable effect on implementation of quality of care

(see also Kane & Kane, 1988). Castle et al.'s (1997) review of the nursing home quality of care literature echoed Davis' (1991) findings, showing inconsistent and generally weak relationships. They argue that while the structure-process-outcome model is the dominant *conceptual* model in this area of research, it has proven to be less useful empirically.

The reason for the inconsistent and weak relationships at the empirical level stems from the inherent difficulty of defining quality of care in the first place. Consistency in operational definitions cannot be expected if an effective definition is not yet generally agreed upon. Quality of care is not only a multi-dimensional concept, it is also based on the values of those who measure it (Davis, 1991; Kane & Kane, 1987). Under such circumstances, it is logical to expect wide variation among researchers in their conceptualization and measurement of quality. This is, however, only part of the problem. Most existing studies suffer from severe methodological limitations, such as use of convenience samples and consequent inability to generalize, lack of causal modeling, and a reliance on cross-sectional data. These drawbacks have resulted in gross inconsistencies between studies (Sainfort, Ramsay, Ferreira, & Mezghani, 1994).

Once the conceptual has become operational, results may also be less than adequate due to measurement problems. Assessment of both care interventions and outcomes is subject to a number of sources of error. For example, Teresi (1994) identifies several sources of assessment error including: errors due to items, information, and criteria used in making an assessment (e.g., the Mini Mental State Exam (MMSE) does not have specific wording or instructions about how to code responses); errors due to occasions (demented residents can vary in performance depending on time of day or day of the

week); errors due to raters; and errors due to respondents (primarily degree of homogeneity of the population - different instruments may be required to measure the same variable depending on the severity of dementia within subgroups). Research into this latter source of error shows that the rate of progression of dementia may depend on the type of dementia (i. e. Alzheimer or other - Mayeux, 1994; Molsa et al., 1986). Accurate measurements of type, rate of progression and stage of dementia are necessary to determine individuals' physical, psychological, social and other capabilities, in the interest of providing optimal care (Reisberg, Sclan, Franssen, Kluger, & Ferris, 1994). However, despite the urgent need to develop valid and reliable instruments to measure severity of dementia, measurement remains an especially difficult task among those beyond the moderate level of the disease, with many instruments demonstrating floor effects (Zandi, 1994). Measures capable of rating the full spectrum of dementia severity are even less common.

While these sources of error are all of concern, it is the *source of information* that is considered to be the critical factor that determines size of error in studies involving demented long-term care populations (Teresi, Lawton, Ory, & Holmes, 1994). A number of studies have shown information source to have a major impact on convergent validity (Elam et al., 1991; Farrow & Samet, 1990; Magaziner et al., 1988; Reid & Chappell, 2000; Teresi et al., 1984). Adding to the complication, measurement of "objective" constructs (e.g., ambulation) has been shown to be more valid than measurement of subjective constructs (e.g., cognitive function). Multilevel, multimethod strategies (Teresi et al., 1994), or "triangulation" (Reid & Chappell, 2000) have been suggested to overcome these

problems, though they are not yet in common use among researchers of the demented long-term care population. The implication is that more precise measurement may allow researchers to more accurately measure and account for variations in quality.

### **Quality of care: What works?**

While much of the research in this area is based on the structure-process-outcome conceptual model, the review studies cited above (Castle et al., 1997; Davis, 1991) indicate that the expected relationships among the various conceptions of quality of care predictors and indicators have not been detected. Without abandoning this conceptual model, recent studies have begun to assess quality of care in terms of dimensions or components of care (Chappell & Reid, 2000; Holmes et al., 1994). Dimensions of care are aligned with structure and process factors, and are expected to influence resident outcomes. The concept, quality of care, is thus embodied in the dimensions of care, which should theoretically result in varying levels of resident outcomes. This conceptual understanding is based on a more general approach sometimes referred to as “effectiveness research”. Effectiveness research has as its main question, “What works?” (Clancy & Cooper, 1997: 8) and proceeds to define and measure appropriate outcomes, and to identify, implement and assess interventions designed to improve the selected outcomes. The remainder of this literature review is based on this broader conception of quality of care, that is, on the dimensions of care, and is reflective of much of the research in the area. By organizing the literature in accordance with the conceptually broader effectiveness research approach, it is possible to retain the theoretical distinctions between,

and usefulness of, structure, process and outcomes without artificially forcing disparate studies into a conceptual straightjacket (see Castle et al., 1997; Davis, 1991).

Research on the provision of quality care for institutionalized dementia sufferers has tended to focus on special care units (SCUs), because they are seen as epitomizing the dimensions of care that in theory will lead to optimal outcomes. Although a widely accepted and conceptually clear definition of what constitutes special care has not yet surfaced, research has been conducted to address this concern (Magaziner & Zimmerman, 1994). At the broadest conceptual level, special care is defined by Leon and Siegenthaler (1994: S58) as “programs and physical environments designed to meet the specific needs of dementia residents.” In an effort to more clearly define what constitutes special dementia care, researchers have turned to the care programs themselves.<sup>3</sup> For example, in a study of 1,497 long-term care facilities, Leon (1994:S73) found that SCUs tended to possess seven indicators of quality care often referred to in the literature, including: modified physical environment (67% reported modified physical environment); physically separated units with controlled on/off access (78%); limiting admissions to residents with a dementia diagnosis (82%); extra staffing (76%); designated unit leadership (67%); specialized staff training (76%); and specialized programming (88%).

Relying on information provided by facility administrators, Morris and Emerson-

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Because special dementia care was implemented in the form of the SCU based not on research, but on the nursing home industry's response to the changing nature of their residents (i.e., increasing levels of dementia and frailty), service developments far outstripped research in the area. See Orr-Rainey (1994) and Cohen (1994) for a discussion of the rapid service developments in specialized care for residents with dementia beginning in the 1980s.

Lombardo (1994) found that SCUs were more likely than non-SCUs and quasi-SCUs to have enhanced activity programming, access to a professional mental health specialist, computerized assessment, a care planning package, academic and educational affiliations, access to hospice care, daycare services, overnight respite service and other (unspecified) services. In another study involving facility administrators, Grant, Kane and Stark (1994) found that among Minnesota's 436 nursing facilities, SCUs were substantially more likely to provide specialized staff training, enhanced environmental features, and specialized programming than were non-SCUs. Similar characteristics are reported elsewhere (see Kutner & Wimberley, 1994; Lawton, Van Haitsma, & Klapper, 1994; Ohta & Ohta, 1988; Rabins, 1986; Wimberley & Kutner, 1994).

Person-environment fit (Kahana, 1975) is another essential concept that was used to guide the selection of variables. Assessment of fit is especially challenging for persons who may not be able to express their needs and wants. The person-environment fit concept emphasises that no individual design factor or intervention will in and of itself influence resident outcomes (Lawton, 1999). "Rather it is the accumulation of such considerations in the larger context of the fit of the physical and social environment to the person that will have lasting effects on resident outcomes" (Teresi et al., 2000). This theoretical position is echoed by Katz and Gurland (1991), who see quality of life for elderly persons as a combination of the person (mind, body and spirit), the environment in which they live, and their life experiences in time and space. The emphasis, then, was on adequate measurement of all the dimensions of care in a comprehensive, detailed and integrated measurement strategy.

There is from this perspective more to the picture than simply the facility-provided dimensions of care. This has been recognized by researchers who advocate the necessity of providing a good person-environment fit (Kahana, 1975; Lawton, 1970). The basic argument is that if the needs and desires of the individual resident are effectively accommodated by the environment, outcomes will be optimal. That is, it is the *congruence* between environment and person that will determine the outcome for that person. For example, Kahana (1983) suggests seven dimensions of person-environment congruence, including: segregate; congregate; institutional control; structure; stimulation-engagement; affect; and impulse control. Each of these dimensions is composed of several sub-dimensions. The sub-dimensions proposed are intended to be parallel between the environment and individual residents in order to allow for a quantitative assessment of the fit between them. One example is the sub-dimensions for the segregate dimension. For the environment, the sub-dimension is concerned with “change versus sameness. It refers to the presence of daily and other routines, frequency of changes in staff and other environmental characteristics.” For the individual, the concerns include, “preference for change versus sameness in daily routines, activities.” (Kahana, 1983: 104). Another example under the dimension “stimulation-engagement” for the environment is, “the extent to which the resident is actually stimulated and encouraged to be active.” and for the individual refers to, “preference for activities versus disengagement.” Each of these pairs of sub-dimensions can be compared and congruency calculated. In effect, measurements of individual preferences and needs are directly compared to measurements of the extent to which the environment is able to meet those needs and preferences.

Theoretically, this model can be seen as a reaction to the two earliest formal social theories of aging, namely, disengagement theory and activity theory. Disengagement theory (Cumming & Henry, 1961) posits that withdrawal from social activities is natural and inevitable for older people, and that it benefits not only the disengagers, but society as a whole. Activity theory essentially states the opposite, that a high level of activities must be maintained during old age in order to maintain quality of life. Subsequent researchers found, however, that individuals differed markedly in the level of activities that resulted in high levels of life satisfaction (e.g., Reichard, Livson, & Peterson, 1962). As it came to be generally understood that many different patterns of adjustment were possible, and that individual differences in modes of coping with the environment explained much of the variation in life satisfaction of institutionalized elderly persons, it also became clear that the provision of an environment that did not meet the varying needs of its residents would be less effective (Kahana, 1975). The fundamental change in thinking that resulted was that the environment must adjust to the individual; one size does not fit all. Research on person-environment fit for institutionalized demented individuals, however, has been hampered due the difficulty of determining each individual's needs and preferences.

Thus, it is clear that the indicators of dimensions of care that should lead to best quality care are as varied as the outcomes they theoretically should influence. However, the dimensions of care can be effectively classified according to the categories such as those provided by Holmes and associates' (1994) "concept mapping" of the components of care that are considered by providers to be the most effective: the environment, activities programming, training and special assignment, rational care planning and family

involvement, and structural characteristics. Chappell and Reid (2000) determined that five dimensions of care were sufficient for classification and review of the research literature in the area. These are similar to Holmes et al.'s (1994) six components of care: the environment, assessment and diagnosis, staff specialization and ongoing education, non-use of restraints (pharmacological and physical), and flexible care routines. Holmes (2001) confirms that these five dimensions essentially concur with the "considered inputs" of the Advisory Committee to the American National Institutes of Health SCU Collaborative Studies. In other words, these dimensions of care reflect the currently held understanding among researchers of "what works" (see also Leon, 1994) and are reflective of the state-of-the-art of measurement in this area.

That the physical institutional environment *can* have a major effect on demented resident outcomes is not seriously contested in the research literature (Carp, 1994; Cohen & Day, 1994; Hiatt, 1979). Some empirical evidence does exist to support this theoretical stance. Minor environmental alterations such as the installation of blinds and cloth barriers to discourage resident exiting behaviours are reported to be highly effective (Dickinson, McLain-Kark, & Marshall-Baker, 1995; Namazi, Rovner, & Calkins, 1989). Horizontal tape patterns on the floor have been shown to reduce exiting (Hussain & Brown, 1987), and, in other studies, to have no effect on exiting behaviour (Namazi et al., 1989). When the desired outcome is a reduction in agitated behaviours, some researchers have found that unlocked doors between the interior and fenced exterior of a facility ("therapeutic gardens") can be beneficial to residents (Namazi & Johnson, 1992). A *locked* dementia unit has also been associated with improved resident functioning in general (McCracken &

Fitzwater, 1989). If the desired outcome is a reduction in incontinence, some evidence indicates that arrows on the floor with the word “toilet” written on them were most effective (Namazi & Johnson, 1992). Any given outcome is associated with a different environmental alteration strategy.

At the facility level, overall environmental changes have been associated with improved resident outcomes. Cohen and Day (1994), in a study of 20 contemporary environments for people with dementia, argue that the creation of a homelike environment is of central importance in any attempt to elicit optimal resident outcomes. A homelike (or non-institutional) environment requires the development of appropriate interior and exterior architecture and materials, the creation of activity areas for therapeutic and recreational use, and the building of accessible and effective outdoor areas or gardens. Modest changes made in an effort to create a home-like environment, (e.g., dining at small tables with family-style service, bright lights) have been shown to result in improved eating behaviour and communication among demented residents (Gotestam & Melin, 1987; Melin & Gotestam, 1981). More extensive attempts to create a home-like atmosphere, such as providing residents with separate apartments with their own furniture and rooms for common activities have been shown to lead to improved social abilities, more alertness and reduced depression, but increased behavioural disturbances compared to similar residents remaining in traditional nursing homes (Kihlgren et al., 1992).

Studies of the effect of physical environmental design on resident outcomes have increased in number in recent years. In a review of empirical research in the area, Day, Carreon, and Stump (2000) identified four primary types of studies on design and

dementia including: environmental comparisons; design feature studies; studies of environmental services and policies; and studies of agitated behaviours. Most of the 71 reviewed studies were published after 1991 and many showed positive effects of environmental changes on resident, staff and family outcomes. However, most studies suffered from poor methodological design: small sample sizes (often fewer than 10 residents) and failure to account for resident baseline level of dementia were especially common flaws.

This latter design problem is of particular concern since a growing proportion of long-term care residents enter the facility with dementia (Teresi, Morris, Mattis, & Reisberg, 2000). That is, the effect of the environment on resident outcomes will differ, depending partly on cognitive functional abilities. Any environmental design modifications would need to account for this (Teresi et al., 2000). For example, agitated behaviours and wandering among residents with dementia have been shown to decline in an SCU setting that ensures an environment with adequate lighting, space, maintenance, low noise levels, adequate stimuli and small unit size (Sloane et al., 1998). Overall, assessment of the effects of the environmental dimension on resident outcomes is as underdeveloped and disparate as is that for the other dimensions. According to Lawton et al. (1997: 93), "...it should be clear that environmental assessment for chronically ill elders under residential care is an area under development, with very little to show beyond the conceptual basis for assessment."

Staffing effects on resident outcomes consist of two general and not unrelated categories of research. Staff specialization and ongoing education comprise the first. Maas,

Swanson, Specht, & Buckwalter (1994a) argue that staff caring for residents of SCUs must be recruited for their specialized skills, as well as for their commitment to the unique care requirements of residents with dementia. Once recruited, these staff members should be provided with opportunities for classroom instruction and clinical practicum experiences to further enhance their ability to care effectively for this population (see also Maas, Swanson, Specht, & Buckwalter, 1994b). Although staffing issues are considered critical to the provision of optimal care for dementia sufferers (Holmes, Ory, & Teresi, 1994), very little research has been published on the association between staffing and resident outcomes (Davis, 1991). This is because staffing ratios, specializations and training have been considered by researchers to be dependent variables, that is, as indicators of quality of care, until relatively recently.

The few studies that have linked staff education and resident outcomes have reported positive findings. For example, a staff education program resulted in a 50% reduction in physical aggression of confused residents towards nursing staff over a three month period (Hagen & Sayers, 1995). Likewise, Aronstein, Olsen, and Schulman (1996) report some evidence that training nurse aides to use recreational interventions when interacting with residents with Alzheimer's disease can result in a reduction in agitated behaviours. An increase in positive interactions between residents and nurse aides, residents and other residents, and residents and visitors was also reported.

The second general category of research on staffing focuses on staff-to-resident ratios. Adequate staff ratios are considered essential to provision of quality care not only because a certain number of staff are required to complete the basic physical tasks of

caring, but because optimal care requires much more than efficient task performance. In theory, higher staff ratios should allow an increase in time spent on non-task-oriented “caring”. However, some researchers argue that while staff ratios must be adequate, the more important consideration is the ratio of each *type* of staff-to-resident. For example, a staff mix that provides a higher than average RN-to-resident ratio is more likely to result in optimal outcomes than is a staff mix that is light on RNs and heavy on care aides (Davis, 1991). The issue becomes one of quality versus quantity of staff. Thus, most studies account for staff-to-resident ratios by type of staff when linking staff ratios to resident outcomes.

Results are not consistent either within or across studies. For example, in a longitudinal study of the effects of nursing home attributes including licenced (RN/LPN) and unlicenced (nursing aide) hours on functional ability, discharge home, and death, results showed that licenced nursing hours were associated with improved functional ability, increased probability of being discharged home, and decreased probability of death (Bliesmer, Smayling, Kane, & Shannon, 1998). However, among residents who did not die and were not discharged, no relationship was found between licenced nursing hours and functional dependency. Unlicenced nursing hours were not related to any of the outcomes. Castle and Fogel (1998) studied the relationship between nursing home structural measures (including staff ratios) and outcomes for persons with mental disorders (including dementia) over a six month period. They found that a higher ratio of nurse aides to residents was associated with improvement in mood, social engagement, cognitive performance and physical dependency. However, a *lower* ratio of RNs to residents was

associated with improvement in mood. In addition, a *lower* ratio of LPNs to residents was associated with improvements in mood, social engagement, and behavioural problems. The authors conclude that the beneficial effects of high staff-to-resident ratios may be dependent on type of staff. In this regard, Cohen and Spector (1996) found that higher RN ratios were associated with increased probability of survival, and higher LPN ratios were related to better functional outcomes over time. They argue that RNs improve survival probabilities because they are trained to recognize and deal with medical emergencies, and that LPNs improve functional outcomes due to their day to day involvement with residents, and because they are better trained than are care aides. On the other hand, Porrell, Caro, Silva and Monane (1998) report that overall staff ratios (including LPNs, care aides and RNs) were unrelated to physical functioning change and incontinence outcomes, but were positively related to mental status change over time. In addition, residents in facilities devoting larger fractions of their nursing expenses to LPNs than to care aides enjoyed greater survival probabilities.

Some studies have gone further, suggesting that optimal resident outcomes can only be achieved by matching the needs of residents in any given facility with the types and ratios of staff. For example, Linn et al. (1977) carried out a comprehensive study of the effects of staff ratios (and other factors) on resident outcomes over a six month period, controlling for resident characteristics, including need. An assessment of need was based on background and health variables for each resident, in addition to a physician's *expected* outcome (prognosis) 6 months after admission. Outcome scores were adjusted for differences in severity of the resident's condition. They found that while overall staff ratios

(RN, LPN, Aide) were not related to outcomes, increased RN hours were positively related to all three outcomes: survival, functional improvement, and discharge home. The authors suggest that RN hours may reflect the philosophy and organization of the facility rather than simple ability to provide direct nursing care. Without delineating staff types, Spector and Takada (1991) likewise found that residents in facilities with moderate or low nursing staff levels and high mean resident physical dependency levels were less likely to show functional improvement than were residents with the same level of physical dependency residing in facilities with high nursing staff levels. From these studies, one would assume that resident need is one necessary component of any attempt to model the effect of staff ratios on resident outcomes.

Dementia-specific studies of staff ratio effects are especially rare. In particular, the study of the effect of activity staff-to-resident ratios has been neglected, despite the theoretical importance (Holmes et al., 1994) and empirical evidence showing the value of activities to the demented individual in the long-term care setting. Almost all SCUs report having some type of specialized activity programming (Leon, Cheng, & Alvarez, 1997). Empirical links between activities and residents' outcomes have also been explored. For example, Beuttner et al. (1996) found that, compared to those in traditional activity programs, dementia residents exposed to an enriched activity program showed improvements in strength and flexibility, and a decline in agitated behaviours. Rovner et al. (1996) also report reductions in behaviour disorders following implementation of activities programming under psychiatric supervision. In an effort to link activity staff ratios and resident outcomes over a one year period, Reid and Chappell (forthcoming)

report that increased activity aide-to-resident ratios result in less decline in social skills, expressive language skills, and cognitive function, controlling for environmental features, resident characteristics, facility characteristics and baseline outcome score. RN and care aide-to-resident ratios showed little or no effect.

Restraint use to manage behavioural difficulties among long-term care residents is a contentious issue. Kane et al. (1993: 545) argue that “Restraint use is a metaphor for society’s approach to care.” That is, as the preferred model of care has shifted over the past century from one of professional dominance to one in which the patient or resident has a substantial role, the place of restraints in the long-term care setting has undergone re-evaluation. As a result, resident care routines are less something done *to* the resident, than *for* the resident. This has in turn resulted in a massive growth in research attempting to understand not only the causes of restraint use, but the effect of restraint use on resident outcomes.

A growing body of literature has shown that physical restraints are not beneficial to the restrained resident (Folmar & Wilson, 1989; Strumpf & Evans, 1989). Similar conclusions have been reached about pharmacological restraint use (Butler et al., 1987; Ebly et al., 1997). Yet many facilities continue to employ these methods of behaviour control (Blakeslee, Goldman, Papougenis, & Torell, 1991). The decision by a staff member to use a restraint is itself the outcome of a number of influences including nurses’ subjective assessment (Glasspoole & Aman, 1988), resident characteristics (Evans & Strumpf, 1989; Schnelle et al., 1992), staff attitudes (Hill & Schirm, 1996), and ongoing education about restraints (Stillwell, 1991). Research has shown that education and

training programs aimed at the reduction of restraint use tend to produce results in the desired direction for both physical (Avorn et al., 1992; Dunbar et al., 1996; Ejaz et al., 1994a, 1994b; Evans et al., 1997; Powell et al., 1989; Ray et al., 1993) and chemical restraints (Coberg et al., 1991; Ray et al., 1993). Recent studies have also addressed the direct connection between facility characteristics and restraint use (Castle, 1998; Castle & Fogel, 1998; Sloane et al., 1991).

Staff who resort to *physical* restraints most often cite the need to prevent injury to the resident and others as the primary reason for their use (Evans & Strumpf, 1989; Liukkonen & Laitinen, 1994). Yet, “no scientific basis of support yet exists for the efficacy of restraints in safeguarding patients from injury” (Evans & Strumpf, 1989: 68). In fact, there are as many serious risks to the restrained resident as there are benefits. Risks include functional decline, skin abrasions, cardiac arrest, emotional desolation (Warshaw et al., 1982), severe physical and psychological discomfort (Brower, 1991), and even death (Miles & Irvine, 1992). Given the double-edged sword of restraint use, it is not surprising that it has been called into question as a method of behaviour control and that other, more beneficial solutions are being developed and administered (Blakeslee et al., 1991; Bradley et al., 1995; Brower, 1991; Cohen et al., 1996; Cruz et al., 1997; Dunbar et al., 1996; Maxfield et al., 1996; Werner, 1994).

Psychotropic drug use is also common among residents who live in long-term care institutions. Lasser and Sunderland (1998) report that 52% of 92 demented residents in 7 nursing homes in Massachusetts had orders for high potency antipsychotics. Other studies report between 43% and 72% of residents with dementia receive some type of

psychotropic medication (Beers et al., 1988; Buck, 1988; Doane et al., 1989; Sloane et al., 1991). Predictors of chemical restraint use include physically abusive behaviour by residents, severe mental status impairment and frequent family visitations (Sloane et al., 1991). Connelly (1992) reports that severity of specific behavioural problems of residents predicts antipsychotic (neuroleptic) drug use. Among facility characteristics, a positive relationship between facility size and antipsychotic medication prescriptions has been reported (Ray et al., 1980; Sloane et al., 1991). Sloane et al. (1991) also found higher level of care and lower staff-patient ratio to be associated with greater use of psychotropic drugs.

As for outcomes of psychotropic medication use on residents with dementia, research results are mixed. Some studies have found that neuroleptics are effective in dealing with symptoms of dementia like agitated behaviours, hallucinations and suspiciousness (e.g., Risse & Barnes, 1986). Likewise, Barnes et al. (1982) compared a group of disturbed dementia patients taking neuroleptic medication with a control group that was not. They found an improvement in level of confusion, impairment of recent memory, and disorientation in the experimental group but not in the control group. However, neuroleptics have also been implicated as a common cause of extrapyramidal side effects in elderly persons (Bassuk & Schoonover, 1977). Kane et al. (1993: 568) argue that "The potential for harm from misuse or overzealous use of psychoactive medications is greater than that for physical restraints." Ebly (1997) found that falls, fractures, impaired cognition, impaired self-care abilities and general morbidity were associated with psychotropic drug use.

A number of additional negative side effects can be expected from certain drugs, the most serious of which is tardive dyskinesia (Avorn et al., 1992; Hulitz, Sumner, Hodge, & Weart, 1991; Peabody, 1987), but also including depression, increased risk of seizures, and eye-lens and corneal deposits (Bassuk & Schoonover, 1977). Its symptoms look similar to parkinsonianism and in older people is often irreversible. Since elderly persons in institutions tend to be administered a greater variety of drugs than other segments of the population, the probability of negative drug interactions is also higher. Peabody (1987) also cites the increased likelihood of postural hypotension, anticholinergic effects, and over-sedation as more dangerous for elderly persons. In general, adverse effects of psychotropic drugs are more frequent and of greater negative consequence in elderly persons than among those at younger ages (Bassuk & Schoonover, 1977).

Much research attention has been focused on the need to provide a flexible care routine for residents. Flexible care is one of the highly visible recent reactions to traditional care routines, where the needs of the institution and its employees take precedence. In other words, it is considered to be a humane response to the task and time-oriented approach commonly encountered in the institutional setting. Coulson defines flexibility of care as “the ability of the carer to adapt to the needs of the resident” (1993: 20). This approach to care allows the resident the ability to eat meals if and when they choose, to participate or not in structured or other activities, and to have a say in when they will bathe and who will assist them. Barton and Burgener (1991) found that increased staff flexibility during interactions with residents was related to improved resident behaviours. The degree of flexibility required, however, varies from individual to individual, and

cannot be effectively exercised outside of the confines of some sort of structured routine. It appears to be, in effect, a balancing act, one that requires frequent adjustments as the underlying disease process ebbs and flows. It also requires staff members to possess not only the propensity to provide flexible care as part of the daily routine, but to acquire and make use of a variety of techniques that can be applied when necessary (Mistretta & Kee, 1997). For example, instead of immediately medicating an agitated resident, a staff member may try talking, walking or sitting with, or playing music for the resident.

The concept of flexibility appears to be closely tied to the psychological literature that deals with choice and control. Residence in a nursing home, for example, is closely associated with dependency; yet psychologists have shown that the most “dependent” of elderly persons possess a reserve capacity that can be tapped in the event that their sense of control is supported and enhanced (Baltes & Baltes, 1986; Baltes & Horgas, 1997). The control that individuals perceive themselves to have may be associated with the opportunity they have to make choices (for example, when to eat or when to bathe versus a set schedule for all routine care) (Perlmutter et al., 1986), and may be influenced by the pervasive (negative) views of aging in Western culture in general (Gergen & Gergen, 1986). The ability to choose and the prevalent view of old age are closely tied. Gergen and Gergen argue that this consists of an “internal/determinant” social pattern, in which it is believed that physical and psychological conditions determine actions. This, they argue further, creates the expectation and invitation for individuals to speak critically about themselves, “to make fewer claims of self worth, to speak disparagingly about well-being, to curtail various lines of activity, to seek dependency in relations with others, to seek

reliance on medical support systems, and so on.” (Gergen & Gergen, 1986: 135). A self-perception of dependency, based on such social expectations, and a concomitant inability to make meaningful choices - or perhaps more to the point, the inability of caregivers to recognize that an elderly person may in fact require choice at all, since they too are subject to the same social expectations - are preconditions for a perceived loss of control.

Perceived loss of control, in turn, can accelerate a decline in mental and/or physical health by reducing the individual’s motivation to exercise control functions whenever possible (Kuhl, 1986). Thus, flexibility in care routines means allowing residents as much perceived control and choice as possible. It means further that staff be recruited and trained accordingly.

The inadequacy of current definitions and measurements of quality of care have led some researchers to attempt to measure the “intangibles” of care. Conventional empirical methods do not appear to be adequate for the collection of such data. Researchers have thus taken to innovative measurement strategies in their search for accurate measurements of this potentially critical component of quality care. For example, Chappell and Reid (2000) have attempted to measure the operationally elusive “intangibles” involved in quality care through the use of panels of experts. These experts were not affiliated with the individual facilities involved in that study, but were familiar with each on a professional level. They were asked which facilities they would place a loved one in, or would go to themselves should the need arise; to choose gold standard facilities. Subsequent multivariate analyses of the effect of intangibles (as measured by panel selections) on 6 non-mortality resident outcomes over a one-year period showed that gold standard facilities

were associated only with less decline in positive affect, perhaps suggesting panel members chose facilities based on resident mood.

Linn et al. (1977) also argue that intangibles may be measurable, if only indirectly. They found that two nursing home quality of care variables were related to the risk of mortality: Lower RN-to-resident ratios and poorer meal services. Because the facilities studied provided at least average care, the effect of structural variables on outcomes may not have come into play. They argue that because all of the facilities were maintained beyond a certain structural quality threshold, differences in structural characteristics no longer contributed to explaining outcome variation. Once this threshold has been attained, intangibles such as the personalities of the staff or facility atmosphere may be the more salient predictors of resident outcomes. They suggest that RN hours and meal service may be indicators of these intangibles.

The choice of the word “intangibles” to describe those elements of the care environment that may have an effect on residents but are not formally measurable, was deliberate. It is worth pausing briefly at this point in the discussion to examine its meaning in greater depth. Once a label is applied to something a researcher wishes to measure, even if it cannot be said with absolute certainty that it exists, it becomes in some sense tangible, even if we continue to call it intangible. In other words, something appears to be operating in the social world that we are interested in understanding and relating to other factors, and to do so one must give it a label. The label “intangibles” itself is not something that induces an acceptable comfort level among many quantitative researchers. It is, to be more concrete, inherently difficult to define conceptually and therefore extremely difficult to

operationalize. As noted previously, however, this is the state of affairs in general in quality of care research. What exactly is quality of care? The answer is only partially known, at best. Yet this problem has not prevented researchers from operationalizing quality of care. The search for conceptual clarity continues, but research cannot wait for the perfect conceptual definition.

Attempting to measure intangible factors is one way that research can, in an obviously exploratory fashion, be advanced. One could in fact argue that a researcher is obligated to explore potentially important factors that cannot at this point be called anything more palatable (to the quantitative researcher) than intangibles. This is especially true when one realizes that, as Linn et al (1977) point out, that differences in the provision of structural care are not great, which means that researchers must look to other factors. *At this point* in the evolution of research on quality of care and its outcomes for institutionalized persons with dementia researchers need to look further afield. While they continue to evolve, traditional quantitative approaches have provided very limited results. The measurement of intangible factors in this study represents an attempt to go beyond traditional quantitative methodology, and by doing so, to provide the opportunity to glimpse a potentially important set of factors that work singly or in concert to affect resident outcomes such as mortality.

Intangibles are likely to reside within the social relations between residents and staff. Using open-ended interviews and direct observations of staff behaviours, Herzberg (1997) found that a relatively independent group of residents on one floor of one long-term care facility reported higher levels of satisfaction with conceptions of self, and with

interactions with other residents and staff, than did a more dependent group of residents on another floor. Dissatisfaction among the latter group extended to their rating of the quality of food served. Significantly, the food came from the same kitchen and was identical to the food served to the other floor. The difference was in the social environment. Herzberg (1997) argued that the social environment that resulted in these different outcomes was itself the result of staff attitudes, perceptions and expectations. That is, once a resident was determined to be dependent and was physically moved to the floor reserved for such persons, staff members tended to treat them in a more task-oriented manner and less as individuals requiring respect and choice.

While the above cited studies measured subjective factors from the resident's and expert's points of view, respectively, others have focused strictly on staff attitudes and perceptions. For example, Yu et al. (1991) studied the reactions of nursing staff to urinary incontinence among residents. They found that resident incontinence led to stress and frustration among staff members, which in turn had implications for staff retention, and therefore quality of care. It has been noted by Brower (1985) that because the resident population will continue to age, residents will increasingly be stricken with multiple health problems, thus increasing the frustration level of what he argues is an inadequately prepared current group of nurses.

The picture becomes even murkier when it is realized that staff may be following different care practices within the same facility, staff might follow different care practices with different residents (Booth, Bilson, & Powell, 1990), and staff, administrator and resident conceptions of what constitutes best practice may differ (Knox & Upchurch,

1992). Kovach and Krejci (1998) measured staff perceptions of changes needed to facilitate positive changes in long-term dementia care. They found that both personal and facility characteristics were perceived to play crucial roles. Most frequently cited by staff among personal characteristics were: genuinely liking people with dementia; being flexible; kindness; calmness; and having a positive attitude. Most frequently cited facility factors included: staff working together as a team; sufficient time to devote to giving good care; staff wanting to spend time with residents, not just “getting the job done”; sufficient time to give attention to more than physical needs of the residents; staff are supported by administration. The least frequently cited facility characteristics included a number of variables considered important among researchers studying structural indicators of quality of care. These include: quality assurance projects; availability of music, arts and activity supplies; Medicare/Medicaid nursing home reimbursement; and nursing staff having easy visibility of residents in all areas of the unit. These studies indicate that both tangible and intangible factors within the social environment play an important but as yet undetermined part in resident outcomes. This takes us back to Davis (1991) who argues persuasively that quality of care is a value based concept.

### **Quality of care and outcomes: Empirical evidence**

A growing number of studies have addressed the relationship between quality of care and outcomes, including mortality. A veritable cottage industry has grown around the theory and practice of measurement and selection of outcomes for the cognitively impaired elderly, and the assessment of effectiveness of a myriad of interventions (see Whitehouse

and Maslow, 1997). There is general agreement among researchers that there is a wide range of appropriate outcomes for this population. They include cognition, behaviour, physical functioning, family caregiver outcomes including burden and stress, use of informal and formal care, quality of life and patient and family satisfaction (Kane, 1997), psychiatric symptoms, physical status, meaningful use of time and affect (Maslow & Whitehouse (1997), as well as survival time, safety, comfort, communication, intimacy, spiritual well-being, choice, decision-making, access to care and social participation (Fortinsky et al., 1997; Holmes et al., 1997; Smyth et al., 1997; Teno et al., 1997). The selection of an appropriate outcome or set of outcomes depends on the stage of the disease and the purpose of the study (Gwyther, 1997; Maslow & Whitehouse, 1997; Teno et al., 1997).

An important finding in the research literature is that SCUs are no more effective at positively influencing outcomes than are non-SCUs (Chappell & Reid, 2000; Porell & Caro, 1998; Holmes, Teresi, Weiner, Monaco, Ronch, & Vickers, 1990). Expected relationships between what (should) work, based on professional belief, and resident outcomes have been less than robust. For example, several longitudinal studies have found no decrease in behavioural problems among residents admitted to SCUs (Chavetz, 1991; Holmes, Teresi, Weiner, et al., 1990; Wagner, Teri, & Orr-Rainey, 1995; Wells & Jorm, 1987). Similar findings for functional outcomes have been reported. In a large sample (N=77,337), one year longitudinal study of residents in SCUs and traditional nursing homes, Phillips et al. (1997) found no decrease among SCU residents in any of nine outcomes (decline in locomotion, transferring, toileting, eating, dressing, and a summary

activities of daily living index, decline in urinary and bowel continence, and significant weight loss). Saxton et al. (1998) also report similar rates of decline for residents in SCUs who were matched to traditional nursing home residents, for cognitive functioning, and activities of daily living. However, an absence of decline in mobility among those residing in the SCU was reported. In a large sample study (N=4,258) of the effect of facility structural and environmental characteristics on six resident outcomes (depressed mood, social engagement, behavior problems, cognitive performance, activities of daily living and mortality), Castle and Fogel (1998) report that structural characteristics are strongly related to some outcomes. However, no single structural or environmental variable was associated with more than four resident outcomes, with the authors reporting coefficients with p-values under .10. A more conservative researcher might lower the threshold for significance to .01, thereby eliminating a number of the apparent relationships. In fact, no large scale comparisons between SCUs and non-SCUs show marked differences in outcomes (Chappell & Reid, 2000; Maslow, 1994; Martin, Gwyther, & Whitehouse, 1994).

Three related reasons for the absence of a strong relationship between what should work and outcomes have been put forth in the research literature. First, it may be that SCUs and non-SCUs do not actually differ in quality of care despite espoused philosophy to the contrary. For example, in a comparison of staff time spent with residents of SCUs and non-SCUs, Holmes, Teresi, Ramirez and Goldman (1997) found no differences for 7 of the 10 staff groups. The three groups showing differences were nurse's aides, speech therapists and physical therapists, with physical therapists spending more time with

residents in non-SCUs (i.e., in the opposite direction expected). Teresi, Grant, Holmes and Ory (1998) also found that SCUs and non-SCUs both had low levels of staff training and support, although SCUs tended to have more dementia-oriented staffing practices (e.g., less frequent rotation of nursing aide assignments). They warn, however, that the labels “SCU” and “non-SCU” refer to the *designation* of the facility, and do not necessarily reflect differences in care practices delivered (see also Holmes, 1996). Chappell and Reid (2000) found that SCUs and non-SCUs implemented similar dimensions of care, and that while many facilities implemented excellent care for a given dimension, they were not likely to do so for more than two dimensions. Grant, Kane and Potthoff (1996) found that SCUs did not differ from non-SCUs for staff categories trained; staffing patterns across shifts, units, and days of the week; training content; or staff turnover. In short, while experts generally agree on what works, SCUs have yet to implement all of the care dimensions that would in theory result in optimal outcomes for residents with dementia, and non-SCUs appear to do just as well at implementing some but not all dimensions of care.

This is linked directly to the second reason for the lack of empirical evidence linking structure and process variables with outcomes: care planned and delivered may not equate to care received (Williams & Rees, 1997). This underlines the need for more effective research into the links between quality of care and outcomes. That is, professionals (e.g., physicians, RNs) may sincerely believe that the implementation of certain care protocols and staffing levels will result in certain optimal outcomes, but lack the empirical research to support their beliefs. For example, a facility with a professionally

determined “optimal” care aide-to-resident ratio may be able to provide observably appropriate hands-on care, but this may result in an increase in resident physical dependency and consequently a greater risk of depression. With the best of intentions, care planned and delivered could result in adverse outcomes, thus making the selection of outcomes a central issue.

This is in turn linked directly to the third reason, that methodological limitations have prevented the establishment of stronger relationships. Much research in the area has not gone beyond case studies and descriptive reports (e.g., Gutman & Killam, 1989; Lahaie & Theroux, 1991; Office of Technology Assessment, 1987; Ohta & Ohta, 1988;), was not based on outcomes research (e.g., Coulson, 1993; Mace, 1987; Pynoos & Stacey, 1986; Rabins, 1986; Ronch, 1987), did not use longitudinal research designs, lacked essential quality of care variables (e.g., Castle & Fogel, 1998; Porell et al., 1998), or did not measure quality of care effectively (e.g., Aneshensel et al, 2000). The implication for effectiveness research in this area is that a study using a longitudinal research design, with appropriate sample size, in addition to effective selection and measurement of dimensions and outcomes, is necessary for meaningful results.

### **Quality of care and mortality**

The majority of studies examining the effect of quality of care on mortality among long-term care residents have found some evidence that a relationship does exist (e.g., Bliesmer et al., 1998; Porrell et al., 1998; Costen, 1996). The associations found, however, tend to be weak, and consistency of findings between studies is lacking. Despite the

paucity of convincing empirical evidence, most studies acknowledge that a relationship should exist. Even among those that have not found a relationship at the empirical level (Aneshensel et al., 2000; Booth, 1986; Joseph & Boulton, 1998; Porrell & Caro, 1998; Wieland et al., 1986), it is generally speculated that quality of care does influence mortality. The sheer complexity of defining and measuring quality of care (Davis, 1991; Kane & Kane, 1987; Mayeux, 1994; Molsa et al., 1986; Reid & Chappell, 2000; Reisberg et al., 1994; Sainfort et al., 1994, 1995; Teresi, 1994; Teresi et al., 1994), however, renders this an exceedingly difficult association to establish. As discussed earlier, the elusiveness and complexity of the concept have prevented researchers from effectively studying its effect on mortality and other outcomes. As a result, researchers have primarily studied the effects of a limited range of quality indicators.

Very few studies have focused specifically on demented residents. The exceptions are Aneshensel and associates (1993, 1995, 2000), while other studies typically control for a dementia diagnosis in their analyses (e.g., Porrell et al., 1998). Yet other studies focus on mentally ill residents, a designation that includes but is broader than a dementia diagnosis (Castle & Fogel, 1998; Castle & Shea, 1998). Given the increased risk of institutionalization and subsequent death among persons with dementia, and the projected increase in numbers of persons with advanced dementia entering long-term care, a shifting of research priorities to the causes of death rates within this population is warranted. Furthermore, studies tend not to examine survival time of newly admitted residents. Those studies that do examine mortality following admission include death as a dichotomous dependent variable (Bliesmer et al., 1998; Bond et al., 1989; Booth et al., 1983; Braun,

1991; Cohen & Spector, 1996; Linn et al., 1977). This type of approach does not adequately deal with the shape of the survival curve - survival probabilities improve over time, especially for the first 6 months following admission - described in other studies (Aldrich & Mendkoff, 1963; Aneshensel et al., 1993, 1995, 2000; Costello & Tanaka, 1961; Kane et al., 1983; Shah et al., 1969; Shapiro & Tate, 1988; van Dijk et al., 1992). The problems of inadequate definition of quality of care, the difficulty of operationalization, and numerous measurement techniques and decisions, all converge at the empirical level, leading to inconsistent and far from satisfactory research findings.

Part of the problem may also stem from a lack of effective causal modeling of the variables involved. Sainfort and colleagues (1994) argue that most studies of quality of care use the structure-process-outcome model as a taxonomy, rather than as a causal framework. The intention of the designer of the model (Donabedian, 1968, 1982a, 1982b, 1988) was that structure, process and outcome be studied in a single causal model. The majority of studies have evaluated the effects of structural indicators of quality on mortality, without accounting for process variables. The majority of these studies have examined the effect of staffing variables on mortality. For example, Castle and Fogel (1998) studied the effects of profit status, membership in a chain, facility size, proportion of Medicaid recipients, staffing levels, occupancy rates, and facility type (SCU or not) on mortality (died vs survived) and five other outcomes. When controlling for individual factors, they found that for-profit facilities, lower average occupancy and higher Medicaid occupancy were associated with a greater likelihood of death. Lower average occupancy has been linked with a greater probability of death in other studies (Zinn et al., 1993).

Higher registered nurse staffing levels are associated with lower mortality rates (Cohen & Spector, 1996; Linn et al., 1977; Porrell et al., 1998), although Zinn et al (1993) found no relationship between these variables.

The effects of other structural factors on mortality are similarly uncertain. Private ownership has been shown to be unrelated to mortality risk (Cohen & Spector, 1996; Porrell et al., 1998) to be linked to lower death rates (Bliesmer et al., 1998; Spector & Takada, 1991; Zinn et al., 1993), and to be associated with higher death rates (Castle & Fogel). Some evidence indicates that whether or not ownership status has an effect on mortality may depend on a combination of ownership status, certification status (skilled nursing facility or not) and size of facility (number of beds) (Castle & Shea, 1998). Facility size (number of beds) itself is commonly included as a structural determinant or control variable in mortality studies. Braun (1991), in a comprehensive study of the effects of quality of care on mortality, reports that facility size is unrelated to mortality in an all-male sample over a six month period. Castle and Fogel (1998) found facility size to be related to mood, social engagement, and physical dependency, but not to behavioural problems, cognitive performance or mortality over a six month period. Similarly, Porrell and associates (1998) found number of beds to be related to decline in mental status over one year, but not to physical dependency, incontinence or mortality. Linn et al. (1977) found number of beds to be unrelated to any resident outcomes, including death, for a sample of 1,000 within 6 months of admission. Higher occupancy rate has been linked to lower risk of mortality (Castle & Fogel, 1998; Zinn et al., 1993), which may reflect higher consumer demand based on the perception of better quality of care in the “low mortality” facilities

(Zinn et al., 1993). Other structural factors such as chain ownership (Castle & Fogel, 1998), operating costs (Spector & Takada, 1991), and length of ownership by current owners (Porrell et al., 1998) show little or no effect on mortality.

Several studies have incorporated both process and structural variables in their models. Typically studied structural variables are discussed above. Braun (1991) studied the effect of structural and 13 process variables on mortality among 369 male veterans in 11 nursing homes. Examples of process variables given by the author include positioning of resident, catheter drainage and personal hygiene. Mortality was found to be positively affected by one structural factor, increased RN hours, and one environmental variable, a security index (presence of prosthetic aids, orientational aids, and safety features), but by none of the 13 process measures. Spector and Takada (1991) studied the effects of structural and process variables on mortality on 2,500 residents in 80 nursing homes over a six month period. Process variables consisted of the following: percentage of residents with catheters; percentage of residents who received skin care; mean number of activities organized by the facility that residents participate in per month per resident; percentage of residents with more than 7 medications; percentage of residents with more than one psychoactive drug prescription; and percentage of residents receiving skilled care (a classification under Medicaid or Medicare). Of the 7 variables, only participation in organized activities was associated with a lower mortality risk. Residents in moderate-participation facilities were 40% less likely to die, and residents in high-participation facilities were 50% less likely to die. No studies exist that examine the effect of structural and process variables on demented residents' probability of survival from time of

admission.

Several studies have incorporated environmental variables, conceptually separating them from structural variables. Definitions of environment vary widely. Castle and Fogel (1998) defined environment broadly, and included legislative factors, competition factors, munificence factors (e.g., average income in the county and number of elderly in the county) and reimbursement policy factors. None was related to mortality. Employing the Multiphasic Environmental Assessment Protocol (MEAP - Moos & Lemke, 1984), Braun (1991) operationalized the environmental factor with MEAP scales: resident comfort; security; autonomy; staffing level; staffing richness; availability of services; and observer rating (physical attractiveness, environmental diversity, resident functioning, and staff functioning). The term "environment" is used to refer to various influences by researchers, including the larger environment that the facility is situated in (e.g., Castle & Fogel, 1998), the physical environment within and immediately outside the facility (e.g., Hussain & Brown, 1987; Dickinson et al., 1995), the social environment (e.g., Herzberg, 1997), and a combination (e.g., Coulson, 1993; Sloane & Mathew, 1990). For analytic purposes, such distinctions are necessary. In reality, however, these definitions are not mutually exclusive.

Evidence for the existence of a relationship between quality of care and mortality can also be found in several small-scale case studies. In a study of the factors associated with an unusually large cluster of deaths in a single nursing home, Weiler and Cooper (1990) found much evidence to suggest that quality of care was substandard. For example, psychotropic drugs were administered inappropriately, high dosages of medications were observed in many decedents' medical records, and specific physical problems such as

pressure sores and dramatic weight loss were not reported to a physician. Staff turnover was 160% per year, changes in physician coverage were frequent, administrative changes were numerous and the responsible committees did not provide reasons for the excess deaths. Environmentally, the facility was known for being exceptionally cold in winter and “sweltering” in summer. Costen (1996) and Speaks (1996) likewise documented the lack of quality care in a Philadelphia nursing home, and describe the circumstances surrounding the death of two residents as being the direct result of neglect by nursing staff. Speaks (1996) describes his role as an under cover agent, posing as a nurse’s aide. His “inside” observations provided clear evidence of the effects of inadequate care on residents’ health. For example, one resident with decubitus ulcers was virtually ignored and left in isolation by staff even as the ulcers became extremely severe (the ulcers bored holes through which the author could see light). The resident died soon after these observations were made, and Speaks (1996) attributed her death to the lack of care quality provided.

Thus, evidence does exist at all levels that quality of care and risk of mortality are related in the long-term institutionalized population. Empirical results, however, remain ambiguous. This ambiguity appears to be rooted primarily in the difficulty of measuring quality of care. This study seeks to improve upon previous studies by employing measures of care quality that are state-of-the-art, and cover a broad base of what theoretically should “work”. It seeks further to describe the shape of the survival curve during the first 12 months after admission, and then to explain the contribution of care quality to the shape of that curve. The literature suggests three hypotheses.

1. Death rates will be highest during the first six months following admission, and

will stabilize during the final six months.

2. Higher care quality as measured by 6 crucial dimensions of care - flexibility of care, environmental design, admission and pre-admission procedures, non-use of restraints, and staff knowledge and education - will result in an overall lower probability of death (i.e., died or did not die during the 12 months following admission), controlling for resident health and demographic characteristics.
3. Higher care quality as measured by 5 crucial dimensions of care - flexibility of care, environmental design, admission and pre-admission procedures, non-use of restraints, and staff knowledge and education - will result in greater survival probabilities from time of admission, controlling for relevant resident characteristics.

Sociology consists of many sub-specialties such as demography, social psychology, structural functionalism, conflict theory and others. Typically, most sociology today, especially empirical research, does not address questions at the grand theory level but rather focuses on middle range theory (Merton, 1968). This dissertation falls within this tradition, marrying demographic with social psychological approaches in order to examine the joint, social structural and social psychological effects on the mortality of dementia sufferers in long-term care institutions. The middle range theory being tested could be viewed as social selection versus social causation.

## **Chapter 2: Methodology**

### **Introduction**

This study makes use of secondary data from the Intermediate Care Facility (ICF) Project (described below).<sup>4</sup> As noted previously, studies linking care quality and mortality for persons with dementia in long-term care are lacking. The data from the ICF Project provide an opportunity to address the question raised in the present study, not least because that project's main purpose was to assess the link between care quality and outcomes for those persons expected to live for the 12 month study period following admission. That is, it is because the persons that comprised the subjects of the present study were expected to live - and not to die - for the 12 months following admission, that they would have been initially provided with care for continued life - rather than another form of care, such as palliative - and therefore that deaths occurring could be considered to be the outcome of that very care. This is not to state that type of care (very crudely stated: living versus dying care) would not be altered from one to the other type of care as any given resident's health status is recognized as being closer to or further from death. It is to state, however, that if all residents participating in the study were expected to live for a year following admission (this was the expectation: see details below), care plans and routines would be based explicitly on this expectation. When some of those expected to live actually died, a link to initial (as well as ongoing) care becomes a concern. The screening out of those expected to die could actually serve to strengthen any conclusions

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arrived at in the present study, since it is known that initial care planned for participants in the ICF study was for continued living, but that subsequently, a significant number of these individuals died. The findings, of course, are restricted to such individuals (i.e., to those individuals with advanced dementia admitted to ICFs and who were expected to live).

### **Sample**

The sample consists of 405 residents with dementia in long-term care facilities throughout British Columbia (excluding Northern BC). Data collection took place from 1996 to 1998 at baseline and 12 months later. Specially trained research personnel collected data on newly admitted residents from the residents themselves, medical charts, family and staff. The study included 77 intermediate care facilities, with 51 special care units (SCUs) and 101 integrated units (a unit was defined by the presence of a nursing station). One facility declined to participate. Some facilities had both SCUs and integrated units. A unit was defined as an SCU if it served primarily dementia residents, identified itself as a specialized unit that cared for residents with dementia, was separated from the rest of the facility by closed doors, and satisfied at least one of the following criteria: a) the unit had staff trained specifically in dementia care, b) unit activities were designed with the dementia resident in mind, or c) assessment and care planning included an evaluation of potential residents and their "fit" to the programs of the SCU. The mean number of beds in the SCUs was 30 and the mean percentage of residents with dementia was 96%.

The mean number of beds in the integrated units was 53, and the mean percentage

of residents with dementia was 58%. All newly admitted residents to the participating facilities who, according to the contact person at the facility (normally the director of nursing, or DoN), suffered from moderate or severe dementia, were screened for eligibility. A resident was considered a new admission for up to six weeks following actual admission.

To be eligible, residents were required to have a primary or secondary diagnosis of either Alzheimer's disease or vascular dementia, have confirmatory evidence of dementia in their medical charts, be considered unlikely to die or move within 12 months of admission, have the ability to communicate in English, and be at least 65 years of age. Because SCUs tend to have residents with higher levels of dementia, and to allow comparison across facility types, only residents identified by DoNs as having at least moderate dementia (N=1181) were screened further.<sup>5</sup> Fifty-four percent (N=638) of all newly admitted residents with moderate or severe dementia were eligible.<sup>6</sup> The most common reason for non-eligibility was a lack of specific diagnosis of dementia in the medical chart. Signed consent was obtained for 88% of those in the eligible sample (N=510).

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DoN assessments of levels of dementia will not be used in the analysis in this dissertation. Their assessments were used solely to provide a pool of participants with probable moderate or severe dementia. Scientifically valid levels of dementia were subsequently obtained with the Multi-focus Assessment Scale (MAS-R, described below; see Reid & Chappell, 2000, for an analysis of the relationship between staff assessments and MAS-R).

6

Nurses tended to under-estimate dementia severity when compared to MAS-R ratings. See Reid & Chappell (2000).

Prior to collection of outcome data, all long-term care facilities in the province that cared for persons with dementia completed a comprehensive survey. In addition to data on facility characteristics such as number of beds and number and severity of dementia of residents, information on the five dimensions of care identified in this proposal was gathered from DoNs. For the outcomes phase, a representative sample stratified by unit (SCUs and non-SCUs) was obtained on the two dimensions that the expert steering committee judged to be the most important of the five dimensions (staff education and flexible care), excluding far north facilities due to cost (5 facilities). A post facto analysis revealed no significant differences between units included in the study and those excluded (including those in the far north) on staff education, flexible care, use of restraints, or assessment. Because of the inadequacy of the information on the environment in the initial mail-out survey, the Therapeutic Environment Screening Scale 2+ Instrument C (TESS; see Measures section below) was used in the outcomes phase. Comparable data, therefore, do not exist for this dimension for the purpose of comparing those included in and those excluded from the study.

The ICF Project data set itself consists of five quality of care dimension measurements (multiple measures for all), resident and facility characteristics, and resident outcome variables. These are described in more detail below.

Death data were provided by the BC Vital Statistics Agency. All residents enrolled in the ICF Project were tracked by Vital Statistics, and death by month/year, and cause(s) of death were provided. Permission to collect these data was obtained from relatives of the ICF Project resident participants.

## Measures

### **Dependent variables**

Two dependent variables were recorded. In order to test hypothesis 1, it was necessary to determine whether or not, and when, any given individual in the sample died during the course of the study. Research assistants monitored each resident in the study regularly over the 12 month observation period. Those who dropped out of the study prior to the end date were noted as such by the research assistants. While mortality accounted for the largest portion of the attrition, transfers to special care units, other facilities, extended care facilities and home care were also recorded. Seventy nine residents (15.5%) of the original 510 fall into these latter 4 categories, while 101 residents (19.8%) died. Two facilities and their participating residents were dropped from the study due to fundamental changes in care quality during the course of the study in those facilities.<sup>7</sup> These account for 26 residents being removed from the sample. The final sample, then, consisted of 405 residents ( $510 - 79 - 26 = 405$ ).

Circumstances surrounding the measurement of mortality rendered it a somewhat challenging measurement proposition. Some residents died only after being sent to hospital or elsewhere. The problem is exacerbated by the lack of specificity of the vital statistics mortality data. Death data included month and year, but not day. Thus, while date of dropout has been reliably recorded, the exact lapse of time between leaving the facility and a declaration of death cannot be reliably calculated due to the crude month/year

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7

In both cases, residents were moved from the facility while renovations were undertaken.

information provided by vital statistics.

For example, an individual may leave the facility (drop out of the study) and go to hospital with an acute condition on May 1, 1997. If they were to succumb to that acute condition on the same date, in hospital, it can only be known with certainty that the person died sometime in May, since vital statistics records only month and year. This, of course, brings up the possibility that the individual's date of passing was influenced to a greater or lesser degree by the time spent in the hospital, thereby potentially confounding any observed relationship between long-term care facility quality of care and the occurrence of death. In essence, the quality of care provided by the hospital, to the transferred resident, may have an independent effect on the survival probability of that person. Presumably the effect, whichever direction, would increase in strength as length of stay in hospital increases relative to the effect exerted by the long-term care facility from which the resident transferred. Within the limitations of these data, this will be dealt with in the following manner.

Of the 405 persons included in the present study, 93 (23%) died within 12 months of admission. Of the ninety-three persons who died during the course of the study, most did so during the same month that the research assistants recorded them as having dropped out of the study.<sup>8</sup> That is, agreement between facility dropout month and month of death recorded on the death certificate was reached for a majority of decedents. Eighty six

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8

In a minority of cases (23/405 or 5.7%), the research assistants recorded both the dropout date and the date of death (provided to them by their facility contacts). Most of these deaths were shown to take place very shortly after these residents left the long-term care facility.

(92.5%) of the 93 deceased residents fall into this category. Three of the remaining 7 deceased residents (all 7 of whom were admitted to hospital and were recorded as having died the month following discharge from the long-term care facility) were included in the study based on the following rationale. Those who were discharged from the long-term care facility and who entered hospital at some point after the 15<sup>th</sup> of one month, and who were recorded as dying in the month following, were included in the present study. Those who entered the hospital on or before the 15<sup>th</sup> of one month, and who died in hospital the next, were excluded from the study. In the absence of actual date of death, the strategy amounts to a compromise between risk of including persons who died more than two weeks following discharge from the LTC facility (and were therefore subject to unacceptable levels of influence from non-LTC facility care), and risk of excluding persons who were discharged in one month who died shortly following admission to hospital (but who were actually influenced to a greater degree by LTC care rather than prolonged hospital care).

The rationale for this approach is based on the expectation that a very frail older individual with dementia who requires hospitalization is at a fairly high risk of death (see discussion in literature review about determinants of death in this population). The expectation is that they will likely die sooner rather than later, or be transferred back to the long-term care facility if they improve. While this is an empirical question which cannot be addressed adequately in this study, some method of dividing these few equivocal cases is required given the imprecision of the vital statistics data. The selection of the 15<sup>th</sup> as a cut point is intended to allow for a period of time following dropout from the facility that

approximates one month (as is technically allowed for the 86 who died either in or within a month of leaving the facility). The alternative, throwing out these three cases from the analysis, could provide error in the opposite direction. That is, those who may have died due to the quality of care provided by the long-term care facility would be incorrectly left out. The compromise solution suggested above is probably optimal given the data limitations.

The dependent variable for hypothesis 2 is composed of a simple determination of whether a resident died or did not during the 12 months following admission, subject to the decisions just discussed. The dependent variable for hypothesis 3 is necessarily composed of two variables: one indicating whether the resident died or did not (the same variable used to test hypothesis 1, and described above), and one indicating length of survival from month of admission in months. Date of death would have facilitated a more precise length of survival variable but was, as mentioned above, not available. Therefore, length of survival was calculated as month of death minus month of admission. This allows for some potential error, since an individual admitted on March 4, 1996 but who dies on March 12, 1997 should technically be censored. In other words, this hypothetical person would be considered to have died within the 12 month observation period but actually died outside of that period. Practically, however, the potential for error of this type is small since only 4 persons were recorded as having died in the 12<sup>th</sup> month of their residency.

### **Independent variables (covariates)**

Multiple indicators of each of the six dimensions of care were collected. The six dimensions include: pre-admission and admission procedures; physical environment; flexibility of care; physical restraints; pharmacological restraints; and staff training and education. Pre-admission procedures are intended to place residents in facilities best suited to their care needs and preferences. Optimal admission procedures should ease relocation into the facility, and over the initial period of residence. The two procedures were combined into a single dimension, since pre-admission logically flows into admission procedures. Standardized forms based on existing, written criteria are considered hallmarks of best practices in this area. The pre-admission and admission dimension is measured using three questions centering on the use of standardized versus unstandardized forms, and whether or not admission criteria are in written form. These items are combined into one measure, with range 0-3. For example, a facility that uses standardized forms during both pre-admission and admission, and also admits residents according to written admission criteria scores "3". Higher scores are considered better in terms of care delivered.

Staff training and education is measured with a series of questions on the provision or non-provision of types of training and not length of training time or quality of instruction and training materials. DoNs were asked whether care aides, licensed practical nurses (LPNs), registered nurses (RNs) and support staff, *as a group*, received each of the following types of training or education (i.e., yes or no): general care for residents with dementia, management of inappropriate behaviours, role of the family, stress reduction

techniques for staff, safety issues and off-site dementia training.<sup>9</sup> Since only 40% of facilities have LPNs, it is necessary to standardize for number of staff types employed. For each type of education, a proportion is calculated using the number of staff types receiving each type of education as the numerator, and total staff types employed by the facility as the denominator. (For example, the denominator for any given type of education is three for a facility that does not employ LPNs but does employ RNs, care aides and support staff). These are multiplied by 100 to produce a percentage score and the six variables are summed to create an education dimension. Scale range is 0-600 (alpha = .80).<sup>10</sup>

Non-use of physical restraints is measured by asking whether the facility used any of 11 specified physical restraints (ankle cuff, bed rails, Dutch doors, geri-chair, isolation, lap belt, posey vest, seclusion, sheet restraint, wrist restraint, and wheelchair tray) during the previous year *for the purpose of behavioural management*. Non-use of pharmacological restraints is measured identically, with questions concerning the use of 17 commonly used psychotropic drugs in three categories (antidepressants: Aventyl, Desyrel, Elavil, Luvox, Paxil, Prozac and Sinequan; anxiolytics: Ativan, Restoril, Rivotril, Serax and Xanax; neuroleptics: Haldol, Loxapac, Mellaril, Orap and Risperdal) during the

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9

Off-site training was included rather than on-site training since it was assumed that the other types of training were typically provided on-site and that the provision of off-site training might reflect an enhanced willingness by facility and staff to provide and obtain such training, respectively. However, it is likely that some facilities provide off-site training because they are unable to provide it on-site. In such cases, the assumption outlined above would not hold.

<sup>10</sup> All variable means, standard deviations, and coding are presented in Table 2.1.

previous year *specifically for the management of behavioural difficulties*. The purpose here is not to distinguish which drugs are good or bad (i.e., medically necessary or not), but to determine how many of these drugs are used as chemical restraints in any given facility.

A factor analysis of all chemical and physical restraints produced two main factors: chemical and physical restraint use. The largest factor (eigenvalue 5.75) included the antidepressants *luvox* and *paxil*, the anxiolytics *ativan*, *restoril*, *rivotril* and *xanax*, and the neuroleptics *haldol*, *loxapac* and *risperdal*. Facilities reported using a mean of 5.99 (s.d.=2.87) of these drugs for behavioural management purposes, with a range of 0-9. Cronbach's alpha is .82. The second factor (eigenvalue 2.55) included bedrails, geri-chairs and isolation. A reliability analysis showed that isolation was responsible for reducing the Cronbach's alpha to .31 from a potential .66 if removed from the scale. The scale consists of only bedrails and geri-chairs. The mean number of these restraints used is 1.02 (s.d.=.86) and ranged from 0-2. Cronbach's alpha=.66. This is in agreement with Sloane et al (1997), who argue that chemical and physical restraints are separate dimensions. Unlike the other four dimensions, a higher score indicates poorer quality of delivery.

Flexible care routines and resident relevant activities are treated as one dimension due to considerable conceptual overlap. Two questions measure this dimension: whether or not facilities integrate activities in day to day care and whether or not support staff receive instruction in activation techniques. Less meaningful data were elicited than had been expected, thus limiting the development of extensive categories for this dimension. Possible scores range from 0 (the facility does neither of these) to 2 (the facility does

both). (Several other questions were dropped because they were not scalable and did not relate singly or summed to any of the outcome measures). This dimension is referred to as flexible care hereafter.

To measure the environmental dimension, research assistants complete a modified version of the Therapeutic Environment Screening Scale 2+ - Instrument C (TESS) in each of the participating facilities. The TESS is designed to “evaluate the appropriateness of a nursing home unit for residents with dementing disorders” (Sloane & Mathew, 1990). Instrument C was the most current version of the TESS available at the time of study commencement. The instrument consists of scales designed to assess general design, maintenance, lighting, noise, residents’ rooms, and programming orientation. Scales are summed in order to calculate a total environmental score for each facility. Scales do not have equal values. For example, maintenance is scored on a 28 point scale, general design on a 16 point scale and resident rooms on a 25 point scale. Instructions for the original TESS described in Sloane and Mathew (1990) specify simple summing of scales. Possible total scores range from 1 to 154 ( $\alpha = .82$ ).

Since the six dimensions address issues more or less objectively, an additional measure of quality of care captures the subjective, intangible factors that may influence outcomes. Experts working in the area of dementia and long-term care, but not employed directly by facilities involved in dementia care, were consulted. They were asked to provide a list of 'gold standard' facilities. That is, they were asked where they themselves would choose to go or where they would place a loved one, should the need arise. Five such panels were convened, each representing a contiguous set of health units, and

together covering all facilities throughout the province. They were able to select gold standard facilities without difficulty. Sixty-two of the 152 units included in the study were considered 'gold' by the panel.

Resident characteristics, behaviours and states at admission will be used as controls. These have been chosen from the literature (Kane, 1997; Warshaw, 1997). The Cohen Mansfield Agitation Inventory (CMAI - short form - Cohen-Mansfield & Marx, 1989) is a 14 item questionnaire that measures the occurrence of three types of agitation during the previous two weeks including, a) aggressive behaviours (hitting, kicking, pushing, scratching, tearing things, cursing or verbal aggression, grabbing); b) physically nonaggressive behaviours (pacing, inappropriate robing or disrobing, repetitious sentences or questions, trying to get to a different place, handling things inappropriately, general restlessness and repetitious mannerisms); and c) verbally agitated behaviours (complaining, constant requests for attention, negativism, repetitious sentences or questions and screaming). Using a 5-point scale (1 = never, 5 = a few times a day or continuous for half an hour or more), nursing staff were asked to indicate the number of occurrences of each specified behaviour during the preceding two weeks. Scales are summed to create a total agitation score with range 14-70 ( $\alpha = .82$ )

A measure of activities of daily living (ADL) was obtained using the Minimum Data Set (MDS), Item E. Item E monitors the level of independence of a resident on a 5-point scale (0 = independent, 4 = total dependence) for each of nine ADLs. These include bed mobility, transfer between surfaces, movement between locations, dressing, eating,

toilet use, personal hygiene, walking, and bathing. Summed scale values can range from 0 (independent) to 36 (completely dependent) ( $\alpha = .86$ ).

Mood is measured using the affect scale of the Feeling Tone Questionnaire (FTQ). The FTQ measures mood in persons with communication difficulties. In this research, 16 mood-life satisfaction questions were asked (e.g., Do you have any pain? Do you sleep well?), and the affect expressed by the respondent was rated by the interviewer. The interviewer rated each response on a 5-point affect score (1=very positive and 5=very negative). The scores were added and scale totals range from 16 to 80, with 80 representing the most extremely negative affect possible ( $\alpha = .89$ ).

The Multi-focus Assessment Scale - Revised (MAS-R) (Crockett, Coval, Tuokko, Buree, & Koch, 1991) was administered by trained research assistants to assess cognitive (discussed below) and behavioural functioning. The MAS-R is a revision of the original MAS (Tuokko, Crockett, Holliday, & Coval, 1987) and consists of seven scales (early memory and present orientation - cognitive function, social behaviour skills, auditory capability, visual comprehension, expressive language skills and accessibility). Social behaviour skills (0-11 point scale) and expressive language skills (i.e., ability to effectively communicate based on speech, language production and comprehension assessment; 3-15 point scale) are considered to be necessary controls among the seven scales (plus cognitive function - see below). Alpha for social behaviour skills is .79 and for expressive language skills, .83. For all MAS-R scales, a higher score means higher competence, except for the expressive language skills, where a higher score means poorer language skills. Crockett et al (1991) report interrater reliability to be high (.96 or greater for all scales).

Cognitive function is measured by the MAS-R using two scales. The first of these measures early memory and the second measures present orientation. Each consists of 11 items. Early memory refers to memories acquired at a relatively young age (e.g., When was WWII? How many years of schooling did you have?). Present orientation measures the ability to acquire and retain current information (e.g., Who is the Prime Minister of Canada? How many people share your room?). (Alpha = .87). Age and gender are the final resident specific controls.

Four facility level variables, including ownership status (public or private), number of beds, percent of residents diagnosed with dementia, and facility type (SCU or not) are also included as controls. The direction of influence of ownership status is uncertain given the research in the area, particularly in the United States. Coburn and associates (1996) argue that despite extensive research into the effect of ownership status - the expectation being that for-profit facilities are likely to try to cut costs and therefore deliver poorer quality of care than not-for-profit facilities - little or no relationship between type of ownership and care quality has been found. Castle et al (1997), on the other hand, found for-profit facilities to be more likely to apply physical restraints, a commonly accepted indicator of poorer quality of care. Number of beds is an indicator of facility size, and has also been viewed by researchers as potentially affecting quality of care, but direction of influence is uncertain (Davis, 1991). Larger facilities may have access to more resources such as additional types of staff, and may, for example, have greater flexibility when the need arises to substitute staff and other resources in any given unit. On the other hand, smaller facilities might be more able to create the homelike environment thought to be

crucial to resident quality of life. Percent with dementia and SCU status may indicate the degree to which a facility is equipped and maintained to deal effectively with residents with dementia to optimize their quality of life.

### **Statistical Analyses**

Although the main purpose of this study is to determine if and to what extent quality of care affects mortality, a number of resident characteristics have been shown in previous research to be important. Prior to calculating and presenting bivariate correlations between the variables in this study, death rates per 1,000 by key resident characteristics are presented. Following that, death rates per 1,000 by each of the six dimensions of care are shown. These detailed tables may provide clues as to how and why any given dimension or combination of dimensions of care are related to death, should the multivariate analyses reveal such relationships. Bivariate correlations are reported for each of these tables to indicate the existence, strength and direction of relationships between variables. Specifically, proportions dying (expressed in rates per 1,000) by age, gender, cognitive function, and physical dependency, as well as the six dimensions of care, are calculated and presented. To get a sense of the combined effects of age and gender, proportions dying by age group and gender also are calculated. Such analyses could be done for all independent variables in this study, but are limited to those variables identified either as the most prominent, or those of most interest in the present study (i.e., the dimensions of care).

Hypothesis 1 is tested by plotting a cumulative survival curve. Proportion surviving is calculated by dividing number of decedents by the total sample size (405). For example, if the number dying in the first month is 10, the proportion surviving is  $1 - 10/405 = .9753$ . If 10 more individuals die in the second month, the proportion is  $1 - 20/405 = .956$ , and so on for each of the 12 months.

To test hypothesis 2, an analysis of the effect of quality of care on the occurrence of mortality using logistic regression will be conducted. This will determine which, if any, dimensions of care have an effect on the occurrence or non-occurrence of death, controlling for the variables outlined above. Logistic regression is often used when the dependent variable is dichotomous (Kerlinger & Lee, 2000). It can be used to predict whether something will or will not happen, and can effectively make use of either continuous or categorical independent variables. Essentially, logistic regression transforms the data by taking the natural logarithms of each variable and estimates using maximum likelihood estimation the logistic curve that best approximates the data. This can be contrasted to ordinary least squares regression, which estimates the straight line that best estimates the data. A further difference is that logistic regression coefficients can be transformed into odds ratios. The odds ratio provides an intuitive method of interpreting the regression coefficients. If an odds ratio of 1.23 is statistically significant ( $p < .05$ ), a one unit increase in the independent variable increases the probability of the occurrence of the event of interest by 23%, controlling for all other independent variables in the model. If the odds ratio is less than 1, the relationship is negative and a 1 unit increase in the independent variable decreases the probability of the event in question. For example, if the

effect of gender (females = 0; males = 1) on probability of death produces an odds ratio of .43, the probability that males would die would be less than half that for females during the course of the study (see Kerlinger & Lee, 2000: 247).

To compare effects, the variables will be entered in blocks for both logistic and Cox regression (see below for discussion). The first block will consist of the six dimensions of care and the expert panel assessment, that is, the quality of care variables. The second block will include all resident characteristic and behavioural state variables. These are essentially the social selection variables, and the previous block the social causation variables. The third block will consist of facility characteristics: ownership and percent with dementia. These variables are conceptually distinct from the previous two blocks but are included in the final model as controls.

Finally, interaction effects will be assessed. In order to test for interaction effects, each of the 6 dimensions of care was multiplied by each of the others to produce 15 cross product terms. These interaction terms will be correlated with death status, controlling for the constituent components of each respective interaction term, to determine whether an interaction effect is present. If a statistically significant relationship ( $p < .05$ ) is detected between any of the interaction terms and death in the partial correlation analyses, further correlations will be calculated. Bivariate correlations will be calculated for one of the constituent components of the interaction term and death for each of the categories of the other constituent category of the interaction term. For example, suppose that a partial correlation between the cross product term "assessment X chemical restraints" and "death" is .43 ( $p < .01$ ). The next step would be to calculate bivariate correlations between

“chemical restraints” and “death” for each of the four categories of “assessment”.

Alternatively, the bivariate correlations between “assessment” and “death” could be calculated for each of the categories of “chemical restraints”. In either case, the purpose is to identify patterns of correlations across categories of the variable in question, in the interest of understanding how risk of death differs depending on which category of the independent variable is being examined.

Hypothesis 3 will be tested by estimating a proportional hazard model using Cox regression. The model is semi-parametric: parametric to the extent that the regression model specified has a specific functional form; nonparametric to the extent that it does not specify the exact form of the distribution of events (Allison, 1984). In the present study, the distribution of time events refers to the occurrence and month of death of each resident. The set of residents who are at risk of death during each month are referred to as the “risk set”. Thus, during the first month 405 residents comprise the risk set, since they are all at risk of dying. During the second month, the risk set would comprise 405 minus those who died during the previous month, and so on. The hazard referred to above is based on the hazard rate, which in the present study is the probability that a particular resident will die in a given month, given that they had survived until that month. This is the dependent variable in this model.

To estimate the model, SPSS requires that data for the dependent variable be entered as two variables. One is a dummy variable, indicating whether or not the event has occurred (0 = did not die; 1 = died), and the other is a variable indicating month of death, or censoring. Censored cases are those that did not experience the event of interest, death,

during the course of the observation period. This type of censoring is referred to as fixed censoring, or Type I censoring because all cases are censored at the same point in time (i.e., at 12 months following admission). Fixed censoring, as opposed to random censoring, requires no further assumptions (Allison, 1984). The critical assumption of the model is that for any two residents during any given month, the ratios of their hazard of death must be proportional. Thus, for example, males and females must have proportionally similar hazards of dying during each month, and likewise, older and younger residents must have proportionally similar hazard rates.

There are several methods for determining whether the assumption has been violated. Many sources, including Norusis (1993), suggest looking initially at cumulative survival functions as well as log-minus-log plots of hazard functions for each covariate in the model. For example, both of these plots can be examined for the covariate gender to determine whether a) the cumulative survival functions or the log-minus-log plot of the hazard functions for males crosses that for females, and/or b) that they do not appear to remain more or less parallel. In either instance, if the curves cross or if they do not remain at a fairly constant distance apart, it is possible that the proportional hazards assumption has been violated. When assessing continuous variables, it is necessary to reduce the categories to a manageable number. Where it appears that the assumption has been violated in this manner, a formal test is called for.

Upon recognition that the proportional hazards assumption may not hold, Norusis (1993:289) recommends a formal test that involves time dependent covariates. Essentially, an interaction term must be created using the suspect variable identified in the steps just

discussed above and a time variable available in SPSS. In the case of gender, time to death in months is multiplied by gender and entered into an equation with gender as the second covariate. Unlike the fixed covariate model, this model does not force the ratio of the hazard rates to be constant over time for the two groups. The ratio can in fact vary over time (Norusis, 1993:291). If the indicator variable (in this case, gender) is shown to have a statistically significant effect on survival in this equation, the effect of gender is not constant over time. In other words, if the null hypothesis that the effect of gender on survival is 0 can be rejected, the hazards are not proportional. These tests have been performed for those variables that appear to violate the proportional hazards assumption and the results are presented in Chapter 3.

It should be noted that although the data are clearly hierarchical (e.g., residents live within facilities), the statistical procedures used in this study do not account for this fact. Hierarchical data imply group or contextual effects that should be accounted for when possible. In the present study, contextual effects might exist since residents within a facility may be more similar on some measures than they would be between facilities. The danger in grouping residents from all facilities is that intra-facility similarities among residents and inter-facility differences may not be accounted for. In the present study, however, these differences cannot be accounted for, although it is important to recognize their potential importance. The distribution of residents among facilities in this study make it impossible to account for the hierarchical nature of the data since many facilities participating in the study contributed fewer than 5 residents to the study. Thus, the study was not designed to account for considerations arising from the hierarchical nature of the

data. It is not statistically viable to try to account for differences among residents within or between facilities when many of the facilities have too few participants to render the results meaningful.

Table 2.1 shows variable means, standard deviations and coding for all variables.

**Table 2.1: Variable descriptions**

<b>Variable name</b>	<b>Mean/%</b>	<b>S.d.</b>	<b>Coding</b>
<b>DV* Survival status (died)</b>	22.0%	-	0=survived 12 months; 1=died
<b>DV Length of survival</b>	10.5	3.3	Months (0-12)
<b>Chemical restraint use</b>	6.0	2.9	Number of the following drugs used in previous year by facility for behavioural management: luvox, paxil, ativan, restoril, rivotril, xanax, haldol, loxapac and risperdal (0-9)
<b>Physical restraint use</b>	1.1	0.8	Number of the following physical restraints used in previous year by facility for behavioural management: bedrails and geri-chairs (0-2)
<b>Flexible care</b>	0.6	0.6	Does the facility integrate activities in day to day care?; Do support staff receive instruction in activation techniques? (0-2)
<b>Specialized environment</b>	103.0	13.7	Extent to which general design, maintenance, lighting, noise, residents' rooms and programming orientation are up to standard (1-154)
<b>Staff training and education</b>	321.2	166.3	Do registered nurses, LPNs, care aides and support staff receive training or education in: general care for residents with dementia; management of inappropriate behaviours; role of the family; stress reduction techniques; safety issues; and off-site training (0-600)
<b>Assessment</b>	2.0	0.9	Does facility use standardized pre-admission and admission forms, and are admission criteria in written form? (0-3)
<b>Medical conditions (cancer and/or heart disease)</b>	41%	-	Does resident have a diagnosis of any form of cancer or any form of heart disease? yes=0; no=1
<b>Expressive language skills (logged)</b>	0.67	0.2	Extent to which resident is able to express their needs in order to receive the care they require (.48-1.18)

<b>Number of beds in facility (logged)</b>	1.7	0.3	Number of beds in facility (1-2.38)
<b>Ownership (private)</b>	49%	-	private ownership=0; public=1
<b>Is unit a special care unit (yes)</b>	51%	-	integrated unit=0; special care unit=1
<b>Resident physical dependency</b>	11.4	7.5	Minimum Data Set Item E: bed mobility; transfer between surfaces; movement between locations; dressing; eating; toilet use; personal hygiene; walking; and bathing (0-36); higher score means higher level of dependency
<b>Resident agitated behaviours</b>	24.3	8.5	Frequency of display of any of 14 types of agitated behaviours in the previous week (14-70); higher is more agitated
<b>Resident affect (mood)</b>	41.0	7.1	Feeling Tone Questionnaire affect scale (16-80); higher score means more negative affect
<b>Resident social skills</b>	10.0	1.9	MAS-R scale score for social skills (0-11); higher means better skills
<b>Resident cognitive function score</b>	6.8	5.0	MAS-R combined score of early memory and present orientation scores (0-22); higher means better cognitive function
<b>Resident age</b>	82.1	6.7	Age in years (65-97)
<b>Resident gender (female)</b>	62.0%	-	males=1; females=2
<b>Percent with dementia</b>	78.8	24.3	Percent of residents with dementia in each facility (19-100)
<b>Panel group selection (gold)</b>	51.6%	-	Not gold=0; gold=1

DV=dependent variable

## **Chapter 3: Results**

### **Introduction**

The present chapter consists of a presentation of findings and does not attempt interpretation of the findings. Interpretation and discussion are presented in Chapters 4 and 5.

### **Sample description**

The sample consists of 405 cognitively impaired residents of intermediate care facilities throughout British Columbia. The mean age at admission was 82.1 years, and 62% were female. One fifth (20.5%) were born in British Columbia, almost half (48.1%) were born elsewhere in Canada, 17% were born in the British Isles, and 14.3% were born elsewhere in the world. Most residents were affiliated with a religion, with 61.3% being Protestant, 13.8% Catholic, 19.8% another religion, and 4.4% identified as having no religion. Forty percent were married, 48% were widowed, with the remainder being never married, separated or living with someone. The median income range was \$10,000 - 14,999, with a range between \$5,000 and 75,000+. Prior to admission to the facility, half (50.6%) came from their own homes and 26.9% came from another facility. About 10% had previously been living in someone else's home or supportive/congregate housing, 8.9% had come from hospital, and 4% were transfers from a different unit in the same facility.

**Deaths Among Residents During the 12 Months Following Admission: A preliminary analysis**

Of the 405 participants at time 1, 89 died prior to the end of the 12 month observation period. This represents a crude mortality rate of 220 per 1,000 per year. This is an extraordinarily high mortality rate when compared to that of the general Canadian population (7 per 1,000 per year). It is also high when compared to the crude death rates of 43 per 1,000 per year for persons aged 65 years and over, and 145 per 1,000 per year for those aged 85 years and over in British Columbia (averaged for the period 1995-1999 - calculated from data provided by the British Columbia Vital Statistics Agency, 2001).

To describe deaths by month following admission, Table 3.1 shows numbers and death rates per 1,000 per year post-admission by month. A distinct pattern is not apparent, with deaths per 1,000 ranging from a low of 144 during the 10<sup>th</sup> month following admission, and a high of 372 during the 3<sup>rd</sup> month. The crude death rate (deaths per 1,000 per year) for the entire sample is 220. There does not appear to be a new admission effect, as reported by Aneshensel et al. (1993; 1995; 2000). Reasons for the apparent lack of such an effect are discussed later.

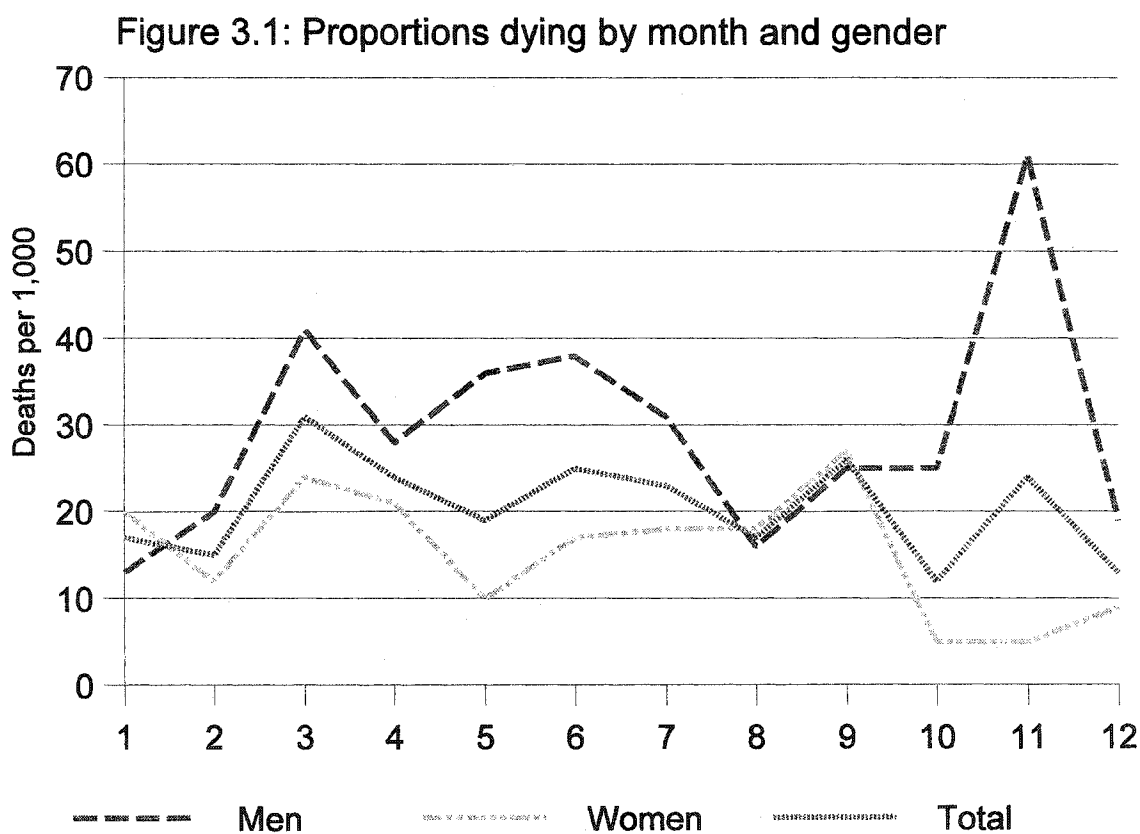
**Table 3.1: Deaths per 1,000 per year**

<b>Month</b>	<b>Number of deaths</b>	<b>Number alive at beginning of month</b>	<b>Deaths per 1,000 per year</b>
1	7	405	204
2	6	398	180
3	12	392	372
4	9	380	288
5	7	371	228
6	9	364	300
7	8	355	276
8	6	347	204
9	9	341	312
10	4	332	144
11	8	328	288
12	4	320	156
<b>Total</b>	<b>89</b>	<b>316</b>	<b>220</b>

Gender and age are known as powerful determinants of mortality risk. To state the obvious, men constitute the weaker sex when it comes to mortality at all ages and older people are in general at higher risk of death than are younger people. In Figure 2.1 below, death rates per 1,000 as shown in Table 3.1 are plotted alongside death rates by gender for each month. Such a strategy risks creating cells that have too few cases to be meaningful. On the other hand, the effects of age and gender are powerful and should reproduce themselves, if they exist, even among relatively small numbers. Rates based on small cell numbers, however, should always be interpreted with caution.

Of the 152 men in the study, 46 (303 per 1,000) had died within 12 months. Of the 253 women, 43 (205 per 1,000) had died within 12 months. For most of the monthly observations following admission, greater death rates existed among men. The exceptions are the first, 8<sup>th</sup> and 9<sup>th</sup> months when the death rates for women were slightly greater than those for males. Crude death rates per thousand men were at least 20 per 1,000 higher than those for women in the 5<sup>th</sup>, 6<sup>th</sup>, 10<sup>th</sup> and 11<sup>th</sup> months, with the 11<sup>th</sup> month being 56 per 1,000 higher.

It should be noted that the relatively high figure for the 11<sup>th</sup> month is unusual. The generally higher proportions dying among men, however, probably does indicate that



gender has an effect, since this is based on a fairly large sample of 405 residents. A Pearson's correlation of  $-0.155$  ( $p < .01$ ) provides further evidence of a relationship at the bivariate level between gender and death.

Turning to the effect of age, proportions dying by age group are reported in Table 3.2. It is not possible to calculate meaningful statistics by age group *and* month of death, since cell sizes would be extremely small or zero in many instances.

**Table 3.2: Deaths per 1,000 per year by age group**

Age group	Number of deaths	Number of residents alive at admission	Deaths per 1,000
65-69	0	11	0
70-74	7	40	175
75-79	10	88	114
80-84	29	119	244
85-89	24	90	267
90-94	13	44	295
95+	6	13	462
<b>Total</b>	89	405	220

A Pearson's correlation coefficient of .186 ( $p < .001$ ) between the continuous variable age, and death indicates a statistically significant bivariate relationship. It is noteworthy that there are few persons in the younger and older age groups, and that most persons are between 75 and 89 years of age. Because most residents are in this age range, most deaths also occur among them. The proportions dying tell another story. With the exception of the higher proportions dying between ages 70 and 74 than among either of the adjacent age groups (65-69 and 75-79), the increase in proportions dying from young

to old age groups is monotonic, with none of the 65-69 year olds dying and almost half (6 of 13) of those aged 95 and over dying within 12 months of entering a facility. It follows that the combination of age and gender would exert an influence on the risk of dying. To explore this possibility, Table 3.3 presents deaths per 1,000 by age and gender.

**Table 3.3: Deaths per 1,000 per year by age group and sex**

Age group	Number dying - Male	Number dying - Female	Number of males at admission	Number of females at admission	Male deaths per 1,000	Female deaths per 1,000
65-69	0	0	5	6	0	0
70-74	3	4	17	23	176	174
75-79	6	4	29	59	207	68
80-84	16	13	50	69	320	188
85-89	13	11	28	62	464	177
90-94	7	6	19	25	368	240
95+	1	5	4	9	250	444
<b>Total</b>	46	43	152	253	303	170

Older men are clearly at much greater risk of death than are older women. Death rates are similar for the youngest age groups, with none dying in the age group 65-69 and 174 per 1,000 of each gender dying in the next oldest age group, 70-74. The number of females dying per 1,000 in the 75-79 year age group is conspicuously low (68), while the male death rate continues its upward trend (207). It is among the next oldest age groups that the male death rates show dramatic increases, while female death rates remain

relatively stable, rising from 188 and 240 per thousand between the age groups 80-84 and 90-94. Male rates of death climb from 320 in the 80-84 age group to 464 in the next oldest age group, and decline somewhat to 368 for the 90-94 year age group. Although males do tend to be at greater risk of death than females throughout most of the first 12 months in a long-term care facility, it is the relatively older males that are at greatest risk. The death rate among women aged 95 and older is high at 444 per 1,000 compared to the male death rate of 250 per 1,000. Likewise, the female death rate for those 95 and older is very high compared to female death rates for all other age groups. However, the denominators for these rates are extremely small: 9 for females and 5 for males. It is certainly not unexpected that gender plays a role in the mortality experience of any given human population. A caution, however, is necessary. The high death rate for women in the 95 + age group may be a chance fluctuation that would not likely be seen if the denominator were, say, 1,000 women with a similar profile living in a long-term care institution.

Turning to cognitive function<sup>11</sup>, Table 3.4 below presents death rates by each of three levels of cognitive function.<sup>12</sup> Due to the fact that they refer to relative levels of cognitive function among a population that has in most cases moderate to severe dementia, the labels “low”, “moderate” and “high” cognitive function are applied for

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<sup>11</sup>

The term “cognitive function” will be used throughout this paper to reflect scoring of this variable: a higher score indicates better cognitive function.

<sup>12</sup>

It was arbitrarily decided to partition dimension of care variables in this section into approximately thirds, since there were no natural break points.

comparative purposes. Those scoring between 0 and 3 are considered to exhibit low levels of cognitive function, those scoring between 4 and 8 moderate, and those scoring between 9 and 22 high. Approximately one third of the sample falls into each of these categories.

**Table 3.4: Deaths per 1,000 per year by cognitive function score**

Level of cognitive function	Number of deaths	Number of residents	Deaths per 1,000
Low	30	122	246
Moderate	31	142	218
High	28	141	199

Death rates per 1,000 are higher for those exhibiting “low” cognitive function (246 per 1,000) compared to those with moderate cognitive function (218 per 1,000). Those with high cognitive function, in turn, are less likely to die than those with either low or moderate cognitive function (199 per 1,000). These rates point to the possibility of a statistically significant relationship between cognitive function and death, which would be consistent with much previous research in the area (e.g., Vitaliano et al, 1981). A Pearson’s correlation coefficient of  $-.02$ , however, is not statistically significant (see Tables 3.13 and 3.14 for summaries of bivariate correlations between independent, control and dependent variables).

Physical dependency is also expected to have an influence on risk of death for this population. Table 3.5 shows death rates per 1,000 for three levels of physical dependency

based on each individual's ability to independently perform the basic activities of daily living. The variable is coded in the opposite direction of cognitive function, so that a higher score means increasing dependency. Low dependency means that the resident scored between 0 and 6, moderate dependency indicates a score between 7 and 13, and high dependency indicates a score between 14 and 32. Approximately one third of the sample showed dependency levels corresponding with each category.

**Table 3.5: Deaths per 1,000 per year by physical dependency**

<b>Level of physical dependency</b>	<b>Number of deaths</b>	<b>Number of residents</b>	<b>Deaths per 1,000</b>
<b>Low</b>	21	131	160
<b>Moderate</b>	33	137	241
<b>High</b>	35	137	255

As expected, risk of death increases with level of dependency. Those individuals that are relatively independent died at the relatively low rate of 160 per 1,000. This increased to 241 per 1,000 for those moderately dependent, and to 255 with those highly dependent. This finding, too, is in line with the findings of previous research (e.g., van Dijk et al, 1991; 1992). In fact, a Pearson's correlation coefficient of .157 ( $p < .001$ ) indicates that there is a relationship between these variables at the bivariate level.

Next death rates per 1,000 per year are calculated for the 6 dimensions of care. Death rates for each of the three categories of physical restraints are shown in Table 3.6. The "Low", "Moderate" and "High" designations in Table 3.6 represent 0, 1, and 2 types

of restraints, respectively, used by a facility during the previous year for the purpose of behaviour management.

**Table 3.6: Deaths per 1,000 per year by number of physical restraints used in previous year for the purpose of behavioural management**

<b>Physical restraint use</b>	<b>Number of deaths</b>	<b>Number of residents</b>	<b>Deaths per 1,000</b>
<b>Low</b>	20	111	180
<b>Moderate</b>	23	131	176
<b>High</b>	46	163	282

Of the 405 residents, 163 (40%) live in facilities that use both bed rails and geri-chairs for the express purpose of managing resident behaviours. It appears from these data that those residents are substantially more likely to die (282 per 1,000) within 12 months of admission than are those residents living in facilities that use either one or the other (176 per 1,000) or neither (180 per 1,000) of these restraint types. A Pearson's correlation coefficient of .107 ( $p < .05$ ) confirms a bivariate relationship (see Table 3.13 for bivariate correlation coefficients between each of the dimensions of care and the panel selection variable, and death.)

Table 3.7 shows death rates per 1,000 for each of three categories of chemical restraint use. Facilities using between 0 and 4 psychotropic drugs for the specific purpose of behavioural management during the previous year are considered low use facilities.

Those using between 5 and 7 are moderate use facilities, and those using between 8 and 9 are labeled “High”.

**Table 3.7: Deaths per 1,000 per year by chemical restraint use**

<b>Chemical restraint use</b>	<b>Number of deaths</b>	<b>Number of residents</b>	<b>Deaths per 1,000</b>
<b>Low</b>	27	125	216
<b>Moderate</b>	31	154	201
<b>High</b>	31	126	246

The large differentials noted in death rates for physical restraints do not appear for chemical restraints. Residents in low chemical restraint use facilities are almost as likely to die (216 per 1,000) as are those in high restraint use facilities (246 per 1,000). Residents of moderate use facilities tend to die least often of all: 201 per 1,000. However, it is worth noting that it is the residents of the high use facilities that are at highest risk of death, even if the differences between the categories are not dramatic. The Pearson’s correlation coefficient shows no relationship at the bivariate level ( $r=-.004$ ).

Death rates per 1,000 by flexible care routines are shown in Table 3.8. Flexible care routines do not require collapsing of categories since it is a 3 category variable as it exists. The low, moderate and high categories are once again used, with “low” corresponding to a score of 0 for flexible care, “moderate” to 1 and “high” to 2. That is, “low” means the facility does not integrate activities into day-to-day care and that support

staff do not receive instruction in activation techniques. Moderate means that the facility does do one of these two things, and high means that they do both.

**Table 3.8: Deaths per 1,000 per year by flexible care routines.**

<b>Flexible care</b>	<b>Number of deaths</b>	<b>Number of residents</b>	<b>Deaths per 1,000</b>
<b>Low</b>	44	210	210
<b>Moderate</b>	42	176	239
<b>High</b>	3	19	158

First, very few residents (19) live in facilities that provide individualized, flexible care. Half, in fact, live in facilities that do not provide flexible care according to this measure of that concept. Among these latter residents, the death rate is 210 per 1,000 per year. This compares to 239 per 1,000 for the moderate group and 158 per 1,000 for the high group. From these data, it appears that the relationship may be curvilinear. It is not linear ( $r=.013$ ).

The physical environment is also hypothesized to affect the survival chances of the resident population. Table 3.9 shows death rates per 1,000 by the degree to which the physical environment is considered appropriate for a resident population with dementia. Three categories are again used: low, moderate and high. "Low" means the facility scored between 65 and 98 on the TESS; "moderate" indicates a score between 99 and 111; and "high" indicates a score of between 112 and 139. The categories were created to include approximately one third of all residents in each.

**Table 3.9: Deaths per 1,000 per year by specialized environment**

<b>Specialized environment</b>	<b>Number of deaths</b>	<b>Number of residents</b>	<b>Deaths per 1,000</b>
<b>Low</b>	31	143	217
<b>Moderate</b>	31	125	248
<b>High</b>	27	137	197

The pattern for deaths by environment is similar to that observed for flexible care routines. The best physical environments are associated with the lowest death rates (197 per 1,000), moderate with the highest death rate (248 per 1,000) and low level physical environments with relatively moderate death rates (217 per 1,000). Similar to the relationship between flexible care routines and death, specialized environment and death appear to be non-linearly related. The Pearson's correlation coefficient is not significant at the .05 level ( $r=-.007$ ), indicating no linear relationship at the bivariate level.

Death rates per 1,000 by pre-admission and admission (assessment) procedures are presented in Table 3.10. The four existing categories of this variable were collapsed to three partly to be consistent with the other variables being examined, and partly because there were far fewer facilities that scored 0 or 1 than facilities scoring either 2 or 3. Thus, "low" refers to those residents living in facilities that reported using neither or one of the following: written admission criteria, standardized pre-admission forms, and standardized admission forms. Those ranked as "moderate" did two of these three things, and those ranked "high" did all three things during assessment.

**Table 3.10: Deaths per 1,000 per year by assessment procedures**

<b>Assessment procedures</b>	<b>Number of deaths</b>	<b>Number of residents</b>	<b>Deaths per 1,000</b>
<b>Low</b>	19	110	173
<b>Moderate</b>	37	150	248
<b>High</b>	33	145	228

Death rates among those residents living in facilities that used none or one of the admission procedures listed above were lower than for those residents living in facilities that provided better quality of care by using 2 or 3 of the procedures. Specifically, the death rate per 1,000 for those living in facilities considered not to do the best job of assessment was 173 per 1,000, compared to a death rate among those in moderate facilities (248 per 1,000) and those in facilities doing the best job (228 per 1,000). Once again, it appears that residents of facilities in the moderate category tend to be at highest risk of death. The same was observed about death rates in relation to flexible care and the environment. The Pearson's correlation coefficient, not surprisingly, is not significant at the .05 level ( $r=.039$ ).

The final dimension of care to be examined in this section is staff training and education. As was done for a number of previous variables, staff training and education has been collapsed into three categories: low, moderate and high. Those scoring between 0 and 300 are labeled "low"; those scoring 301-375 are labeled "moderate"; and those scoring 376-600 are labeled "high". Results are presented in Table 3.11.

**Table 3.11: Deaths per 1,000 per year by staff training and education**

Staff training and education	Number of deaths	Number of residents	Deaths per 1,000
Low	31	139	223
Moderate	32	128	250
High	26	138	188

Death rates appear to lowest for the residents living in facilities that have the best staff training and education (188 per 1,000). As with the previous three variables - environment, flexible care and assessment - the residents living in facilities scoring in the moderate category appear to have the highest risk of death (250 per 1,000). Those living in “low” staff education and training facilities had death rates between these two extremes: 223 per 1,000. A relatively large “Moderate” category once again indicates the possibility of a non-linear relationship between staff training and education and death. The Pearson’s correlation coefficient is not significant at the .05 level ( $r=-.014$ ).

In order to test for the existence of non-linear relationships between flexible care routines, environment, chemical restraint use and assessment procedures, and death status, dummy variables were created and bivariate correlation coefficients were calculated between these and death status. The dummy variables were coded “0” for the moderate category of each variable, and “1” for high and low values. None of the correlation coefficients was significant and they are not presented here. Additionally, Chi-square statistics were calculated for each of these pairs of variables. Consistent with the

bivariate correlation, only the Chi-square statistic for physical restraint use and death was significant ( $p < .05$ ). Based on a visual examination of Table 3.6, however, it does not appear that the relationship is non-linear.

### **Bivariate Correlations**

In order to have a better understanding of the relationships between the independent variables of interest (i.e., the dimensions of care), Table 3.12 provides bivariate correlations for the 6 dimensions and the panel selection variable.<sup>13</sup> One would expect, for example, that if facilities tended to implement all of the dimensions of care at a high level, the variables would be strongly interrelated. Weaker or non-existent relationships might indicate the opposite. Several relationships are of note. Chemical and physical restraints are positively correlated, indicating that facilities that tend to use one type of restraint also tend to use the other. Although the correlation coefficient between the two is the largest of any within this set of independent variables, it is by no means strong ( $r = .31$ ,  $p < .001$ ). Unexpectedly, physical restraint use is also positively related to flexible care routines, with those facilities with a greater propensity to engage physical restraints being associated with a greater degree of flexibility in care routines ( $r = .19$ ,  $p < .001$ ), although chemical restraint use is negatively and weakly associated with flexible care ( $r = -.10$ ,  $p < .05$ ). The use of chemical restraints is also negatively related to the

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Bivariate correlations for all variables in this study have been calculated and analysed, but for the sake of keeping the focus of this study on the dimensions of care and death, the correlation matrix between dimensions of care and other independent variables, as well as those between the other independent variables, are not shown here.

suitability of the environment ( $r=-.26, p<.001$ ), as is use of physical restraints ( $r=-.13, p<.01$ ). Chemical restraint is unrelated to staff training, assessment procedures and panel selection. Physical restraint use is negatively related to staff training ( $r=-.16, p<.01$ ), indicating that those facilities with less or poorer staff training and education tend to apply physical restraints more frequently. Physical restraint use is related to neither assessment procedures nor panel selection.

Flexible care is related to all other dimensions of care, but not to panel selection. In addition to the relationships with physical and chemical restraints just discussed, flexible care is negatively associated with the environmental variable ( $r=-.21, p<.001$ ) and staff training ( $r=-.16, p<.01$ ). That is, facilities with poorer environments and facilities with less well trained staff tend to also employ more regimented (less flexible) care routines. Consistent with these relationships, facilities with more flexible care tend to employ better assessment procedures ( $r=.15, p<.01$ ). One other bivariate relationship is shown in the table, with assessment procedures being negatively related to panel selection ( $r=-.13, p<.01$ ). Assessment is the only dimension of care related to panel selection, with facilities selected as gold standard facilities tending to have poorer assessment procedures than non-gold facilities.

Overall, the six dimensions of care are in many cases interrelated, but not strongly. Flexible care is related to all other dimensions, while assessment is related only to flexible care. The panel selection variable is related only to assessment procedures, and not in the expected direction. Likewise, the negative relationship between flexible care

routines and staff training and education, as well as the positive relationship between physical restraint use and flexible care, are not in the expected directions.

**Table 3.12: Bivariate correlations: Dimensions of care and panel selection**

	1	2	3	4	5	6	7
<b>1 Chemical restraint</b>	-	.313***	-.099*	-.256***	.025	-.028	.072
<b>2 Physical restraint</b>		-	.187***	-.134**	-.157**	.042	.086
<b>3 Flexible care</b>			-	-.208***	-.164**	.154**	-.071
<b>4 Environ- ment</b>				-	.027	.046	.025
<b>5 Staff training</b>					-	.054	-.093
<b>6 Assess- ment</b>						-	-.133**
<b>7 Panel selection</b>							-

\* <.05    \*\* <.01    \*\*\* <.001

Zero-order correlations also provide a baseline look at relationships that are most likely to be identified in the multi-variate equations to follow. That is, a relationship identified in the absence of controls that remains statistically significant after the

application of controls (via the use of a multi-variate equation), is more convincing: it is less likely an artifact of the applied statistical procedures. Following are two tables that show bivariate correlations between the dimensions of care and panel selection and death status (Table 3.13) and those between all other independent variables and death status (Table 3.14). Correlations between the 6 dimensions of care plus the panel selection variable and death status are weak and not statistically significant except for physical restraint use. This relationship ( $r=.11$ ,  $p<.05$ ) indicates that residents within facilities that tend to use physical restraints more often are more likely to die over the 12 months following admission than are those residents within facilities that use restraints less often. Chemical restraint use, flexibility in care routines, degree of specialized environment for dementia care, staff training and education, assessment procedures and panel selection were unrelated to death status.

**Table 3.13: Bivariate correlations: Dimensions of care, panel selection and death status**

	Death status (alive=0; died=1)
<b>Chemical restraints</b>	-.004
<b>Physical restraints</b>	.107*
<b>Flexible care</b>	.013
<b>Environment</b>	-.007
<b>Staff training</b>	-.014
<b>Assessment</b>	.039
<b>Panel selection</b>	.025

\* < .05

The remainder of the independent variables and their bivariate correlations with death status are shown in Table 4. As discussed previously, age and gender are significantly related to death status. Older individuals ( $r=.19$ ,  $p<.001$ ) and men ( $r=-.16$ ,  $p<.01$ ) are more likely to die over the course of the 12 month observation period. Also as expected those with greater physical dependency at admission are at higher risk of death ( $r=.16$ ,  $p<.01$ ). Poorer social skills ( $r=-.13$ ,  $p<.01$ ) and poorer expressive language skills ( $r=.13$ ,  $p<.05$ ) are also associated with greater risk of death. None of these relationships is unexpected. However, some non-significant correlations do require further attention. Medical conditions at admission appear to be unrelated to risk of death. That is, those diagnosed with cancer and/or heart or circulatory system diseases tend not to die any

more rapidly than do those not similarly diagnosed. Similarly, residents in special care units are no less likely to die than are their counterparts not in special care. Cognitive function is also unrelated to risk of death, as is the display of agitated behaviours at admission. Finally, ownership status (private vs public) seems to have no relationship with risk of death. These findings are discussed later in this study.

**Table 3.14: Bivariate correlations: Resident characteristics/status, facility variables and death status**

	<b>Death status</b>
<b>Expressive language skills (logged)</b>	.128*
<b>Number of beds (logged)</b>	-.003
<b>Ownership</b>	-.047
<b>Is unit a special care facility</b>	.021
<b>Physical dependency</b>	.157**
<b>Agitated behaviours</b>	.011
<b>Medical conditions</b>	.055
<b>Affect</b>	.059
<b>Social skills</b>	-.130**
<b>Cognitive function</b>	-.020
<b>Age</b>	.186***
<b>Gender</b>	-.155**
<b>Percent with dementia</b>	.023

\* < .05

\*\* < .01

\*\*\* < .001

### **Multicollinearity Tests**

Prior to calculating the logistic and Cox regressions, tests for multicollinearity were completed by entering all variables into an ordinary least squares multiple regression equation. Results indicated that percent with dementia, log of number of beds, and whether the facility is an SCU were highly collinear. This was not entirely unexpected, since SCUs tend to have fewer beds than non-SCUs, and also normally have only dementia residents. The log of expressive language skills was strongly collinear with social skills, which again is not unexpected because effective communicative ability underpins each. A person who cannot express themselves well enough to receive the care they require are not likely to possess fundamental social skills either.

To understand how each of these variables might behave in a multivariate equation, to assess how they might act to affect the likelihood of survival, and to assist in deciding which ones should be eliminated in the final equation, a series of 6 logistic regressions was run. These equations included all independent variables discussed above minus each of the 6 combinations of collinear variables possible among the 5 identified above. Specifically, the first logistic regression (Regression 1) will not include log of number of beds, percent with dementia, and log of expressive language skills, but will include as independent variables all those discussed above plus social skills and SCU status. The successive 5 equations will simply substitute these last two variables in the remaining possible combinations. That is, all independent variables plus: (Regression 2) social skills and log of number of beds (but not log of expressive language skills, SCU status, and percent with dementia) ; (Regression 3) social skills and percent with

dementia (but not log of expressive language skills, log of number of beds, and SCU status); (Regression 4) log of expressive language skills and SCU status (but not social skills, percent with dementia, and log of number of beds); (Regression 5) log of expressive language skills and log of number of beds (but not social skills, SCU status, and percent with dementia); (Regression 6) expressive language skills and percent with dementia (but not social skills, log of number of beds, and SCU status). The model summary results for the 6 regressions are shown in Table 3.15.

**Table 3.15: Logistic regression summary results for six competing models**

	<b>Reg 1</b>	<b>Reg 2</b>	<b>Reg 3</b>	<b>Reg 4</b>	<b>Reg 5</b>	<b>Reg 6</b>
<b>Cox &amp; Snell R square</b>	10.6	10.7	10.8	10.6	10.6	10.7
<b>Nagelkerke R square</b>	16.3	16.4	16.5	16.2	16.3	16.4
<b>-2 Log likelihood</b>	380.991	380.816	380.424	380.501	380.393	379.992

The R square statistics for the 6 logistic regression models show little variation, as do the respective -2 log likelihood statistics, indicating that each of the 6 combinations of independent variables explains essentially the same proportion of variance in the dependent variable. Cox and Snell R square statistics range from 10.6% (Regressions 1, 4 and 5) to 10.8% (Regression 3). Nagelkerke R square values range from 16.2% (Regression 4) to 16.5% (Regression 3). In each of the 6 models, the same 4 variables -

physical dependency, physical restraint use, age, and gender - show similar and statistically significant effects on risk of death (results not shown). Statistically, the choice of a final model points, albeit not strongly and convincingly, to Regression 3. Theoretically, percent with dementia is as useful a predictor of resident outcomes as is SCU status and number of beds, and social skills is a more commonly encountered measure than is expressive language skills. In the following, regression 3 will be retained as the “final” model, recognizing that the substantive differences between it and the other models are negligible.

### **Logistic Regressions**

To assess the effects of the dimensions of care versus resident characteristics versus facility characteristics, the independent variables were entered into the regression equation in blocks. The first block consisted of the 6 dimensions of care plus the panel selection variable; the second of resident characteristics medical conditions, age, gender, social skills, affect score, agitated behaviours and physical dependency; and the third block of facility characteristics ownership status and percent with dementia. Results are shown in Tables 3.16, 3.17, 3.18, and 3.19 below.

**Table 3.16: Logistic regression: Constant only (Beginning block)**

	B	S.E.	Wald	df	Sig	Exp(B)
<b>Constant</b>	-1.267	.120	111.492	1	.000	.282

Model summary: Percent of cases correctly classified: 78.0

**Table 3.17: Logistic regression: Effect of dimensions of care and panel variable on risk of death (Block 1)**

	B	S.E.	Wald	df	Sig	Exp(B)
<b>Physical restraints</b>	.374	.167	4.996	1	.025	1.453
<b>Chemical restraints</b>	-.040	.047	.727	1	.394	.961
<b>Environment</b>	-.002	.010	.032	1	.859	.998
<b>Staff education</b>	.000	.001	.000	1	.982	1.000
<b>Assessment</b>	.114	.137	.689	1	.407	1.121
<b>Flexible care</b>	-.080	.227	.123	1	.726	.924
<b>Panel selection</b>	-.106	.247	.184	1	.668	.899
<b>Constant</b>	-1.439	1.189	1.467	1	.226	.237

Model summary Cox & Snell R square: .015  
-2 Log likelihood: 420.296

Nagelkerke R square: .024  
% of cases correctly classified: 78

**Table 3.18: Logistic regression: Effects of dimensions of care, panel selection and resident characteristics on risk of death (Block 1 + Block 2)**

	<b>B</b>	<b>S.E.</b>	<b>Wald</b>	<b>df</b>	<b>Sig</b>	<b>Exp(B)</b>
<b>Physical restraints</b>	.401	.182	4.873	1	.027	1.494
<b>Chemical restraints</b>	-.050	.052	.934	1	.334	.951
<b>Environment</b>	-.002	.010	.040	1	.841	.998
<b>Staff training</b>	.000	.001	.001	1	.976	1.000
<b>Assessment</b>	.124	.146	.720	1	.396	1.132
<b>Flexible care</b>	-.142	.248	.327	1	.567	.868
<b>Panel selection</b>	-.001	.268	.000	1	.998	.999
<b>Medical conditions</b>	-.015	.270	.003	1	.956	.985
<b>Age</b>	.082	.021	15.101	1	.000	1.085
<b>Gender</b>	.766	.266	8.257	1	.004	2.150
<b>Social skills</b>	-.118	.073	2.651	1	.103	.888
<b>Affect</b>	.008	.020	.159	1	.690	1.008
<b>Agitated behaviours</b>	.003	.017	.027	1	.871	1.003
<b>Physical dependency</b>	.048	.019	6.491	1	.011	1.050
<b>Cognitive function</b>	.029	.032	.798	1	.372	1/029
<b>Constant</b>	-8.497	2.404	12.490	1	.000	.000

Model summary Cox & Snell R square: .106  
-2 Log likelihood: 381.370

Nagelkerke R square: .162  
% of cases correctly classified: 79.5

**Table 3.19: Logistic regression: Effects of dimensions of care, panel selection, resident characteristics and facility characteristics on risk of death (Blocks 1, 2 and 3)**

	<b>B</b>	<b>S.E.</b>	<b>Wald</b>	<b>df</b>	<b>Sig</b>	<b>Exp(B)</b>
<b>Physical restraints</b>	.388	.183	4.503	1	.034	1.473
<b>Chemical restraints</b>	-.041	.053	.600	1	.439	.960
<b>Environment</b>	-.003	.010	.082	1	.775	.997
<b>Staff training</b>	.000	.001	.001	1	.982	1.000
<b>Assessment</b>	.092	.154	.362	1	.548	1.097
<b>Flexible care</b>	-.143	.251	.325	1	.568	.867
<b>Panel selection</b>	.009	.285	.001	1	.974	1.010
<b>Medical conditions</b>	-.021	.271	.006	1	.939	.979
<b>Age</b>	.085	.021	15.743	1	.000	1.088
<b>Gender</b>	.757	.270	7.880	1	.005	2.131
<b>Social skills</b>	-.121	.073	2.745	1	.098	.886
<b>Affect</b>	.006	.020	.093	1	.760	1.006
<b>Agitated behaviours</b>	.002	.017	.018	1	.894	1.002
<b>physical dependency</b>	.049	.019	6.447	1	.011	1.050
<b>Cognitive function</b>	.031	.032	.912	1	.340	1.031
<b>Ownership</b>	.159	.281	.319	1	.572	1.172
<b>Percent with dementia</b>	.005	.006	.643	1	.423	1.005
<b>Constant</b>	-8.988	2.489	13.038	1	.000	.000

Model summary Cox & Snell R square: 10.8  
-2 Log likelihood: 380.424

Nagelkerke R square: 16.5  
% of cases correctly classified: 80.0

Among the dimensions of care and panel selection variables (Block 1), only physical restraint use emerges as a significant predictor of probability of death within 12 months of admission to a long-term care facility (Table 1a, Block 1:  $B=.374$ ,  $Wald=4.996$ ,  $p<.05$ ). Increased facility level physical restraint use during the previous 12 months is associated with an increased probability of death, controlling for the effects of the other 5 dimensions of care and the panel selection variable. For the block as a whole, the dimensions of care explain less than 3% of the variation in probability of death (Cox & Snell R square=.015; Nagelkerke R square=.024). The -2 Log likelihood is 420.296. In short, the dimensions of care as measured in this study appear to contribute little to the probability that an individual will die during their tenure as a resident of an intermediate long-term care facility in British Columbia.

The addition of resident characteristics (Block 2) to the equation, however, does appear to explain a significant proportion of the variation in risk of death. The inclusion of these variables increases the two R square measures considerably (to .106 for Cox and Snell R square and .162 for the Nagelkerke R square). The -2 log likelihood is diminished by almost 40 points to 381.370. Each of these model summary measure changes points to an improvement in the predictive power of the equation over the previous equation (i.e., Block 1 only). Physical restraint use retains statistical significance ( $B=.374$ ,  $Wald=4.996$ ,  $p<.05$ ) when controlling for all other variables in the equation. That is, increased physical restraint use at the facility level remains associated with increased probability of death within the 12 month post-admission period. As expected, none of the other dimensions of care attain statistical significance after entering the second block of variables. Of the

variables entered in the second block, 3 have statistically significant effects on probability of death. Age is positively associated with death ( $B=.082$ ,  $Wald=15.101$ ,  $p<.001$ ). As expected, older individuals are at higher risk of death than are younger residents. Males are at higher risk of death than are females ( $B=.766$ ,  $Wald=8.257$ ,  $p<.01$ ) and those more physically dependent are also at higher risk of death ( $B=.048$ ,  $Wald=6.491$ ,  $p<.05$ ).

The two facility characteristics that comprise the third block of independent variables have no independent effects on risk of death, and do not contribute to overall improved predictive power of the model. The final summary statistics are therefore very similar to the equivalent statistics for the model following the addition of the block 2 variables. The Cox and Snell R square is .108, the Nagelkerke R square is .165, and the -2 log likelihood is 380.424. Eighty percent of cases are shown to be correctly classified. In this final model, chemical restraints, environment, staff training, assessment procedures, flexible care, panel selection, medical conditions, social skills, affect, agitated behaviours, cognitive function, ownership type and percent of resident population with dementia are unrelated to probability of death. To get a sense of the strength of the relationships between each of the 4 significantly related variables and probability of death, respectively, odds ratios are useful.

For each additional restraint a facility reports having used in the previous years for the purpose of behavioural management, a resident is at greater risk of death by 47.3%, when controlling for the effects of all other variables in the equation. Each additional year of age is associated with an increased risk of death of 8.8%. Males are 113.1% more likely to die within 12 months of admission than are females. For each one point increase

in the 36 point physical dependency scale, probability of death increases by 5.0%.

Although each of these relationships is in the expected direction, it is the lack of relationships between the dimensions of care and risk of death that is not expected, the interpretation of which is discussed in Chapter 4.

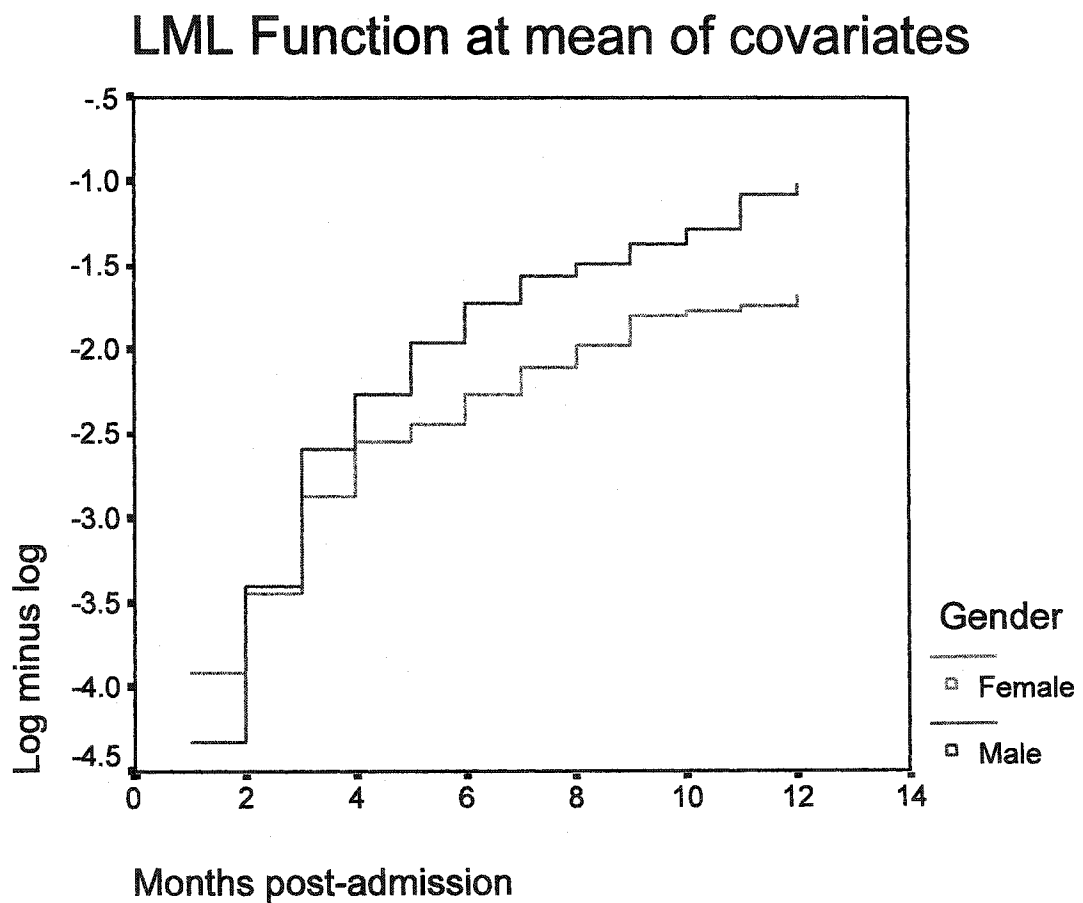
### **Cox Regressions**

The next stage of the analysis requires the introduction of a time-until-death variable among residents who died. This can be accomplished through the use of a Cox regression. Prior to estimating a Cox regression equation, however, it must be determined that the proportional hazards assumption is not violated. A central assumption of the Cox regression procedure is that the hazard be proportional for all covariates in the model. For example, the hazard of dying for males and females should be proportionally similar for each of the 12 months under observation.

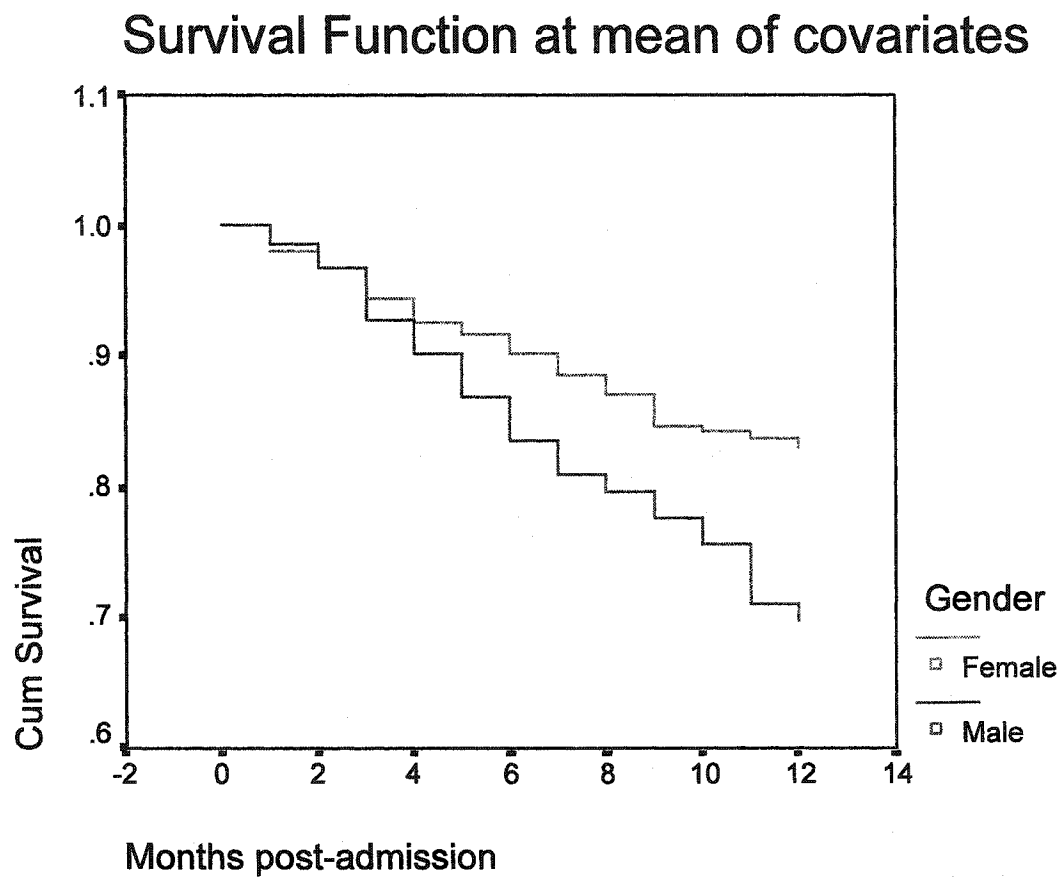
For the purposes of this research, it would not be practical to include graphic evidence of cumulative survival function and log-minus-log plots of hazard functions for each of the 17 covariates in the model proposed here. Examples for two covariates - age and gender - will be presented, since they appear to be the most likely violators of the proportional hazards assumption. Figures 3.2 and 3.3 show cumulative survival functions and log-minus-log plots of the hazard functions, respectively, for gender for the 12 month observation period. Figures 3.4 and 3.5 present equivalent plots for age. Note that age has been dichotomized by assigning one half of the residents to the 65 to 81 year old group,

and the others to the 82 to 97 year age group (There were no natural break points, so this represents a split at approximately the mean).

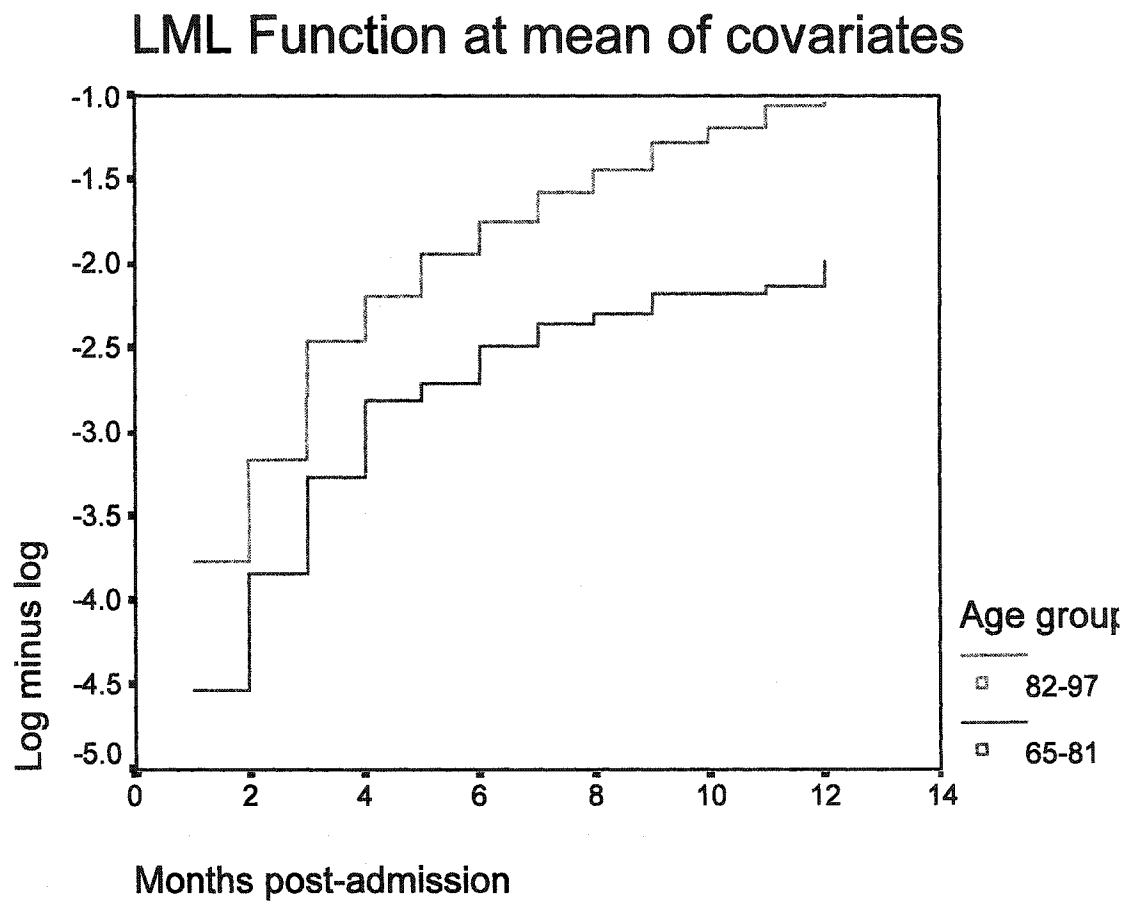
**Figure 3.2: Log-minus-log plot of hazard functions for gender**



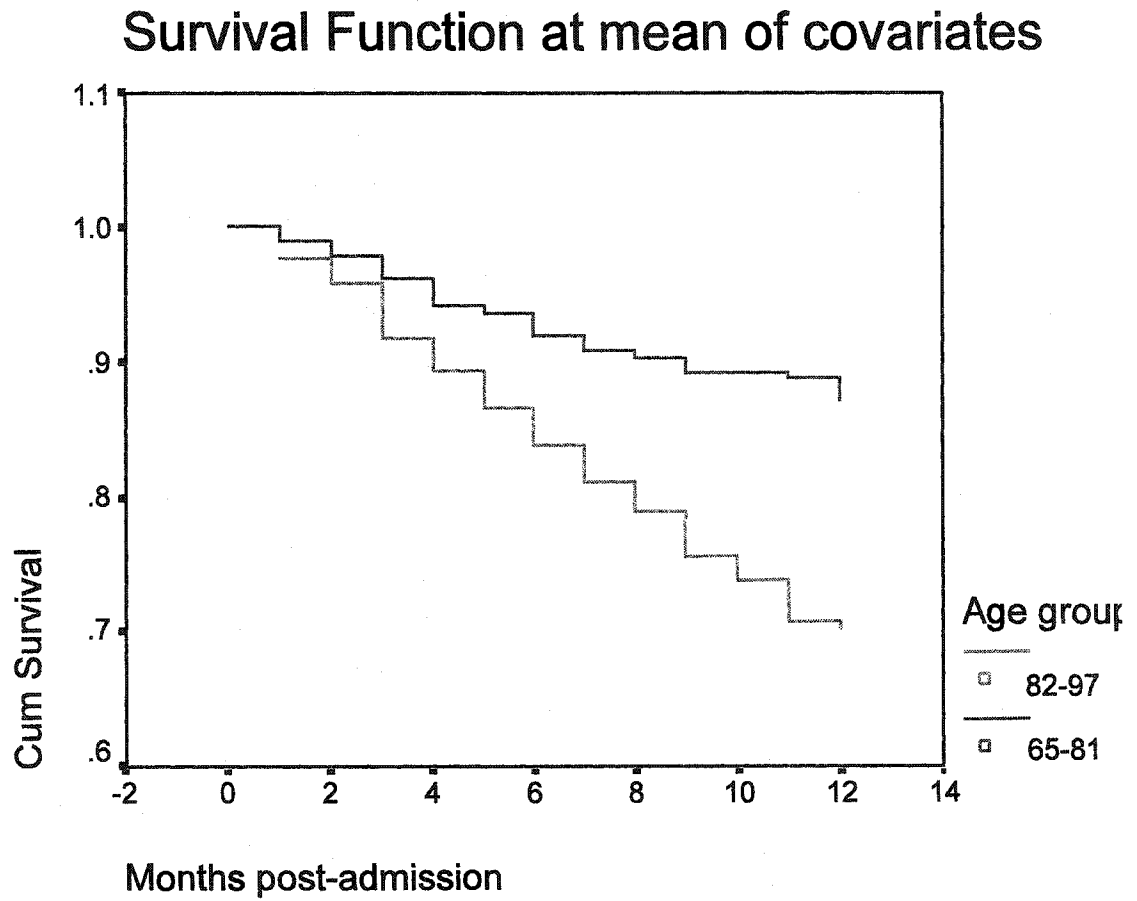
**Figure 3.3: Cumulative survival functions for males and females**



**Figure 3.4: Log-minus-log plot of hazard function for age**



**Figure 3.5: Cumulative survival functions for age groups**



In figure 3.2, the log-minus-log functions for females and males actually cross in the second month post-admission before they eventually begin to run approximately parallel from about the third month onwards. Similarly, the survival functions for each gender (Figure 3.3) cross in the early months, and then continue to diverge from about the 3<sup>rd</sup> month. These results indicate the possibility that the proportional hazards assumption is not valid, and that further tests are required. The log-minus-log functions for the two age groups presented in Figure 3.4 do not cross, but they do diverge from about the 3<sup>rd</sup> month. It appears that the hazards may not be proportional. The cumulative survival functions for the same age groups shown in Figure 3.5 also suggest non-proportional hazards across time. A formal test is called for (for a description of the test, see Chapter 2). Table 3.20 presents the results of this formal test for gender. Table 3.21 presents the results for age.

**Table 3.20: Statistics for time dependent Cox model for gender**

	<b>B</b>	<b>SE</b>	<b>Wald</b>	<b>df</b>	<b>Sig.</b>	<b>Exp(B)</b>
<b>Gender</b>	.040	.454	.008	1	.930	1.041
<b>T * Gender</b>	.097	.066	2.139	1	.144	1.102

**Table 3.21: Statistics for time dependent Cox model for age groups**

	<b>B</b>	<b>SE</b>	<b>Wald</b>	<b>df</b>	<b>Sig.</b>	<b>Exp(B)</b>
<b>Age group</b>	-.649	.499	1.69	1	.194	.523
<b>T * Age group</b>	-.046	.074	.392	1	.531	.955

The results of the tests shown in Tables 3.20 and 3.21 indicate that the null hypothesis of zero effects cannot be rejected. It must therefore be concluded that the effects of age and gender are constant across time despite the apparent violation of the proportional hazards assumption suggested during the visual examination of the cumulative survival functions and the log-minus-log plot of hazard functions. The same formal test was conducted for each of the covariates that appeared to violate the proportional hazards assumption in both the log-minus-log and the cumulative survival plots. None was significant. The model presented below (Tables 3.22, 3.23 and 3.24) is therefore a Cox regression model with fixed covariates, each of which has been tested for proportionality of hazards. The variables are again entered in 3 blocks including, 1) dimensions of care and the panel selection variable, 2) resident characteristics, and 3) facility characteristics.

**Table 3.22: Cox regression: Dimensions of care and panel selection variable  
(Block 1)**

	<b>B</b>	<b>S.E.</b>	<b>Wald</b>	<b>df</b>	<b>Sig</b>	<b>Exp(B)</b>
<b>Physical restraints</b>	.323	.150	4.651	1	.031	1.382
<b>Chemical restraints</b>	-.036	.041	.789	1	.374	.964
<b>Environment</b>	-.001	.008	.012	1	.912	.999
<b>Staff training</b>	.000	.001	.001	1	.975	1.000
<b>Assessment</b>	.094	.122	.596	1	.440	1.099
<b>Flexible care</b>	-.066	.199	.109	1	.742	.936
<b>Panel selection</b>	-.093	.218	.180	1	.671	.912

Model summary: -2 Log likelihood: 1043.754

Chi-square: 5.553 df: 7 Sig: .593

**Table 3.23: Cox regression: Dimensions of care, panel selection variable and resident characteristics (Blocks 1 and 2)**

	<b>B</b>	<b>S.E.</b>	<b>Wald</b>	<b>df</b>	<b>Sig.</b>	<b>Exp(B)</b>
<b>Physical restraints</b>	.363	.155	5.463	1	.019	1.438
<b>Chemical restraints</b>	-.048	.044	1.168	1	.280	.963
<b>Environment</b>	.000	.009	.001	1	.972	1.000
<b>Staff training</b>	.000	.001	.037	1	.848	1.000
<b>Assessment</b>	.064	.121	.279	1	.597	1.066
<b>Flexible care</b>	-.103	.211	.241	1	.624	.902
<b>Panel selection</b>	.007	.227	.001	1	.976	1.007
<b>Medical conditions</b>	.002	.227	.000	1	.994	1.002
<b>Age</b>	.064	.017	14.241	1	.000	1.066
<b>Gender</b>	.609	.223	7.487	1	.006	1.839
<b>Cognitive function</b>	-.117	.027	1.218	1	.033	.890
<b>Social Skills</b>	.030	.055	4.533	1	.270	1.030
<b>Physical dependency</b>	.043	.015	7.875	1	.005	1.044
<b>Agitated behaviours</b>	.001	.014	.002	1	.962	1.001
<b>Affect</b>	.010	.017	.333	1	.564	1.010

Model summary: -2 Log likelihood: 1005.132

Chi-square: 45.947

df: 15

Sig: .000

**Table 3.24: Cox regression results**

	<b>B</b>	<b>S.E.</b>	<b>Wald</b>	<b>df</b>	<b>Sig.</b>	<b>Exp(B)</b>
<b>Physical restraints</b>	.347	.155	5.013	1	.025	1.415
<b>Chemical restraints</b>	-.037	.045	.659	1	.417	.964
<b>Environment</b>	-.001	.009	.024	1	.878	.999
<b>Staff training</b>	.000	.001	.022	1	.883	1.000
<b>Assessment</b>	.037	.130	.081	1	.776	1.038
<b>Flexible care</b>	-.107	.214	.251	1	.616	.898
<b>Panel selection</b>	.045	.243	.035	1	.852	1.046
<b>Medical conditions</b>	.002	.227	.000	1	.995	1.002
<b>Age</b>	.067	.017	14.926	1	.000	1.069
<b>Gender</b>	.595	.225	7.001	1	.008	1.814
<b>Cognitive function</b>	.031	.027	1.323	1	.250	1.032
<b>Social Skills</b>	-.121	.055	4.799	1	.028	.886
<b>Physical dependency</b>	.043	.015	7.937	1	.005	1.044
<b>Agitated behaviours</b>	.000	.014	.000	1	.984	1.000
<b>Affect</b>	.008	.018	.195	1	.659	1.008
<b>Ownership</b>	.202	.237	.657	1	.418	1.004
<b>Percent with dementia</b>	.004	.005	.723	1	.395	1.224

Model summary: -2 Log likelihood: 1003.815

As was the case with the logistic regression, physical restraint use emerges as the only significant predictor in the first block ( $B=.323$ ,  $Wald=4.651$ ,  $p<.05$ ). The direction and strength of the relationship are likewise comparable. As for the model fit, a -2 log likelihood of 1043.754 is calculated. The Chi-square statistic is also reported. With 7 degrees of freedom and an associated p value of .593, the Chi-square statistic of 5.553 does not achieve significance. Thus, the dimensions of care in and of themselves explain very little of the variance in the probability of time to death.

When the variables representing the 8 resident characteristics and behavioural states are entered in the next block, the -2 log likelihood declines some 38 points to 1005.132. The Chi-square statistic increases accordingly to 45.947. The associated significance level is .000 with 15 degrees of freedom. As expected from the results of the logistic regression, the introduction of resident characteristics and behaviour states results in a better overall model fit. The 3 statistically significant resident characteristics in the logistic regression are also significant in the Cox regression: age, gender, and physical dependency. One additional variable appears to have an effect on probability of death, that is, social skills. The effect is negative, with better social skills resulting in lower probability of death. The addition of the variables comprising the third block (facility characteristics) appears to add little to the explanatory power of the model. The -2 log likelihood is reduced slightly to 1003.815 following the entry of these variables into the equation.

In the final model, then, none of the following variables has a statistically significant effect on probability of death: chemical restraint use, environment, staff

training and education, assessment procedures, flexible care routines, panel selection, medical conditions, cognitive function, agitated behaviours, and affect. At the same time, each year increase in age is associated with an increase in the odds of death during the 12 months following admission of 6.9%. Maleness is associated with an increase in the odds of death of 81.4% when compared to women. Facilities using one additional physical restraint in the previous year are associated with a 41.5% increase in the odds of death. A one point increase in physical dependency is associated with a 4.4% increase in odds of death. Finally a one point decline in the 11 point social skills score is associated with an increase in the odds of death of 11.4%.

#### **Predictors of Facility Physical Restraint Use**

Of central interest to this study is the effect of care quality on mortality risk. Only physical restraint use emerged as a significant predictor of risk of death. A final multiple regression was therefore run with physical restraint use serving as the dependent variable. Independent variables include chemical restraint use, environment, staff education, ownership status, flexible care routines, assessment procedures, percent with severe cognitive impairment and panel selection. Selection of independent variables was based on the need to understand how the other dimensions of care relate to physical restraint use, and the need to control for other possible influences. Knowing what influences or explains physical restraint use may shed some light on why it, in turn, seems to result in higher risk of death. Table 3.25 shows the results of the regression.

**Table 3.25: OLS Multiple regression with dependent variable Physical restraint use**

	<b>Beta</b>	<b>t</b>	<b>Sig</b>
<b>Constant</b>		1.755	.080
<b>Chemical restraints</b>	.327	6.783	.000
<b>Environment</b>	-.025	-.518	.605
<b>Staff education</b>	-.113	-2.335	.020
<b>Ownership</b>	-.110	-2.252	.025
<b>Flexible care routines</b>	.200	4.105	.000
<b>Assessment procedures</b>	.035	.746	.456
<b>Percent with severe cognitive decline</b>	.106	2.203	.028
<b>Panel group selection</b>	.045	.927	.354

R- square.187

Five of the eight selected predictor variables are significantly related to physical restraint use. Greater chemical restraint use is related to greater physical restraint use. A higher level of staff education and training is related to less physical restraint use. Private facilities are associated with less physical restraint use. Facilities with more flexible care routines tend to employ more physical restraints, and facilities that have a resident population which is relatively more demented tend to use a greater number of physical restraints. Degree of physical environmental specialization, pre-admission and admission procedures, and panel group selection are unrelated to use of physical restraints.

Finally, the possibility that interaction effects are present was assessed. Of the 15 cross-product terms calculated among the 6 dimensions of care, 3 were found to be related to "death" while simultaneously controlling for the constituent components of the cross-product terms. Further tests for the presence of interactions were inconclusive. These results are presented in Appendix A.

## **Chapter 4: Discussion**

### **Introduction**

This study is an assessment of the effect of care quality on the probability of death among intermediate care facility residents with dementia. Care quality is measured along 6 dimensions as identified in the literature, in addition to a subjective assessment by panels of experts who were asked to indicate which facilities could be considered the best; the gold standard facilities. The six dimensions include assessment procedures, non-use of physical restraints, non-use of chemical restraints, flexibility of care, staff training and education, and the facility environment. It was expected that each of the care dimensions would be associated with the occurrence of death and the probability of death over time, with better quality of care being associated with fewer deaths (logistic regression) and a reduced probability of death over time (Cox regression). Little evidence of such an association was found. In fact, it was resident characteristics and behavioural states that contributed the lion's share of each model's explanatory power.

Taken at face value, this might be construed simply as further evidence in support of the social selection and against a social causation explanation. As discussed earlier in this study, however, the extent to which social causation can be a useful explanation of mortality depends on effective conceptualization and measurement. The remainder of this study will therefore focus essentially on two things. In this chapter, a discussion of the findings reported in the results section will be presented. This will involve explanations of those variables that were shown to be related to mortality as well as those that were

not. In the following chapter, suggestions for improved measures and methods in the interest of more effectively studying the effect of quality of care on mortality will be presented.

### **The shape of the survival curve**

The survival curve for this sample was obviously not shaped by time. That is, deaths did not occur in any discernible pattern by month. This is directly counter to the expectation that survival probabilities would be lowest during the first six months (e.g., Aneshensel et al., 2000). A possible explanation for this is based on two related methodological issues. First, although the death rate is extremely high, neither the sample on which these death rates are based, nor is the absolute number of deaths (89), is especially large. It is probably adequate for the analyses undertaken in this study, but a larger sample would instill more confidence in the findings.

The second, and probably more important issue is that concerning sample selection. When assessing a newly admitted resident for eligibility for the original purposes of the study<sup>14</sup>, one criterion used was whether the facility contact (usually the director of nursing) thought the resident would survive for 12 months following admission. The residents who did participate in the study could therefore have been pre-selected for their ability to survive for 12 months. On the other hand, directors of nursing

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14

As explained at the beginning of Chapter 2, the purpose of screening out those who might die was to allow for an assessment of the effect of care quality on those who would actually survive for the duration of the study.

were clearly unable to identify all persons who would die within 12 months of admission. This is not especially surprising for those who survived at least, say, 6 months but who died prior to 12 months in the facility. Accurately predicting time until death can be a difficult business, one that can be as much art as science.

It is more interesting, however, that directors of nursing were unable to accurately assess the risk of death of many individuals who died within weeks or months of admission (25 persons died within 3 months of admission). This in and of itself raises questions about the development of care plans and interventions and the consequent effect of these interventions on survival probabilities. That is, care plans presumably are based at least partly on the expected life course of each newly admitted resident. The expectation of survival for the foreseeable future for those who died within a few months of admission was that they would likely not die. Thus, care plans would have been developed with the expectation that each of the deceased residents would be alive for the foreseeable future. Knowledge of the impending death of a resident likely would alter care plans to reflect a palliative orientation. The question then becomes: What effect on survival probabilities does a care plan based on the expectation that the resident will survive for an indefinite period have versus a care plan with palliative principles? The question remains an open one, but a study that examines care plans developed for those expected to die and those not expected to die, but who nonetheless die within a similar time frame following admission, would be revealing. In short, expectation versus non-expectation of death may in fact have some effect on survival probabilities.

The relationships found in the present study should therefore be seen in this context. That is, all residents were expected to survive for 12 months and, at the outset, their care plans would have been based on this expectation. Of course, things can and do change quickly for persons as frail and demented as the individuals in this study, and care plans may be altered in accordance with, for example, knowledge of a resident's changing health status, the policies and procedures of the facility, and resident advance directives. To reiterate, the extent to which expectation of survival affects actual survival for the population under study is unknown. The effect on sample selection, however, is potentially important, particularly for the effect of quality of care on survival probabilities of those who died shortly after entering the facility. Furthermore, the actual number of those not included due to directors' of nursing assessment that risk of death was high, is unknown. With this in mind, the shape of the observed survival curve reflects to an unknown extent the actual survival probabilities for all individuals entering the facility. This, however, should not be of great concern when the goal of the study is to determine the effect of quality of care on likelihood of death, since, if quality of care exerts an effect, it should be across the spectrum of resident types and not just those at greatest risk. In fact, the sample under study provided a unique opportunity to study the effect of quality of care on mortality as an outcome precisely because those expected to die were not invited to participate.

On the other hand, it does have implications for the generalizability of the findings that are based on these data. To the extent that the survival probabilities of the residents in this sample are biased towards both greater likelihood of survival and lower

risk of death over time, the findings are similarly limited. Generalizability might also be limited due to a selection bias involving facilities. No northern British Columbia facilities were included due to cost considerations. Because these northern facilities have a larger catchment area, they probably house a greater variety of residents. Comparison of care quality between the majority of facilities that exist in metropolitan or highly urbanized centres may be a comparison of apples and oranges. On the positive side, the facilities were located in every region of British Columbia other than the north (where few facilities exist). A relatively large number of facilities were studied, and their inclusion was based on geographic, facility size and resident characteristics considerations. In other words, a wide array of facilities that care for persons with dementia was included. Results should be generalizable with caution to other long-term care facilities that house a similar population.

#### **An important dimension of care: Physical restraint use**

The lack of detected effects of most of the dimensions of care and the panel selection variable are more perplexing. Only physical restraint use emerged in the multivariate models as predictive of risk of death. Residents of facilities that use more physical restraints for behaviour management purposes tend to be at higher risk of death. The reason for this may be seen as emanating from several, interrelated causes. Deaths can occur directly from the application of physical restraints. For example, Miles and Irvine (1992) report that at least 1 in every 1,000 deaths in nursing homes in Minnesota is directly caused by restraint use. They based their argument on an investigation which

showed that deaths due directly to restraints are substantially underreported and underrecognized. Although the present study neither sought nor found any such direct evidence, it remains a plausible explanation for some deaths that did occur.

Another obvious causal mechanism through which increased physical restraint use may adversely affect survival probabilities is the reduction in individuality and dignity that accompanies the application of restraints. The essence of the argument is that regardless of the physical and mental states of an individual, there remains a residual store of sense of self that can be damaged during episodes of restraint (Bradley, Siddique, & Dufton, 1995). On the whole, individuals subjected to the indignity of physical restraint and who are already old, frail and vulnerable, will eventually be more likely to succumb to death with the addition of this final insult. It has been shown repeatedly that the removal of physical restraints does not lead to increased falls and fall related injuries (Capezuti, Strumpf, Evans, & Maislin, 1999). It follows that deaths occurring due to these causes would not increase with a reduction in physical restraint use. In fact, one might expect better odds of survival, since the affected individual may retain some sense of dignity. Furthermore, the removal of restraints would require a more individualized approach to care for that individual, which in and of itself is thought to be beneficial.

The problem with the present study, however, is that it cannot be stated with any certainty that any of these potential causal mechanisms were in operation. The problem is essentially one based on differing units of analysis. Restraint use was in this case based on whether or not the facility tended to use more or fewer restraints. Resident mortality was based on whether or not a given individual died during the observation period. That

is, the unit of analysis of the former measure is the facility and of the latter, the individual. There may be no relationship whatsoever between a facility's tendency to use restraints and the propensity of an individual to die, unless facility restraint use is an indicator of another factor or factors that were not directly measured in the study. For example, restraint use may stand as an indicator of facility ambience, social atmosphere, or some other unmeasured causal factor. If in fact social atmosphere is measured accurately by restraint use, it may be possible to infer with appropriate caution that social atmosphere has an effect on mortality risk. The unit of analysis becomes less problematic in this scenario since, presumably, every resident in the facility is affected by social atmosphere but not every resident may be affected by restraint use.

The difficulty that arises, of course, is trying to understand what "facility level restraint use" stands as an indicator of, if it in fact stands for anything beyond restraint use itself. While obviously speculative, the exercise is worth the effort due to the small amount of variance explained in the dependent variables in this and other studies. Of the variables used in the present study, it could be argued that physical restraint use may very well be indicative of something less tangible in the social atmosphere. It seems likely that administrative philosophy of care would be reflected in the propensity to use restraints. Furthermore, the social atmosphere or ambience of the facility could be reflected in and reinforced by the use of physical restraints. That is, unlike pharmacological restraints, physical restraints are visible to staff, visitors and other residents. Also unlike with pharmacological restraints, a resident often knows that they are being restrained (recall that the question asked of directors of nursing was whether the mechanisms in question

were used for *behavioural management* purposes). Thus, it is plausible that facility level physical restraint use may be an indicator of some other factor or factors that play some role in determining the survival probabilities of some residents. Linn et al (1977) argue similarly that RN hours and meal services are in and of themselves less important in determining resident mortality risk than they are as a representation of intangibles that come into play once a minimum threshold of structural care quality has been achieved.

### **Which facilities use restraints?**

The likelihood that a given facility will use more restraints than another facility for behavioural management appears to be related to a number of other factors. The regression model estimated in this study shows that physical restraint use is related to several other factors in the care environment. Facilities tending to use physical restraints for behavioural management also tend to use chemical restraints for the same purpose. The relationship is a relatively strong one and holds even when controlling for such factors as staff education and training, and the percent of the resident population that has severe dementia. It is possible that this is indicative of unit or facility philosophy, but other factors that may be important were not measured. Foremost among these other factors might be the level and type of agitated behaviours displayed by the resident population on any given unit. In other words, behavioural management that includes physical and chemical restraints may simply be more common on units that house persons with more behavioural problems. On the other hand, persons with dementia that end up in a special care unit often do so because of their behavioural problems. In this regard,

percent with severe cognitive decline may stand in as a proxy for type of residence (SCU or not) in the statistical model, since SCUs house those with greater levels of cognitive decline and those with behavioural problems that require special management. In fact, the model estimated originally included type of residence (SCU or not) and it proved to be highly collinear with the variable “percent with severe cognitive decline”. (For comparison purposes, a second regression model was estimated, in which type of residence was substituted for percent with severe dementia. Results were almost identical.) On the other hand, the research literature shows that type of residence is unrelated to resident outcomes in a consistent manner (e.g., Saxton et al, 1998). From this it appears that neither type of residence nor percent with severe cognitive decline are likely to affect outcomes. Furthermore, behavioural problems are not linearly related to cognitive decline. The relationship is more likely curvilinear, with behaviour problems declining as individuals move into the very severe stage of the disease. Future research should take this into account.

Other outcomes that were expected to have some effect did not. A better environment is not associated with the use of fewer restraints at the facility level. However, the environment could conceivably be involved in several ways to reduce the use of physical restraints. An appropriate environment for persons with dementia that includes home-like qualities, adequate lighting, is clean and has effective queuing for residents may contribute directly to a decrease in behavioural problems and thus a decrease in the need for restraints of any type. The more comfortable and oriented a person is, the less the tendency to display agitated behaviours. A facility built or altered

with the dementia resident in mind might also be part of a larger philosophy, one that eschews the inevitability of restraint use for any reason. Much of the research literature in the area is focused on the desirability of using fewer restraints while at the same time acknowledging the continued common usage of physical restraints. This is in evidence in British Columbia where facility level philosophies commonly require minimal or “least” restraint policies, but actual usage remains relatively high (Reid, Chappell, & Bater, 2001). It may be that enforcement of a minimal restraint policy - a policy with teeth - may be required if it is truly believed to be beneficial for residents. It is one thing to pay lip service to those interventions that are believed to be necessary to optimize resident quality of life; it is quite another to invest in their effective implementation and ongoing improvement. A superior environment, like restraint minimization and elimination, may simply be part of a larger comprehensive, effective and enforced philosophy of care. The environment may also have effects on staff, family and others. A better environment should therefore have beneficial effects on the social environment, which may work to reduce resident agitated behaviours.

Staff training and education were significantly related to physical restraint use in this study. As expected, facilities whose staff are better trained tend to use fewer physical restraints than do staff in other facilities. It is unclear from the research literature whether sufficient general training in dementia care is enough to effect a decline in physical restraint usage. It is clear that educational programs specifically designed to reduce the use of restraints can have the desired effects (e.g., Bradley, Siddique, & Dufton: 1995; Dunbar, Neufeld, White, & Libow: 1996; Ejaz, Jones, & Rose: 1994). The present study

uses a general measure of education, one component of which does address the provision of restraint reduction programs, and does emerge as a statistically significant predictor of physical restraint use at the facility level. This allows for the possibility that improved training and education in general may lead to a decline in physical restraint use and thus improve the survival probabilities of some residents.

Ownership also emerges as a significant predictor of physical restraint use. Privately owned facilities tend to use fewer physical restraints than do publicly owned facilities. Davis (1991) argues that privately owned, for-profit facilities may have a different approach to resident care than not-for-profit facilities. For example, for-profit facilities do not perform as well as not-for-profit facilities in prevalence of pressure ulcers and psychiatric care (Davis, 1991), while the former exhibit lower rates of urethral catheterization (Zinn, Aronson, & Rosko, 1993). Higher rates of such process factors as catheterization are often considered indicators of poorer delivery of care. Castle and Fogel (1998) examined the effect of ownership status on whether a facility is restraint free or not, and found that not-for-profit facilities are more likely to be restraint free. They argue that because restraint reduction is commonly (and incorrectly) seen as expensive due to factors such as increased liability and the need for more supervisory staff, for-profit facilities may be reluctant to explore restraint reduction programs or measures. Although this explanation appears sound, it was not provided with corroborative evidence in the present study. A possible explanation is that Canadian long-term care facilities differ in this manner in comparison to their US counterparts (the research cited above is all US-based). This may be due to differing policies that govern the use of physical restraints. It

may also be that the particular restraints that compose the restraint measure used in the present study are used with similar frequency in both countries and that their selection and subsequent compilation into one measure created a statistical relationship that would not hold if the measure were expanded to include other types of restraints (the US studies cited here use a wider range of restraint types). That is, an increase in the number of restraints included in a composite measure of restraint use would increase the variability of that variable. The relationships between this expanded variable and its predictors would therefore likely be different than those between the more restricted version and its predictors in the present study. Finally, the US studies cited tend to refer to “for profit” versus “not for profit” while the present study only made the distinction between private and public ownership. “For-profit” does not necessarily align with private ownership, since some privately owned facilities are not-for-profit.

The greater the percentage of the resident population with severe dementia, the more likely a facility is to resort to physical restraints. This finding is consistent with the research literature. Physical restraints tend to be seen as a legitimate method to deal with the behavioural difficulties that accompany an increase in the percentage of the resident population with dementia that a given facility may house (Burton et al., 1992; Mion et al., 1989). This likely reflects a resistance by many operators to the mounting research evidence that physical restraint use does not result in an increase in fall-related injuries (see Evans & Strumpf, 1989). In the present study, it also indicates that in special care units, which are residence to a greater percentage of severely demented individuals, physical restraints are more likely to be applied. The propensity of special care unit staff

to apply restraints may be conditioned to some extent by the behavioural characteristics of residents. Criteria for admission into special care are overwhelmingly behaviourally based (Reid et al, 2001). Individuals deemed eligible for admission often display any number of agitated behaviours, from verbally aggressive to physically non-aggressive to physically aggressive. Although this probably helps to remove individuals displaying unacceptable levels of agitated behaviours that may result in unrest or injury to themselves and others in non-special care units, it *does* serve to bring together a group of people in the special care unit that may not enjoy one another's company. That is, confining several individuals to a locked unit primarily because they exhibit challenging behaviours, may promote elevated levels of interpersonal friction. For staff, particularly in circumstances where under-staffing is the norm, physical restraints may become a more attractive alternative to the escalation of negative behavioural interactions between already-agitated individuals.

Flexibility in care routines also appears to play a role in whether restraints are used or not, but not in the expected direction. The more flexible the care, the greater the restraint use. Restraint use is not commensurate with flexible care. Flexible care is defined as the ability of the caregiver to adapt to the needs of the resident in the interest of promoting residents' freedom of choice, increasing resident cooperation, decreasing invasion of resident personal space, promoting a home-like atmosphere and decreasing caregiver workload and stress (Coulson, 1993). It can only be speculated that flexible care was not measured adequately in the present study. This is addressed more fully below.

To return to the possibility that physical restraint use acts as an indicator of something else, possibly social atmosphere, some support is evident. Facilities that

engage in one type of restraint use also tend to engage in the other. Of the two types, physical restraints are more obvious to the restrained individual and to others, and may therefore, as argued earlier, contribute to a less-than-optimal social environment or atmosphere. Chemical restraint use as a means of behavioural management is more insidious. Sloane et al (1998) found that frequent family visitations predicted increased likelihood of psychotropic drug administration.

In spite of the overwhelming research evidence that restraint use is not beneficial to residents (e.g., Strumpf & Evans, 1989), some facilities continue the practice. From the data analysed here, it appears that facilities prone to using one type of restraint are also prone to using the other type. It is worth noting that the relationship between chemical and physical restraints holds even after controlling for severity of dementia of the resident population and staff education. If it is accepted that increased propensity to use both physical and chemical restraints is indicative of the larger social environment, this could be interpreted to mean that the philosophy of care and associated social environment in such facilities are not conducive to enhanced survival probabilities.

### **Restraint use and quality of life**

It is argued by some researchers (e.g., Gibson, 1998) that for populations such as the one under observation in the present study, mortality is not a relevant outcome since it cannot be known whether longer or shorter duration of life is a positive or a negative outcome. It is, the argument continues, difficult at best to attribute length of life to the antecedent institutional processes that residents are subject to and it is almost impossible

to determine beforehand precisely what someone's life expectancy should be. While this position understates the value of research into the social causative factors of mortality risk, it does appropriately highlight quality of life issues for frail, institutionalized elderly persons. The ultimate outcome for everyone is death, but the road to death may consist of any given degree of quality, which in turn may partially determine risk of death. The findings in the present study are relevant to quality of life issues, which should be outlined here.

On the one hand, it is not difficult to imagine an environment in which restraints are commonplace. As argued previously, the effect this can have on all participants might tend toward the negative. Most recent research agrees that restraints, whether chemical or physical, are not beneficial to the person restrained (e.g., Schnelle et al., 1994). This begs the question, however, about those not restrained. Do restraints prevent some aggressive restrained individuals from injuring others? This is a quality of life issue for those not restrained. In the aggregate, the risk of serious interpersonal confrontation between residents or between residents and staff is not high. Main reasons given by staff for using restraints include resident disruptive behaviour and resident safety, among others (Janelli, 1994), yet the bulk of research in this area does not support such reasoning (Powell, 1989; Rubin, 1993; Yip, 1994). Furthermore, restraint reduction programs have shown impressive results, some recording sustained reductions in restraint use of 90% (Dunbar et al., 1996). Restraint reduction appears to be dependent on staff being made aware of specific alternatives to restraints (Mion, 1992; Werner, 1994). Bradley et al. (1995) report that resident falls and injuries did not increase following a restraint reduction program at

any of four participating sites. Whether or not other unwanted restraint reduction outcomes take place (e.g., increased violence towards others or greater risk of self-abuse) is dependent on the extent to which effective alternatives are available, known, effectively implemented (Strumpf & Evans, 1991). It therefore seems likely that restraint reduction can in general be seen as a positive event, one that is likely to contribute to resident quality of life, provided these alternatives are used. Thus the findings of the present study, that residents in facilities that tend to employ more restraints have a greater risk of mortality, are not unrelated to quality of life of residents.

#### **Important resident characteristics and states**

Two ascribed resident characteristics stand out, as they do in the general population, as predictors of survival. Males and older individuals are at increased risk of death. Greater resident physical dependence also results in a greater probability of death following admission. Similar findings have been reported elsewhere (e.g., Wolinsky et al., 1993). Although these findings are not surprising, they do have implications for the role of long-term institutional care in the future. Assuming that the admitted resident populations of long-term care facilities will become increasingly old and frail as the population itself ages, it seems likely that death rates within the institution will increase as well. It is estimated that 20% of all deaths in the United States in 1993 were among residents of nursing homes. It is expected that this figure will rise to 40% by 2020 (Brock & Foley, 1998). This, in turn, will have implications for the types of care provided and will shape the very purpose of long term care facilities. For example, evolution towards

an increasingly palliative model of care may be inevitable as the resident population becomes older and more frail.

In the present study, results indicated that age and gender do not affect risk of death in the 2 or 3 months immediately following admission. The expected relationships do appear after 3 months and do appear to gain momentum over time, however, with males and older residents showing elevated cumulative death rates when compared to females and younger residents. One explanation might be based on the procedure used to screen out those likely to die before 12 months in a facility. If the procedure successfully screened out older persons and males at higher risk of death, the remaining newly admitted residents would be composed of persons not expected to die in the near future. The influence of age and gender would then be muted or removed, at least for the brief period following admission. Given the difficulties involved in predicting mortality risk over a longer period of time for the population of interest, one could reasonably expect these two most important influences to re-establish themselves after a short period of time. In this scenario, the similar death rates for males and females, young and old, are essentially the result of a selection procedure.

It is unknown, however, the extent to which the screening procedure was successful at identifying persons at high risk of death, and what those individuals' characteristics were. Given that 89 of the 405 study participants actually did die, despite the screening procedure, it is equally reasonable to speculate that the screening procedure was minimally effective, and that the lack of difference in death rates by age and gender immediately following admission was the result of something other than the non-

selection of older persons and males at higher risk of death. It may be possible that the effects of age and gender are temporarily suspended by some aspect or aspects of the relocation process. If this is so, future research into the reasons for the lack of influence of age and gender immediately following admission would be valuable.

### **Variables that did not appear to influence survival**

Although one relationship between a quality of care variable and risk of mortality was evident in this study, the most important result is the general lack of relationships. Of note is that chemical restraint use is, while moderately and positively correlated with physical restraint use was directly unrelated to risk of death. This might be explained by the nature of these types of restraints. Physical restraints are visible, uncomfortable in cases where a person resists their application, and tangible. They are a potential identifiable source of embarrassment and indignation for the person so encumbered, and may, as discussed above, contribute to a general sense of helplessness and hopelessness. An individual so distressed may be at greater risk of death, particularly in cases where the person is resistive and is at least partially aware that they oppose the application of any such mechanisms. Chemical restraints, on the other hand, would likely have the opposite effect. Chemical restraints are defined in this study as psychotropic medications - anxiolytics, neuroleptics and antidepressants - which are in general designed to reduce symptoms of anxiety and depression. Unlike physical restraints, such chemical restraints are more likely to have a calming effect. While this does not appear to translate into a

barrier against risk of death, it stands in marked contrast to the apparent direct effect of increased physical restraint use.

Given the research attention afforded the environment, one would expect it to be related either directly or indirectly to mortality risk. Yet it is unrelated in the present study. It is of course possible, as it is with all other dimensions of care, that the attainment of a certain threshold level of environmental appropriateness ensures optimal outcomes (including minimizing risk of death). Assuming that all participating facilities have attained this threshold, it should be expected that other factors would exert an influence on risk of death. If this is the case, facilities would be well advised to abandon efforts to improve these dimensions of care (or generically, quality of care), and to ensure maintenance of current care practices while redirecting resources towards identifying these other, unknown factors. In a world with perfect measurement, one could rest assured that such an approach would be of great potential value. However, as has been shown repeatedly, measurement is not developed to the point that such an assumption would be warranted. Aneshensel et al (2000), for example, think that their measure of care quality may not capture the relevant aspects of care quality that might impact on resident survival probabilities. Moreover, care quality in general has not proven amenable to consistent and effective measurement within and across studies.

As has been discussed earlier, however, there exists some research that does show an effect of individual care quality dimensions on resident mortality. For example, higher registered nurse staffing levels have been associated with lower mortality rates (Cohen & Spector, 1996; Linn et al., 1977; Porrell et al., 1998), a better environment is associated

with improved survival (Braun, 1991), as has increased resident participation in organized activities (Spector & Takada, 1991). The present study indicates that facility physical restraint use is related to decreased survival probabilities.

### **Social causation or social selection?**

From the evidence uncovered in the present study, it appears that social selection is more important than is social causation in determining who will die and who will not, at least during the first 12 months in a long-term care facility. As is the case in the general population, men are at higher risk of death than are women, and older persons are at greater risk than are younger persons. Likewise, greater levels of physical dependency are related to greater probability of death. This is not, of course, surprising in and of itself. Very old, frail men with moderate to severe dementia who reside in a long-term care facility can be expected to die with relative frequency. Nonetheless, a very small percentage of the variation in the occurrence of death is explained by resident characteristics and behaviour states despite their relative importance when compared to the dimensions of care. That is, social causation is important but it does not explain the lion's share of the variance. This leaves open the question of what does explain that variance. The following (concluding) chapter provides a discussion of the limitations of the present study, and offers suggestions for future research.

## **Chapter 5: Conclusions**

### **Introduction**

The purpose of this study was to determine the effect of quality of care on mortality for long-term care residents with dementia. Mortality, the dependent variable, was measured in two ways; first as occurrence versus non-occurrence of death without regard for time, and second as occurrence versus non-occurrence of death with month of death accounted for. Quality of care was measured along 6 dimensions including: flexibility of care; physical environment; assessment procedures; staff training and education; physical restraint use and pharmacological restraint use. The panel selection variable was added in an attempt to measure the effects of intangible factors on mortality. It was hypothesized that higher quality of care would result in greater survival probabilities. To be specific, residents exposed to greater flexibility in care, a superior physical environment, effective assessment procedures, high levels of staff training and education, and relatively low levels of physical and pharmacological restraint use would exhibit higher survival probabilities. A logistic regression model was used to test for the effect of quality of care on the former dependent variable, and Cox regression for the latter.

Five major conclusions were reached. First, survival probabilities were unrelated to length of stay following admission. This may have been due to procedures that were intended to screen out individuals who were likely not to survive for 12 months post-admission. Second, of the quality of care variables, only facility use of physical restraints

showed a relationship with mortality. In both models, greater facility use of physical restraints was associated with elevated risk of death among residents. Third, resident characteristics and behaviours including older age, male gender, and greater physical dependency were much more powerful predictors of mortality than were the quality of care indicators. Thus, while social causation was evident, social selection variables accounted for most of the explained variance in each model. Fourth, although the social causation and social selection variables accounted for a statistically significant proportion of the explained variance in the dependent variable, a far greater proportion remained unexplained. Improved conceptualization and measurement of quality of care is needed. Fifth, the number of physical restraints used by a facility is related to a number of other factors, including chemical restraint use, staff training and education, ownership, flexible care routines and percent of residents with severe cognitive decline. This suggests the existence of a complex series of causal mechanisms which ultimately operate to exert an influence on the outcome of interest, risk of death.

### **Study Limitations**

The measurement of mortality proved to be problematic. Exact date of death would be preferable, but the larger question concerns timing of death. There is good evidence from a number of studies that mortality is highest shortly after admission (e.g., Aneshensel et al., 2000). According to this research, death rates appear to stabilize thereafter (although it must be expected that everyone will die at some point after admission). It might therefore be expected that different causal factors are in operation

shortly after admission than is true later in the resident's tenure in a long-term care facility. If the variable of interest is mortality shortly after relocation, it would be necessary first to determine the shape of the survival curve within the population of interest to verify this assumption, before going on to specify the covariates. If interest is in longer term mortality risk, an adjustment of covariates would likely be required. The focus might even shift from predicting risk of death to predicting propensity to live despite the inadequacies of care provided. An understanding of what does produce more months or years of life may be more informative than the study of risk of death. This shift in thinking might more appropriately focus research on quality of life, since the factors that promote lengthened life would then be front and centre. Some researchers in fact see death as an entirely inappropriate outcome for a frail and demented population such as the one studied here. For example, Gibson (1998) asks whether a shortening or lengthening of life is desirable. It is acknowledged that death may be valuable as a marker or as an outcome of care quality in the acute care setting, but that for chronic care the focus should be on quality and not quantity of life.

Furthermore, determination of life expectancy for an individual is difficult, as was shown in the present study. If it is not known how long a person is expected to live, it is that much more difficult to determine whether the care they received prior to death contributed to or delayed their demise. The relationship between death and care quality is rendered yet more difficult to establish given the differing units of analysis used. Death was measured at the individual level and care quality at the facility level. The extent to which any given resident participating in the study is actually influenced by any care

intervention or combination of care interventions can only be inferred. For example, a facility may provide the most flexible care possible, but it is not possible to know with certainty that a given participant in the study was subject to (and thus potentially influenced by) the flexibility measured at the facility level. Flexibility may be at a high level for that facility, but it may have no perceptible impact on any given individual. Future research (see below) needs to solve the difficulties caused by different units of analysis.

Turning to the measurement of quality of care dimensions, it is clear that staff education and training are important for resident outcomes. Although the present study found no effects, many other studies have (e.g., Lindeman et al., 2000). The present study measured this dimension using a series of questions on the provision or non-provision of types of training for different staff groups (e.g., care aides, registered nurses, licensed practical nurses and support staff). These questions did not delve into the actual dementia care knowledge of each participant, nor did they look at length of training time, quality of instruction or uptake of course content. Likewise, work experience was not accounted for. This factor may work interactively with availability of courses that provide improved dementia care practices, as well as attendance by each staff member. Attendance and availability may be shaped by the incentives provided by the facility, which in turn would result from the care philosophy employed by the facility administrators, as well as available resources.

Pre-admission and admission procedures were measured through the use of only 3 questions regarding the use of standardized forms for each procedure. The two

components of this dimension would more appropriately be treated as separate dimensions. Pre-admission procedures should stand as a single dimension and admission procedures might be amalgamated with care practices and routines. Pre-admission procedures involve a complex set of interactions between facilities and individuals. If, when and where an individual is admitted to a facility is dependent on a number of factors, including government policy. In British Columbia, for example, recently enacted government regulations require that a potential resident be assessed and wait listed prior to being placed in a facility. The potential new resident is required to accept the "bed" offered to them regardless of its proximal location. Subsequent moves to other facilities are allowed after 6 weeks in the first facility. Initial placement is based partly on resident preferences, partly on availability of beds, and partly on a host of other factors such as whether or not the individual has special needs or whether they require security (due to wandering, for example). In short, the procedure is complex and not easily measurable, and it is not likely generalizable from one jurisdiction to the next due to some extent to differing government policies.

Flexible care routines were measured using two questions. One asked whether the facility integrated activities into day-to-day living and the other whether or not support staff received instruction in activation techniques. These were combined to form a single measure. If flexibility of care is taken to mean the degree to which staff members adapt to meet the needs of the resident (Coulson, 1993), then the measure clearly fell far short of capturing this meaning. Effective measurement of flexibility in care would probably require on-site observations of care in practice. Furthermore, the ability of staff to be

flexible, even in facilities where flexibility is valued by staff, can be mitigated by such factors as low staff-to-resident ratios. The meaning, and the effect, of flexibility might be very different from one facility to the next depending on the extent to which staff members are able to be flexible.

One of the strengths of the present study was its method of measuring chemical and physical restraint use in a facility. Restraints are generally frowned upon but commonly used. Directly asking whether restraints are used in a facility would likely result in socially desirable responses, and the incidence of restraint use would be underestimated. By asking whether psychotropic drugs or physical restraints (referred to only as “one of the following” and not as restraints per se in the actual question) had been administered in the previous year for the purpose of behavioural management, a broad understanding of the extent to which each facility tended to administer restraints was gained.

A similar approach might be taken at the facility level again, but not at the resident level of measurement. At the facility level there remains the concern that the measurement of restraint use took place prior to actual measurement of resident outcomes. The level and types of drug use may have changed during that period of time. At the resident level, one needs to define clearly what restraint use is prior to attempting to measure it. That is, any type of psychotropic can be considered either a restraint or a therapeutic intervention. Likewise, any type of physical restraint can be considered either beneficial (if not for the resident to whom it is applied, then for the other residents and

staff who may end up in harm's way if the restraint were not applied) or otherwise. One must carefully consider what a restraint is and why before proceeding to measurement.

The physical environment, on the other hand, can be measured directly. The TESS probably measures the physical environment adequately, but includes only one question regarding the social environment. The social environment can consist of a wide array of variables, not least of which would be staff attitudes and perceptions, job stress, and work satisfaction.

In an effort to measure the intangibles of quality of care, the present study convened several expert groups to determine which were the best facilities in each region of the province. Although the variable derived from these consultations did not prove to have any effect on mortality, the idea is one worth pursuing. Studies in this area are rarely able to explain much of the variance in the dependent variable, whether mortality or otherwise. In the present study, less than 20% of the total variance in mortality risk was explained by the independent variables. It is likely that more effective measurement of resident characteristics including health status would explain a greater proportion of the variance in mortality risk. However, even if these resident factors are measured with extreme precision, it is still likely that unexplained variance in mortality risk would remain. Much of the remaining unexplained variance may be accounted for (explained by) factors that are currently conceived of as intangibles.

**Other study limitations**

The present study was subject to a number of other limitations. Some of these were unavoidable due to cost considerations, but remain technically as limitations and will be addressed here. Others were due to the nature of the work in this area. That is, quality of care itself is inherently difficult to conceptualize and operationalize. This does not mean that improved conceptualization and measurement of care quality should not be attempted, but that the evolution of such measures often involves “three steps forward and two steps back”. Limitations in measurement, as we have seen in the previous section, should be seen in this light. A third category of limitations refers to statistical and methodological limitations such as sample size and study design.

The present study made the assumption that care quality remained constant for the duration of the study. Checks were in place to ensure that care quality did not change appreciably during the study. These included an ongoing assessment by research assistants that fundamental changes in care were not occurring (two facilities were dropped due to fundamental observed changes). In addition, the TESS environmental instrument was administered at the beginning and at the end of the study in each facility to ensure that fundamental environmental changes were not taking place. Major changes in TESS scores would have resulted in the elimination of a facility from the study. The main problem with this approach is that it may not account for changes in the social environment. It has been argued earlier in this paper that intangibles that reside within the social environment may account for some variation in resident outcomes, in this case risk of mortality. If this is so, it would be necessary to monitor changes in the social

environment - in the ongoing interactions between staff, residents and others - over time. It may very well be that residents living in facilities that are subject to changing social atmospheres are more at risk for negative outcomes than are those in stable environments. Instability in social environment may be related to resident mood, behaviour and general quality of life. This possibility becomes more real when one considers the research showing the relationships between resident outcomes and staff turnover. High turnover is associated with poorer outcomes. Staff turnover, it can be speculated, is directly related to social environment. Increased staff turnover may result in a less stable environment and, if so, it would be necessary to monitor it. Moreover, this points to the need to monitor the social environment - as well as other aspects of the care provided - either indirectly through such factors as staff turnover, or directly through the development of a method of measuring the social climate or environment. This suggests the need for both qualitative and quantitative methodologies: qualitative to more thoroughly investigate what the social environment consists of, and quantitative to render the qualitative findings measurable via an instrument or instruments. The changing nature of the social environment and other components of the care environment also suggests that repeated measures of key indicators are needed.

While the sample size was adequate to deal with the question at hand, a larger sample would be desirable. Given the difference in survival probabilities between men and women, it may be desirable to collect a sample large enough to complete separate analyses. One would need to over-sample males, given that they represent a smaller proportion of the institutional population. Furthermore, it may be of value to gather a

large enough sample of older males to compare with other age/gender groups, given that in the present study they tended to be at much higher risk of death than did those in other age groups. Assuming that death rates by gender and age would be similar to those in the present study, a larger sample of residents with these demographic characteristics would result in a larger number of deaths than were observed in the present study. The ability of any given statistical test to detect effects where effects are present would be increased by both increased sample size and by the larger number of events.

The present study did not account for the long term health and living arrangement history of the resident. The literature on relocation of elderly persons documents a series of negative reactions, from discomfort to death (Lieberman, 1991). This suggests that, at the very least, information on number of relocations should be collected. Some individuals may have entered one of the long-term care facilities under study directly from their own home and they may live out their lives in that particular facility. In their own home, they may have received care from their immediate family and, say, some measure of formal home care. Other individuals may experience a different path to institutional care. For example, an individual may move from their own home to a son or daughter's home, from where they may move to a second choice facility before being admitted to their first choice facility. The decision to enter an institution may not be their decision at all, and may result from the decision of family members who think it in the best interest of themselves, the individual in question, or both. There are many possible paths to institutionalization, and then paths between institutions for some. It may very well be that the type of path the institutionalized person takes will have some bearing on

their risk of death as well as on other outcomes. A person who has transferred between 3 facilities in the months prior to being admitted to the facility under study may be at greater risk of death, net of other influences, than the person who goes relatively willingly into their first choice facility. These previous paths of each individual might allow better explanation of the risk of death.

### **Policy and practical implications**

Several practical and policy implications arise from the findings of this study. Consistent with the main body of research literature on the effects of physical restraint use, the present study found that physical restraint use is detrimental and, specifically, can be related to a greater probability of death. The most obvious implication is that physical restraint use should be reduced. This means devising procedures for enacting, monitoring and enforcing a non-restraint care routine. It suggests likewise that alternative care procedures be provided for instances where physical restraint use might seem the only course. It means further that alternative potential restraints, such as certain psychotropic drugs, be covered at the policy level. Moreover, it indicates the need for defining what a restraint is and making effective rules for its use or non-use. For example, a bedrail may or may not be considered a restraint, depending on the circumstances and the care provider's understanding of what constitutes restraint use. In one circumstance a resident may fall and receive an injury without a bedrail, whereas another resident may be injured because a bedrail was raised. Similarly, psychotropic drugs may in one circumstance be

unequivocally beneficial and detrimental in another. An effective policy would need to deal with these and other related issues.

The most important of these other issues is probably staff education. The lynchpin between any policy affecting provision of care and, consequently, resident outcomes is the facility staff. The extent to which a facility requires and encourages relevant and periodically upgraded education is probably directly related to the degree to which staff recognize which situations call for restraint removal or non-application. In this regard, research has shown clearly that restraint reduction programs can and do result in the application of fewer restraints (e.g., Capezuti et al., 1999; Ejaz et al., 1994). In the United States, a combination of legislation (OBRA '87 - enacted in 1990) and education have been credited with a reduction in restraint use in nursing homes from 40% in 1990 to 16% in 1998. Corresponding figures are not available for Canada.

Although the findings in this study do point to the desirability of reducing the incidence of restraint use, the larger overall finding is that quality of care appears to have little effect on risk of death for institutionalized elderly persons with dementia. The issue, then, is much less about which policy and practical implications arise from the findings, than whether there is any relationship between quality of care and risk of mortality. Measurement issues are addressed above, as is the adequacy of mortality as an outcome for this population.

### **Future research**

The role of the long-term care institution in Canada is changing as the profile of the seniors population evolves primarily in response to demographic shifts in previous decades. In particular, the baby boom and the subsequent (and sustained) baby bust have assured the growth of the seniors population both as a proportion of the total population, and in sheer numbers. The especially rapid growth of the older seniors (75+) has been documented and, barring the development of a cure or effective preventive measure, it is likely that long-term care facilities will become the residence for increasingly frail and demented individuals. Frailty and dementia are associated with a higher risk of death. Facilities, therefore, are likely to see their roles evolve, logically towards a palliative model. This is not to say that some individuals will move into long-term care facilities and not live some unspecified number of years. It is, rather, to point out that mortality is likely to occur more frequently in this care setting. If quality of care does affect length of life - whether or not it is the goal of the care provided to lengthen life - care providers, residents and their families should be aware of the potential affects of care decisions. That is, even if the stated goal is maximum quality of life without regard for length of life, the risks to length of life emanating from any given type or intensity of care should be known.

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**Appendix A****Bivariate correlations for death with each of “chemical restraints”, “staff education” and “physical restraints”, by assessment category**

<b>Care dimension</b>	<b>Assessment category</b>		
	<b>0 or 1</b>	<b>2</b>	<b>3</b>
Chemical restraints	-.217*	-0.033	0.127
Staff education	-.210*	-0.07	-0.103
Physical restraints	-0.002	0.085	.196*
N	36	150	145

\* p&lt;.05