

**HEALTH SERVICE UTILIZATION DURING TRANSITION
FROM COMMUNITY TO INSTITUTIONAL LIVING**

by

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ABSTRACT

An evaluation of health service utilization (HSU) patterns among an elderly BC cohort during the transition from community to institutional care was conducted. Social process theory provided the theoretical framework for HSU during the transitional period. The sample was derived from a linkage of participants from the Canadian Study of Health and Aging (1991-2001) and the BC Ministry of Health administrative dataset from 1986-2001. Cost per day at risk (CPDAR) for Continuing Care, Medical Services and Pharmacare costs was used to determine if individuals experience a “flurry of HSU activity” in the 12 months prior to institutionalization compared to previous HSU. Medical services and Pharmacare costs were also examined for differences pre and post institutionalization. Last year of life among institutionalized elderly was evaluated for increasing HSU. The effect of declining cognitive function on HSU was also examined over the transitional period. Results revealed an increase in HSU just prior to institutionalization and a decrease in medical services and Pharmacare costs following institutionalization. HSU costs were higher for institutionalized elderly who died within 12 months of being institutionalized. Cognitive decline did not have a significant effect on HSU costs during the transition. In conclusion, there was a notable increase in HSU patterns just prior to institutionalization reflecting an attempt by individuals and families to re-adjust their healthcare to stabilize medical and social conditions. Future research is needed to determine ways to best assist individuals and families to minimize the cost increases during this transitional period. Services provided in institutions have cost benefits that could be applied earlier during the transition period to minimize costs and assist individuals and families.

DEDICATION

Many people have provided substantial guidance and support to me during this process. I wish to formally acknowledge them. Drs. Lynn Beattie and Alan Donald who helped in the formulating of the idea and structure for the study and provided unrestricted hours of guidance, encouragement and assistance. They are both very giving mentors. I would like to particularly thank my parents, Hildegard and Karl Sauter who always encouraged me to set higher goals for myself. I would also like to thank Michele Assaly for being a best friend during this process. Finally, this thesis could not have been produced without the help and encouragement of Drs. Gloria Gutman and Norm O'Rourke. I am forever grateful to you both that you provided the final push to get this done.

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CHAPTER I

Background and Statement of the Problem

1.1 Study Background

In this age of fiscal restraint, the Canadian healthcare delivery system is undergoing review and implementing a number of dramatic policy revisions that are affecting the healthcare received by individuals across the lifespan (Romanow, 2002). This is especially evident in Continuing Care policies that deal with the transfer of elderly persons from their private community-based homes to residential care facilities when individuals are no longer able to cope on their own. As government funding and subsidies become scarcer, there are incentives to keeping elderly at home in the community longer with added social and health supports that are less costly to implement than institutional placement (Hollander, 2003). Additionally, a growing proportion of Canadian seniors are voicing their interest in how the healthcare system responds to their housing and healthcare needs as they age (National Advisory Council on Aging [NACA], 2000). Seniors are concerned about receiving timely, affordable and family oriented health services. They expect coordination and monitoring, an available range of services, appropriate settings of care and opportunities for self managed care (NACA, 1997).

In addition to changing healthcare policies and a stronger public voice among seniors, population demographics are expected to change significantly in the next 20 years. It is projected that by 2021, 19% of the Canadian population will be aged 65 and older and by 2041 that proportion will increase to an estimated 25% of the population (Statistics Canada,

2003). The fastest growing segment of the senior population is expected to consist of individuals aged 85 and older. This oldest-old group is expected to increase five fold by 2051 compared to current numbers (Statistics Canada, 1999a).

Over a quarter of the oldest-old seniors live in institutions, making institutional care a vital component in delivering senior healthcare in the country, even with changing policies that focus more on homecare. In British Columbia, 25.3% of the oldest-old are currently living in institutional settings, while overall in Canada, that percentage is 31.6% of those aged 85 and older. Elderly women are more likely than men to be residents of these institutions and are more likely to be widowed than their male counterparts (Statistics Canada, 1999a).

However, male residents tend to live within institutions for a shorter period of time (29% < 1 year) than do woman (20% < 1 year; Statistics Canada, 1999b). In 1996, Statistics Canada reported that 265,515 Canadians (7.5%) aged 65 and older were living in institutions (Statistics Canada, 2003). By 2001, 287,475 (7.4%) elderly Canadians were living in institutions, of which the majority were female (205,400; Statistics Canada, 2003). Generally, the oldest-old have the greatest need for healthcare and social support, indicating that the need for long-term care facilities will continue to grow as the number of older individuals increases.

Additionally, as the population ages there will be an increase in diseases that affect the elderly, especially dementia. There were an estimated 60,150 new cases of dementia per year in Canada (Canadian Study of Health and Aging [CSHA], 2000) and half of Canadian seniors diagnosed with dementia live in institutions. The three predominant chronic

conditions among institutionalized elderly are dementia, incontinence, and stroke; conditions which are consistently reported to have a strong association with risk of institutionalization (Rockwood, Stolee & McDowell, 1996; Simonsick, et al., 2001).

Thus, a picture of the future begins to emerge: a growing proportion of seniors, many with dementia are becoming key players in a healthcare system trying to refinance itself with a greater emphasis on homecare versus institutional care. The changing dynamics have supported a new focus in healthcare research on the continuum of care (Hollander & Prince, 2002).

1.2 Statement of the Problem

Although recent emphasis on healthcare fiscal management has resulted in research on health service utilization (HSU) cost comparisons between community and institutional care (Hollander, 2001; Chappell, 2004), some significant shortcomings remain in the emerging literature concerning the process of institutionalization. Little emphasis has been placed on researching HSU patterns in the period just prior to entering an institution. For clinicians reflecting on their patients' move from community to institution, a "flurry of activity" is believed to exist where care needs multiply and family and healthcare professionals attempt to stabilize and keep an elderly person in the community. Can this perception of an increase in activity prior to institutionalization be indicative of a unique transitional period? Can the "flurry of activity" be operationalized as HSU costs, and can it be distinguished from earlier HSU and from services received once placement in an institution setting has occurred? It has been noted that transitional periods can be

potentially perilous for the elderly when new care providers lack timely and complete information about medical history, medications, care preferences and care needs (Murtaugh & Litke, 2002). Therefore, if HSU patterns are unique during this transitional period, there may be more efficient means of allocating resources to alleviate potential stressors on individuals and the healthcare system. Additionally, if research can pinpoint distinctive transition periods occurring in the continuum of care provided to seniors that are costly compared to other care periods, this may be an indication that there are missing service components or access to services is not being achieved in a timely manner.

Linkage of a cohort of British Columbian participants in the CSHA study with their provincial healthcare utilization data presents a unique opportunity to examine HSU and costs among the elderly, over a substantial period of time before and after transition from community to institutional care. The fact that the CSHA study sample was randomly selected from the BC population 65 years and older, removes much of the selection bias found in convenience samples with similar HSU data. The majority of prior HSU studies have been cross-sectional and limited to pre-institutional utilization rates and costs. They have for the most part focused on identifying risk factors associated with high utilization rates prior to institutionalization. The added benefit of the linkage sample is that individual cost patterns can be derived for each participant from earlier years to act as a comparison to costs in the year prior to institutionalization and costs post institutionalization.

CHAPTER II

Present State of Knowledge

The following literature review provides background on components surrounding the healthcare transition from community to institutional care. In the first section, an overview is provided of the current state of institutional care in Canada with all indicators forecasting an ongoing need for institutional care. Findings from early studies on transitions from community to institutional care in BC are described. Since caregivers are an important factor in determining when an individual enters an institution (Cohen et al, 1993), some of the key findings pertaining to caregivers and institutionalization are presented.

Additionally, a review of the elderly as users of health services provides background literature on patterns of use, prior use, cognitive impairment and service use, and use in the last year of life. Pilot work using the BC Linked Health Database (BCLHD) and the CSHA is presented as an introduction to the HSU cost measures applied in this study and preliminary findings regarding predictors of HSU for the linked sample. Finally, a theoretical framework based on social processes or networks is presented as a viable approach to explaining HSU in the period of time just prior to institutionalization.

Previous research has provided very limited information on health service utilization (HSU) patterns in the year prior to entering an institution. Analyzing patterns of use just prior to institutionalization relative to previous healthcare use and compared to amalgamated costs that come with institutionalization should provide some insight into this transitional care period and an idea of how elderly individuals and their caregivers use health services.

2.1 Institutional Care in Canada

Healthcare restructuring has placed emphasis on cost comparisons of home and institutional care (Hollander, 2001; Chappell, 2004). This has resulted in policy initiatives in BC intended to lower provincial continuing care expenditures through a process of shifting services and funding to home based care and supportive living options, thereby decreasing residential care utilization (British Columbia Ministry of Health and Ministry Responsible for Seniors, 2000). Yet, because of projected senior population increases, the number of institutionalized persons is still expected to increase significantly in coming years.

Institutionalization is an important part of dementia care in Canada, with half of elderly Canadians with dementia living in institutions (Canadian Study of Health and Aging Working Group, 1994a). This is in spite of recent de-institutionalization policies (Jacobzone, Cambois, Chaplain, & Robine, 1998) that have seen the national institutionalization rate fall from 10% in 1971 to 7% in 2001 (Statistics Canada, 2003) and an actual increase in real numbers of institutionalized elderly. Current policy initiatives and research have focused on the potential substitution of health services available for the elderly (Tuokko & Rosenberg, 2001); however, critics have noted that shifting care to the community has not seen a parallel shift of funds from acute and long term care to community home care (Steering Committee of the Review of Continuing Care in British Columbia, 1999) or an overall decrease in healthcare costs.

2.2 Transitions from Community Care to Institution

As part of the National Evaluation of the Cost-Effectiveness of Home Care project, Sub-Study 2, Uyeno and Hollander (2001), looked at care trajectories of Continuing Care clients in British Columbia in an attempt to document patterns of client movement in the care system. Rather than finding common logical patterns for care trajectories, the authors found complex patterns of care for BC clients that prevented further analysis to try and cost the most common care trajectories. Over the 10 year period from 1987/88 to 1996/97, a quarter of the service utilization records examined showed a pattern of clients entering the system while in the community, making use of some home services without changing care levels and then dying while remaining in the community without moving to an institution. Just over 20% of the records indicated that the client had moved from community to an institution. Of these records, 16% of clients died in the institution over a 10 year period, with the highest proportion of deaths occurring within 6 months of institutionalization (22%) and within 3-5 years of institutionalization (22.9%). The majority of moves to institutions were among clients who entered the system at higher levels of care. Two-thirds of all clients in the system died over the 10 year period. The authors noted that further research was needed to determine the factors that led to what they felt was a high proportion of deaths in their study sample and notably to find out if delays in care may have contributed to these deaths (Uyeno & Hollander, 2001).

Earlier research on the transitions from community to institutional care in BC was completed by researchers using a long term care admission cohort from 1981-1982 and

followed for five years (Stark, Kliewer, Gutman and McCashin, 1984; Stark & Gutman, 1986; Ellencweig, Pagliccia, McCashin, Tourigny & Stark, 1990). Stark and Gutman's (1986) follow-up of Continuing Care clients in BC found that over a third (34.3%) of personal care level clients (the lowest care level) were still in the program after five years, with 14.5% still receiving home care at their admission level, 6.7% receiving higher levels of care in the home, and 11.7% having moved into an institution for more care. Over a third of the clients had died (38.9%), while the remainder were discharged from the program. Ellencweig and colleagues (1990) examined the same data and compared HSU before and after institutionalization. They reported a reduction in hospitalizations and physician visits following admission to an institution compared to community care.

More recently, Wilson and Truman (2004) reported on HSU before and after institutionalization for Alberta clients in long-term care facilities from 1988 to 1990. Hospital and ambulatory services decreased after institutionalization while physician visits increased post institutionalization. Pharmaceutical use was not included in this study nor was a cost comparison of home care services prior to institutionalization and institutionalization costs. The authors note that institutionalization has the potential to benefit its residents with specialized programs and services that they may not have received while in community care.

2.3 Caregivers and the Decision to Institutionalization

Caregivers have noted that their decision to have a relative admitted to an institution comes only after having exhausted family and community supports (Smallegen, 1985). Caregiver

interviews by Smallegen found that 88% of elderly persons admitted to nursing homes had long-standing health problems (over a year in duration) and only 9% had problems that could be considered sudden and recent. However, while most elderly had an average of four health problems, many reported that one problem had become acute over the last month prior to admission in addition to two problems that were precipitating factors in the decision to seek nursing home care. Over 80% of elderly admitted to a nursing home had been recently hospitalized and 93% could not walk well when admitted to the nursing home. Over 70% had received substantial help at home from family, formal services or private resources prior to nursing home admission. The change from community care to a nursing home was often a result of negative health changes in the individual, with at least 30% of families indicating the individual needed 24-hour care at the time of admission. Caregivers also indicated that institutionalization was necessary because of their own exhaustion, difficult behaviour from the elderly person, and their own ill health. For those with caregivers, the closer the kinship of the caregiver, the longer it seems the individual was kept out of a nursing home though the impact of caregiver burden seemed to mediate the effect of kinship (Smallegan, 1985; Canadian Study of Health and Aging Working Group, 1994b). Additionally, living alone was a risk factor for institutionalization (Smallegan, 1985; Canadian Study of Health and Aging Working Group, 1994b; Molloy, Bédard, Pedlar, & Lever, 1999).

Using data from the CSHA it was found that among a community dwelling group of elderly with dementia (Hébert, Dubois, Wolfson, Chambers, & Cohen, 2001), over 50% entered an

institution during the five year period following initial contact with study personnel.

Institutionalization in this study was largely mediated by the level of disability and type of dementia (e.g., Alzheimer disease) and less so by severity of dementia. Significant caregiver factors affecting institutionalization risk were the age and kinship of the caregiver (i.e., not a first degree relative), level of burden and caregiver health problems.

Interestingly, this Canadian analysis showed regional differences in institutionalization risk. British Columbia was one of three regions in Canada with a significantly greater risk of the elderly with dementia becoming institutionalized, possibly the study authors suggest, reflecting the lack of home-care services. In an earlier study, Shapiro and Tate (1988) found that for individuals who were 85 years and older with no spouse at home, a recent hospitalization, living in retirement housing, impairment in one or more ADL and psychological/psychiatric problems there was a 62% risk of institutionalization within two and a half years compared to a 4% risk for the same individuals without any of these factors. In Taiwan, caregivers' preference for institutionalization, caregivers' needs for followup medical and social services, and perceived caregiving resources were significant predictors of an elderly person being placed in a nursing home following hospital discharge (Shyu & Lee, 2002). The relevance of Asian caregiver studies should be considered in future provincial healthcare policy and HSU strategies given the large and growing Asian community in British Columbia. Notably, cultural values among the BC Asian communities, may affect how and when Asian caregivers decide on institutionalization (Torti, Gwyther, Reed, Friedman, & Schulman, 2004). These studies stress the necessity of

including caregiver factors (regardless of cultural background) when assessing how and when institutionalization decisions are made.

2.4 The Elderly as Users of Health Services

Longitudinal data from the province of Manitoba continue to show that a small segment of the elderly use the highest proportion of health services (Roos & Shapiro, 1981; Menec, MacWilliam, Soodeen, & Mitchell, 2002). This finding is in contrast to the view that all elderly are high users. These authors also noted that it is this small group of high users who are most likely to continue accessing a large proportion of the health services in the future. As Roos and Shapiro (1981) point out, this is similar to utilization patterns of a select subgroup seen in other age groups. In their review of the literature, Rosenberg and James (2000) found that physician, hospital and ambulatory services were most heavily used by women and elderly persons over the age of 75. The authors noted, however, that heavy use did not indicate a *misuse* of the services. Indications are that predictors of whether services are used or not (service contact) may differ from predictors of volume and duration of service utilization (Bass & Noelker, 1987). Volume of service use may be one important difference in service patterns just prior to institutionalization.

HSU research can focus on different perspectives such as societal perspectives, health care perspectives and hospital perspectives. Societal perspectives considers all costs and health effects and is the broadest perspective. Research regarding HSU from a societal perspective takes into account intensity of HSU and not just variability in service use. For example, Pearlman and colleagues (1997) in a study looking at the HSU among elderly from

different US payer/provider plans, grouped individuals based on past service use. Seven patterns of use over a ten year period were established based on factor analysis: (1) consistently low expenditures; (2) consistently medium expenditures; (3) consistently high expenditures; (4) decreasing expenditures; (5) increasing expenditures; (6) U-shaped expenditures; and (7) inverted U-shaped expenditures. This study was conducted over an 18 month period. On average, high users had 20 times more combined health service expenditures than low users in the first six months. Service use intensity among high users increased to almost 50 times the expenditures of low users by the end of the evaluation period. For this reason, it is important to include a longitudinal measure for each individual subject. Comparisons can then be made for a subject's previous use with current use.

2.4.1 Health Service Utilization – Prior Use

A longitudinal study of HSU by women found that previous use of healthcare services was significantly related to current HSU, explaining twice the variance in current physician visits, and one-third more of the variance in hospitalizations (Eve, 1988). Manitoba Health data also indicated prior use to be a consistent predictor of HSU (Menec & Chipperfield, 2001). Boulton and colleagues (1993) found that older age, male gender, poor self-rated health, availability of an informal caregiver, presence of coronary artery disease or diabetes, at least six doctors visits, and having had a hospital admission during the previous year increases the risk of repeated hospitalizations in the next four years. Reasons as to why previous use is such a strong predictor of current health status may be closely linked to the ability to access health services when needed rather than an indication of ongoing health problems. That is, high users may actually be those with easy, relatively unhindered access

to health services or those with a regular physician rather than very ill health (Boult et al., 1993). Unhindered access can range from living within walking distance from a medical clinic to having a family member on hand to take someone to a clinic when needed.

Previous health status was not significant when entered into the regression model predicting previous use. Additionally, previous use is closely correlated to knowledge of services which, in turn, may directly affect current use patterns. Eve (1988) has observed that HSU patterns may be lifelong and habitual.

A majority of elderly express an aversion to institutional placement as a future option and clearly the involvement of family and medical personal involved in the community care of that individual play a role in institutional placement (Kane & Kane, 2001). Placement decisions are often made with a crisis mentality and carry a sense of urgency. As Kane and Kane (2001) noted, acute events trigger hospital stays and subsequently a gathering of relatives and a reevaluation of care needs where families may emphasize wishes that differ from those of the elderly person. It is possible, therefore, that HSU patterns just prior to institutionalization are different from previous use patterns of the patients.

2.4.2 Health Service Utilization– Cognition Impairment and Dementia

Cognitive impairment can significantly effect an individual's ability to understand when health services are required and how to go about obtaining services. For this reason, family and professionals involved in the care of cognitively impaired individuals become crucial in navigating the complexity of health services and providers. Moreover, increasing cognitive deficits are directly associated with an increasing dependence on caregivers (Caro et al.,

2002) which often prompts caregivers to access services such as home care and day care to assist in caring for individuals with dementia. Accordingly, the role of the caregiver is an important factor when reviewing the research literature pertaining to HSU by the cognitively impaired as indicated earlier.

In a cross-sectional survey of rural elderly with cognitive impairment, Ganguli and colleagues (1993) found a significant association between cognitive impairment and home health and social service use after adjusting for age and education. Their analysis showed a greater number of hospitalizations in the previous six months, nursing home use and prescription medications in cognitively impaired elderly.

Allocation analysis of healthcare expenditures in the Netherlands found that dementia was the third highest costing diagnostic group just after musculoskeletal diseases and mental retardation (Meerding, Bonneux., Polder, Koopmanschap, & Van der Maas, 1998). A Canadian analysis of formal HSU in Manitoba showed that those with dementia in addition to accessing a wider array of services used the highest proportion of services (Shapiro & Tate, 1997). Dementia has been shown to have an independent and significant effect on HSU with the average per person health service costs almost twice those of the cognitively intact group. Most subsequent studies have supported this finding, (e.g., Chumbler, Cody, Booth, & Beck, 2001), some also showing that cognitive impairment acts as a modifier of living arrangements and that the presence of secondary helpers, depression and task burden are significant predictors of health service use (Bass, Looman, & Ehrlich, 1992). In

contrast, Leibson and colleagues (1999) did not find increased costs associated with Alzheimer disease (AD) for community dwelling participants.

The conflicting findings may be a reflection of when HSU costs are measured during the disease span. Ernst and colleagues (1994) showed HSU costs decreased in the later years of AD. Study design may be crucial to explain why there are significant differences in HSU costs associated with AD in some studies and not others. If the study design incorporates incidence of AD (new cases of AD), as opposed to the prevalence of AD (total of all cases, new and ongoing, of AD in the community), the cost differences can be negligible.

The literature reports a number of notable findings that differentiate persons with AD from those without AD. Leibson and colleagues (1999) noted that AD participants had more physician visits when in nursing homes than non-AD participants. In contrast, Fillenbaum and colleagues (2001) found that hospital visits increased with dementia severity among AD participants living in the community but did not change for those living in institutions. When looking at the costs incurred by cognitively impaired but not demented (CIND) patients, Shapiro and Tate (1997) found that controlling for levels of functioning and living arrangements increased the expected average cost per person by 20%. Their finding highlights the need to separate levels of cognitive function when assessing HSU costs.

Hux and colleagues (1998) using CSHA data estimated the cost per AD patient at \$9,451 for mild AD, and \$36,794 for severe disease with institutionalization being responsible for the largest cost component. For individuals living in the community, these authors found

that there were increasing costs with increasing disease severity. Included were costs attributed to unpaid caregiver time and use of community services.

Using data from the first phase of CSHA, Østbye and Crosse (1994) showed that the cost of dementia in community participants varied by severity. Including direct and indirect costs, mild AD participants living in the community cost \$6,259 annually, moderate AD cost \$12,608 and severe AD cost \$15,795 annually. The control participants' costs were subtracted from the actual annual costs of AD and the figures presented are the differences, or additional costs that an AD community participant incurs. Direct costs for mild, community dwelling AD patients were two times lower than the costs for moderate and severe community AD patients, whereas indirect costs were only one and a half times greater for moderate AD patients but two and a half times greater for severe AD patients. These findings, also supported by other studies (Hu, Huang, & Cartwright, 1986; Ernst & Hay, 1994; Hux et al., 1998), indicate that direct service costs in the community were comparable for moderate and severe disease, but that the indirect costs to family and friends assisting in daily activities increases substantially for patients in the end stages of AD. It is likely that the toll, physically and emotionally, that these hours of indirect care represent, precipitate institutionalization. Additionally, in the Østbye and Crosse (1994) study, costs for services such as homemaking were averaged across all participants losing sight of the fact that need will vary markedly on the basis of modifying factors such as the extensiveness of a participants' social networks of family and friends. These estimated costs are less than those reported by Hux and colleagues (1998) as institutionalization costs are not included in the Østbye and Crosse (1994) calculations.

The data from Medicare claims in the United States indicate that costs for patients with AD are significantly higher than for those without the AD diagnosis (Newcomer, Clay, & Luxenberg, 1999; Taylor & Sloan, 2000). Furthermore, increasing AD symptoms were associated with increasing patient HSU and increasing time spent by caregivers providing care (Small, McDonnell, Brooks, & Papadopoulos, 2002). Estimated net costs of AD per person in the United States in 1991 ranged from \$35,040 in the first year to \$33,590 in the second and later years (Ernst & Hay, 1994).

In the US, approximately 60% of the net cost was attributable to the indirect costs of unpaid home care. These estimates were based on several broad assumptions: complete disease disability begins at diagnosis; annual costs are constant over the course of later stages of the disease (second and later years); and total costs are based on survival rates of 3.3 years for men and 4.3 years for women which was the average survival rate from two published studies. These assumptions probably inflated the estimated costs of AD for the US. Other studies have reported that costs in the second and later years of AD decrease (Ernst & Hay, 1994; Taylor & Sloan, 2000). Given the heterogeneity of the disease (Stern, Tang, & Albert, 1997; Neumann, Araki, Arcelus, Longo, Papadopoulos, Kosik, et al., 2001) economic models need to account for individual variability (Caro, Getsios, Migliaccio-Walle, Raggio, & Ward, 2001).

There are further considerations when reviewing the cost literature for diseases such as AD and the implications of findings such as higher costs among the cognitively impaired.

Public health providers may manage their care strategies with user fees, intentional waitlists and/or stricter eligibility requirements for services for groups of patients that are seen as using a higher frequency of services which may be considered inappropriate or improper. Particular patient groups may be classified as significantly needier than other patient groups. For some groups, the result can be stigmatization that can affect further HSU behaviour.

2.4.3 Health Service Utilization – Last year of life

Wolinsky and colleagues (1994) using Longitudinal Study on Aging data for 7,527 study participants found that decedents used substantially more hospital services than survivors. However, Malmgren and colleagues (1999) found no difference in hospital utilization, pharmacy use or total costs in the last year of life when comparing a cohort of well older adults along a Good Health Behaviour score of low, medium and high scores. Prior to these studies, a large prospective Canadian study examining HSU in the four years prior to death of over 4000 adults from Manitoba found that a disproportionate amount of HSU was used by a small group of individuals (Roos, Montgomery, & Roos, 1987); that is, not all adults in their final year of life showed high HSU. For all adults over 45 years of age, hospitalizations increased significantly in the period immediately before death; however the 85+ age group showed fewer days in hospital and fewer physician visits prior to death which may be a reflection of the shorter period of time between onset of disease and death in the oldest old. The cost of HSU however in the 85+ age group in the years prior to death was 31% higher than in the 75 to 84 age group and 79% higher than in the 65 to 74 age group. It is believed that this increase is made up largely of the nursing home expenditures

that come with later life. However, not all elderly in their last years of life end up moving into an institution when care needs change. For example, Stark and Gutman's (1986) follow-up study of BC Continuing Care Program clients found that a third of clients who died had remained unchanged in their level and place of care, 25% had changed only their level of care remaining in the same location, and only 19% of those who died had changed both level of care and location (i.e., institutionalized).

Levinsky and colleagues (2001) showed that Medicare expenditures in the last year of life decreased as age increased. These authors suggested this may be primarily as result of decreased aggressiveness of applied medical care in the last year of life for older individuals. Longitudinal data focusing on proximity to death do not support the notion that expenditures increase with age (Zweifel, Felder, & Meiers, 1999). Indications are that health service expenditures depend on remaining time to death, not on chronological age and thus decrease with age. At age 80, there are many more people in their last two years of life than at 65. McGrail and colleagues (2000) using the BC Linked Health Database (BCLHD) report similar findings indicating that the proximity to death is a more important determinant than age in predicting increasing HSU costs. Their analysis indicates that higher HSU costs in younger patients close to death come primarily from medical services such as hospitalizations, physician services and pharmaceutical costs. These costs may well decrease for the older patients who are also close to death. Interestingly, though medical costs decrease with age and proximity to death, nursing and social HSU costs increase slightly for older patients.

2.5 Pilot Study

Pilot work done by the division of Geriatric Medicine at the University of British Columbia has integrated the CSHA-BC Cohort database and BCLHD for two periods. Period 1 covers 1987 to 1992 and Period 2, 1992 to 1997. Database integration for Period 3 (1997-2001) was completed in the Spring of 2003. The intent of the pilot study was to determine if service utilization costs could be predicted by simple measures from the CSHA database such as walking, self-rated health, education and cognitive functioning. Additionally, the pilot study was an opportunity to work with the linked databases, eliminate programming bugs and work with a unique cost measure that utilized cost per day at risk ratios.

Analyses of Period 1 and 2 data focused on characterizing costs in the health service utilization data by applying a unit of measure called cost per day at risk (CPDAR). The CPDAR was obtained by multiplying the cost of a service by the number of days a patient used a service over the number of days the patient was alive in the period in question.

A key focus in the analyses of the pilot data was to determine the effect on CPDAR of the following simple, dichotomized CSHA health status factors: (1) self-rated health (SRH), a non-specific indicator of health status; (2) the ability to walk assisted or unassisted as a surrogate index for physical function (WALK); (3) the Modified Mini-Mental State Examination (3MS; Teng & Chui, 1987) as a gross indicator of cognitive status and (4) social support and years of formal education. Linear models were used to assess the effect of the predictors. In both periods, WALK, SRH, 3MS and age were significant predictors

($p < 0.05$) of CPDAR. CPDAR was substantially higher in Period 2. Higher costs were associated with the lower 3MS scores. Two interesting interactions emerged. In Period 1, the effect of assisted WALK was more pronounced among those who did not live alone as compared to those who did live alone (CPDAR 29.89 vs. 17.84 respectively). In Period 2, the CPDAR of patients with assisted WALK declined with age (42.02 to 27.81 for 70 and 90 year olds). In contrast, CPDAR for those with unassisted WALK increased with age. Hospitalizations, home and institutional care made up the largest proportion of CPDAR, not physician visits or medications (Beattie, et al., 2002). This pilot study indicated that, in addition to the more complex HSU factors elicited from the background literature, some very basic health measures, such as walking, self-rated health and the 3MS scores were significant predictors of health service utilization for our linked study sample. Given the complexity of health service utilization factors in the literature related to HSU costs and the heterogeneity in Continuing Care transitional patterns seen in earlier BC Continuing Care studies, it was felt that applying a theoretical framework to this health service utilization analysis would assist in identifying a “flurry of activity” just prior to institutionalization.

Specifically, applying a social process theoretical framework to evaluate HSU in the CSHA-BC sample highlights the interactions of elderly and the network of family, medical and social care professionals involved in navigating the transitional period between living in the community and moving to an institution. Based on a qualitative study, Penrod and Dellasega (1998) have outlined the decision-making process caregivers go through during

the placement process as: uncertainty; surrendering to the system; urgency; and validating. It may be this process of uncertainty to validating that reflects itself in the observed “flurry of activity” prior to institutionalization.

2.6 Theoretical Framework

There are a number of models available to assist in explaining healthcare utilization behaviour. For the purposes of this thesis, the Social Process Model (Zola, 1990) expanded into a Network Episode Model (Pescosolido, 1992) will be presented as a framework for analyzing the transition from community to institutional care in terms of cost per day at risk. Two other models were considered for this study. The Health Belief Model focuses on individual psychological characteristics such as personality and attitudes towards healthcare and illness as key components to explaining help-seeking behaviour (Kasl & Cobb, 1966; Rosenstock, 1966; Rogers, Hassell, & Nicolaas, 1999). However, the heavy emphasis on individual characteristics in the Health Belief Model curtails its appropriateness for application to cognitively impaired individuals’ health seeking behaviour, which may be more dependent on the caregiver’s involvement in accessing health services. Formal healthcare utilization among the elderly in general is mediated by family enabling factors and caregiver need characteristics, and previous research has shown that families arbitrate, refer and provide general gate-keeping functions for elderly persons seeking healthcare services (Cantor, 1989). Thus, the involvement of a caregiver adds a dimension to healthcare seeking behaviour not addressed by the Health Belief Model.

The Andersen-Newman model, also known as the Socio-Behavioural Model (Andersen, 1995; Andersen & Newman, 1973), takes into account the added dimension of a caregiver's influence upon individual healthcare seeking behaviour. This social-behavioural approach categorizes the following characteristics as: (1) predisposing factor; (e.g., demographic and social characteristics, beliefs about health and health services, psychological and social resources or social structure such as coping styles and the social support); (2) enabling factors (e.g., access to care and organization of health system); and (3) need factors (e.g., evaluated and perceived needs, illness severity and type). However, the statistical associations arising from the application of the Andersen-Newman model have been disappointingly low. In most studies, the model explained only 4% to 29 % of healthcare utilization behaviour. Need factors were most consistently significant when measuring contact with formal services (Mechanic, 1979; Bass & Noelker, 1987; Houle, Salmoni, Pong, Laflamme, & Viverais-Dresler, 2001) whereas enabling factors tended to determine the amount or volume of service use (Bass & Noelker, 1987; Bass, Looman, & Ehrlich, 1992).

2.6.1 Network Episode Model (A Social Process Framework)

The Network Episode Model (Pescosolido, 1992) stems from a Social Process theoretical framework (Zola, 1990). Hassell, Rogers and Noyce (2000) contend that reliance on cross-sectional relationships between individual characteristics and utilization rates probably explains very little about why people in particular groups are more or less likely to seek healthcare. Instead, analyzing health service utilization as a social process that views

decision-making around healthcare as a series of interactions between the patient with others that takes place over time and includes a range of social and interpersonal influences can be far more enlightening. As Hassell and colleagues note,

Studies influenced by the social process approach view decision-making around illness as subject to a range of social and interpersonal influences.

The timing between the onset of problems and contact made with 'formal' healthcare, the extent to which people are able to contain and cope with signs and symptoms within socially-defined situations, the multiple possibilities in the decision-making process, including the overturning of decision and non decision making, and the relationship between everyday events, such as work, and the decision to use primary care, have all been identified as relevant in a number of studies... (2000, p.41).

The Social Process Theory has a temporal component, examining when and how people use health services and not just if they use them, making the framework especially applicable to research examining the transition from community to institutional care. Cohen and colleagues (1993) observed that increased service use predicted the desire to institutionalize and actual institutionalization. Their findings suggest a temporal decision-making process actively involving the family and friends who support an elderly individual living in the community. As family and friends struggle to maintain the individual in the community, Cantor (1989) suggests that services, specifically formal services, are used when informal support resources from family are no longer available or sufficient to meet increasing or

changing needs. Changing needs initiate a series of adjustments in the health services provided. This adjustment can involve formal services such as increasing home care, providing respite or institutionalization. Formal home care services support frail elderly person by assuming heavy housekeeping chores and personal care; however, family and friends continue to perform other tasks such as shopping, transportation, paying bills, and provision of the majority of emotional support and socialization (Cantor, 1989). At some point, the combination of informal home care and formal home care is insufficient to enable the elderly individual to remain safely in the community. Beyond this point, the only choice left for many families is institutionalization.

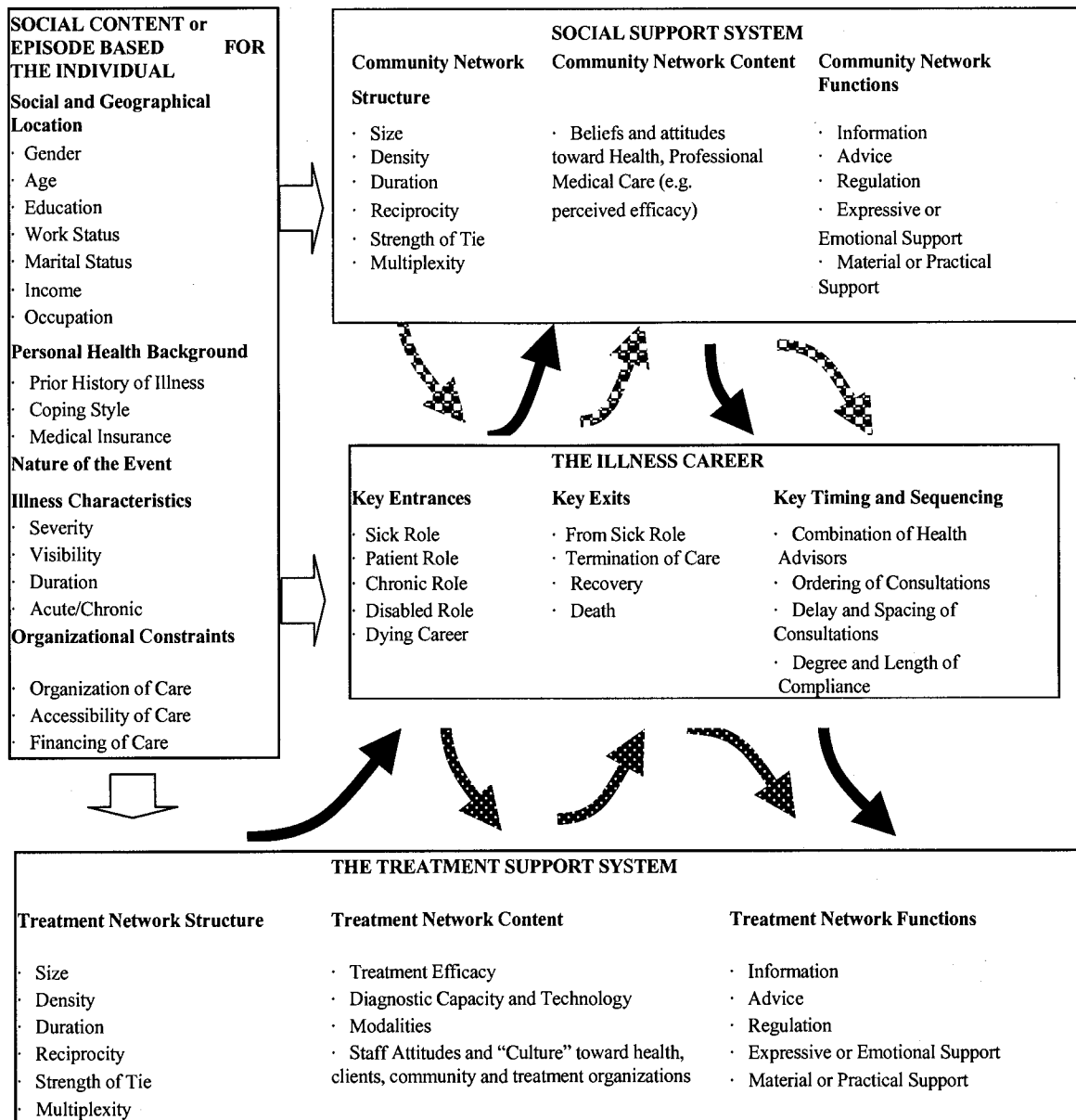
The Network Episode Model does not negate the individual in the transition between living in the community and moving into an institution but, instead, shifts emphasis to the social network. Network members perceive a change in the rhythm of life (i.e., in health status or ability to live independently) and an alteration to the overall system of relations occurs.

The Network Episode Model incorporates the idea that decisions made by a network at any one stage are shaped by decisions made at earlier stages, and that making choices is an iterative process, often taking place over an extended period.

Figure 2.1 provides Pescosolido and Boyer's (1999) conceptualization of the social process and the influence of the health care system, family and community on the HSU of the individual.

Figure 2.1

Conceptualization of the Network Episode Model



Source: Pescosolido, B.A., and Boyer, C.A. (1999). How do people come to use mental health services? Current Knowledge and Changing Perspectives. In A.V. Horwitz and T.L. Scheid. (Eds.), *The Sociology of Mental Health and Illness* (pp. 392-411). New York: Cambridge University Press.

Thus, the actual process of institutionalization should be examined over time. Anecdotal experience gleaned from medical and allied health professionals in the field of geriatrics and facilitating caregiver support groups suggests that for many families, the year prior to institutionalization is especially dynamic. Many adjustments are made to try and keep elderly individuals in the community. The Network Episode Model seems a particularly appropriate framework to use when examining this complex behaviour.

2.7 Study Objectives and Hypotheses

Objective

The primary objective of this study was to characterize the HSU pre and post institutionalization among a sample of elderly Canadians. More specifically, it sought to characterize HSU costs for newly institutionalized CSHA-BC patients prior to and post institutionalization. HSU costs to be examined were Continuing Care costs (i.e., home care hospitalizations, and institutional care), medical services (i.e., physicians, specialists and rehabilitation services) and Pharmacare costs.

From this objective a series of hypotheses were developed regarding pre and post institutional HSU patterns in relation to the transition from community to institutional care for a sample of elderly patients in the province of British Columbia.

Hypotheses

1. In accord with the clinical assertion that there is a “flurry of activity” prior to institutionalization, it was hypothesized that a significant increase in HSU costs (as measured by Continuing Care, medical services and Pharmacare costs) occurs in the 12 months prior to institutionalization relative to post institutionalization costs.
2. The institutionalization of elderly persons was hypothesized to lead to a decrease in medical services and Pharmacare costs once these services are consolidated under the umbrella of one service provider (i.e., the institution) compared to pre institutionalization periods.
3. The imminent death of newly institutionalized persons (i.e., within the first 12 months) was hypothesized to be associated with a significant increase in HSU costs (i.e., Continuing Care, medicals services and Pharmacare costs) over the transition period compared to those institutionalized persons not in their last year of life.
4. Declining cognitive status was hypothesized to be associated with a significant increase in HSU costs (i.e., Continuing Care, medical services and Pharmacare costs) over the transition period relative to those assessed as cognitively stable.

This analysis extends the findings of prior research and contributes to the literature in the following ways:

1. It provides within subject comparisons of HSU pre and post institutionalization for a more accurate examination of how HSU changes over a transitional period from community to institutional care.
2. Using actual HSU administrative data is a more reliable and valid indicator of utilization than self-report HSU data.

CHAPTER III

Methodology

3.1 Derivation of the Study Sample

This study used a CSHA-BC study sub-sample of 127 participants who met the following criteria: (1) had baseline CSHA-1 screening data; (2) were institutionalized after their initial CSHA interview in 1991; and (3) consented to have their provincial Medical Services Plan (MSP) information linked to their CSHA data. The 127 participants make up 7% of the original CSHA-BC community dwelling sample ($n=1,805$) which is in line with the 11% reported in Stark and Gutman's (1986) report on Continuing Care client transfers to institutions for an earlier BC cohort and considering this study also required subject consent to link data.

CSHA data were collected in 1991-1992 (CSHA-1), 1998-1999 (CSHA-2) and 2001-2002 (CSHA-3) by staff from 18 centres across Canada. There were 9,008 men and women, over 64 years of age, randomly recruited from the community and 1,255 living in institutions for a total of 10,263 participants in CSHA-1. Subsequent studies, CSHA-2 and 3, were follow-up studies of the original participants. All provinces were represented in the study; however the Yukon and Northwest territories were excluded as were Indian reservations and military bases. In BC, the 1,805 community dwelling participants were randomly chosen from subscribers to the provincial Medical Services Plan (MSP) and 252

participants were randomly chosen from institutions for a total of 2,057 participants. An additional 14 participants moved from other provinces to BC to become part of the CSHA-BC cohort. Of these, 1,636 (79%) consented to have their MSP information linked to their CSHA data. A file of consenting CSHA participants with identification numbers (IDs) and personal health numbers (PHN) was forwarded to the data stewards at the Ministry of Health Planning and Ministry of Health Services, Health Information Access Centre who then forwarded the list of IDs plus veiled PHNs to the University of British Columbia's (UBC) Centre for Health Services and Policy Research. UBC completed the retrieval of CSHA participants' data in the BC Linked Health Dataset (BCLHD) and forwarded these data to the CSHA study offices at UBC. Of those whose data were successfully linked, 259 were institutionalized and of these, 127 were institutionalized after their initial CSHA interview in 1991, thereby meeting criteria for inclusion in this study. The remaining 132 participants had been institutionalized earlier between 1979 and 1991.

The BCLHD (Chamberlayne et al., 1998) records longitudinal healthcare service utilization (HSU) among British Columbians from 1986 to 2000. Approval to use the BCLHD was received through the Ministry of Health Planning and Ministry of Health Services, Health Information Access Centre. The data included information on when and where each patient received health services through the provincial medical services plan. The services recorded into the dataset included: (1) hospitalizations and Continuing Care services such as home care and institutional care; (2) physician services, rehabilitation services; and (3) Pharmacare A for seniors 65 years and older and Pharmacare B for permanent residents of

licensed long-term care facilities. Raw data were exported into large matrices using the S-Plus statistical package (MathSoft, 2000). The average cost per day in 1998 Canadian dollars of maintaining a patient in that service was calculated by Krueger Associates Inc., (2000) from available data sources including the British Columbia Ministry of Health. A spreadsheet outlining the resource values and relative weights for service status codes is included as part of Appendix A. The matrices allow for calculation of the total HSU cost and grouped HSU costs for pharmaceuticals (Pharmacare costs), doctors' visits (MSP costs) based on actual billed prices, and home care, hospitalizations and institutional care (Continuing Care costs) based on Appendix A values.

3.2 Sample Characteristics

The 127 participants institutionalized after 1991 ranged from 65 to 94 years of age. As shown in Table 3.1, the majority were female (61.4%), over the age of 74 (79.5%) and had fewer than 12 years of education (74.8%). Half of the participants were living alone prior to institutionalization. Approximately two-thirds (66.1%) of these participants had baseline 3MS scores in the range of 79 to 100. CSHA-1 clinical assessments were completed with 44 participants (34.6%). Over half of the 127 participants (56.7%) died between the ten years separating CSHA-1 and CSHA-3. Just over one third of participants (38.6%) had no limitations with their Activities of Daily Living (ADLs), 35.4% had one or two ADL limitations and 26% had three or more limitations. Over 70% of participants reported that they had three or more chronic health conditions. As expected, the 127 institutionalized participants were significantly older, had lower 3MS scores, required assistance with more

ADLs and had more chronic conditions than the CSHA-BC participants who did not enter an institution over the study time period.

Table 3.1

Socio-Demographic, Functional and Health Status of Study Participants at Baseline (CSHA-1). CSHA-BC Institutionalized Participants Compared to Not-Institutionalized.

	Institutionalized		Not institutionalized	
	<i>n</i> =127	%	<i>n</i> =1678	%
Age*				
65-74	26	20.5	773	42.8
75-84	65	51.2	754	41.8
85 +	36	28.3	278	15.4
Male	49	38.6	799	44.3
Female	78	61.4	1006	55.7
Education- less than 12 yrs	95	74.8	903	50
Living alone prior to institutionalization.	63	50.0	671	37.2
3MS score* 79-100	84	66.1	1504	83.3
50-78	36	28.3	273	15.1
<50	7	5.5	28	1.6
Had CSHA-1 clinical assessments	44	34.6	302	16.6
Died (1991-2001)	72	56.7	384	21.3
<i>Level of Performance of Activities of daily living (ADL)*</i>				
No assistance needed	49	38.6	1182	65.5
1-2 ADLs require assistance	45	35.4	380	21.0
3-4 ADLs require assistance	13	10.2	101	5.6
5-6 ADLs require assistance	9	7.1	72	4.0
7 + ADLs require assistance	11	8.7	55	3.1
<i>Chronic Health (CHRONIC)*</i>				
None	5	3.9	106	5.9
1-2 chronic conditions	17	13.4	492	27.3
3-4 chronic conditions	29	22.8	516	28.6
5-6 chronic conditions	31	24.4	353	19.6
7+ chronic conditions	45	35.4	277	15.5

Note: * Independent samples t-test significant difference in means $p < 0.02$.

3.3 Key Variables

The dependent variable for this study was cost per day at risk (CPDAR) measured over five periods. Four independent variables were examined: sex (SEX); live alone (LALONE); cognitive decline (COGCHG); and last year of life (LYL). A description of these follows. A series of covariates were identified that are known to be correlated with health service utilization costs: Modified Mini-Mental Exam (3MS) scores; activities of daily living (ADL); co-morbidity; self-rated health; age; and years of formal education. All of these potential covariates had correlation coefficients of less than 0.30 with the dependent variable, CPDAR. These coefficients were not high enough to necessitate including covariates in the analysis (i.e., using an ANCOVA instead of an ANOVA analysis). Given the comparatively small sample size, the decision was made to exclude these variables from further analyses as increased risk of Type I error was deemed greater than any benefit from inclusion of independent variables with little association with CPDAR.

3.3.1 *Dependent Variable*

The dependent variable of interest, cost per day at risk (CPDAR), is a repeated measure calculated for five periods of time. CPDAR incorporates a summation of HSU costs over a time period and divides the total costs by the number of days a person is alive during that period. Figure 3.1 shows the five time periods and the corresponding number of days included in terms of the index point or “institutionalization date”. CPDAR was calculated for three types of costs: Continuing Care costs; Medical Services Plan costs; and

Pharmacare costs. The CPDAR ratio is determined according to the following equation with days alive taking into account the death data provided by the BCLHD to adjust the denominator ‘days at risk’:

$$\text{Cost Per Day at Risk} = \frac{\text{Average Service Cost} \times \text{Days of Service Received}}{\text{Days alive (within Time Period)}}$$

CPDAR

Thus, CPDAR provides a comparable cost ratio for participants for TIME 1 that incorporates all of the participant’s previous use data available in the BCLHD which ranges back to the year the participant was admitted to the continuing care program in BC.

Figure 3.1

Study Timeline Reflecting the Transition from Community to Institution.

TIME 1	TIME 2	TIME 3	Index Point	TIME 4	TIME 5
Over 365 days prior (over 1 year)	181 to 365 days prior (1 year)	1 to 180 days prior (6 months)	Institutionalization Date	1 to 180 days post (6 months)	181 to 365 days post (1 year)
CPDAR 1	CPDAR 2	CPDAR 3		CPDAR 4	CPDAR 5

CPDAR 1, 2, and 3 are pre-institutionalization periods. CPDAR 1 covers the period of time more than a year prior to institutionalization. CPDAR 1, for the purposes of this study, is a measure of “prior HSU use” for each participant. Each participant acts as his/her own control in the analysis using CPDAR 1 as the baseline. CPDAR 2 and 3 are measures of service utilization during the 365 days before, and 180 days before, institutionalization respectively; these are the specific periods in which the flurry of HSU activity prior to institutionalization is believed to occur. CPDAR 4 and 5 are post institutionalization

periods and include service utilization costs for participants in the first six months and in the year after admission to an institution respectively. As a ratio CPDAR provides a comparable HSU cost for participants whether they died within TIME 4 or 5.

There were 7 of 127 participants who were flagged in the matrix because they showed multiple institutionalization dates. These participants went in and out of an institution (i.e., moved to a rehabilitation facility, hospital or back into the community for short periods of time, then entering an institution again). Other studies have also reported participants with multiple transitions (e.g., Murtaugh & Litke, 2002). For this study, it was decided to take the first institutionalization date as the index date for these participants. This assumed that the first institutionalization occurred when the participant was no longer able to live in the community. Costs associated with the post-institutional hospital care or rehabilitation were included in the CPDAR 4 and CPDAR 5 calculations.

3.3.2 Independent Variables-Between Subject Factors

Four between-subject variables that divide the sample into discrete subgroups were identified for the General Linear Model (GLM) based on literature identifying them as prospective predictors of institutionalization. These were sex, live alone, cognitive decline and last year of life.

Sex

As indicated previously and shown in Table 3.1, 61.7% of participants institutionalized after 1991 were female.

Live Alone

Participants were asked “Do you live here alone?” during the CSHA-1 screening interview. All participants in this sub-sample were community dwelling at baseline and completed their own interviews. For purposes of this study, a “no” answer (i.e., lives with others) was considered a surrogate measure of instrumental and social support that reflected the daily assistance provided by individuals living with participants (Kristjansson, Breithaupt, & McDowell, 2001). Among those who answered “yes” (i.e., live alone), 16 participants said that they were married or in a common law relationship. Generally, this response reflected a living situation where one spouse was in an institution and the other still lived in the family home.

Cognitive Decline

Criteria had to be established to determine cognitive decline for study participants because of limitations in the CSHA data. Specifically, only 22 of the 127 participants had 3MS scores for each of CSHA-1, 2 and 3 and only 21 of the participants had both longitudinal 3MS and clinical diagnoses.

Therefore, a new variable of cognitive decline was computed using the available information from the 3MS and clinical cognitive consensus diagnoses, working from the most current information (CSHA-3) backwards in time to CSHA-1. The set of steps shown in Table 3.2 were followed to compute the ordinal cognitive decline variable (COGCHG).

Table 3.2

Criteria for coding COGCHG variable.

COGCHG Criteria	COGCHG coding (Total $n=127$) (# of participants meeting each criteria)
A clinical diagnosis of dementia at either CSHA-1, 2 or 3	3=dementia diagnosed ($n=43$)
A clinical diagnosis of cognitive impairment but no dementia (CIND) at the final CSHA-3 clinical assessment or a CIND clinical diagnosis at CSHA-1 or 2 without subsequent clinical assessments	2=cognitive change but no diagnosed dementia ($n=31$)
A no cognitive impairment diagnosis at CSHA-3 or at CSHA-2 (without a CSHA-3 clinical)	1=no change cognitively ($n=10$)
A no cognitive impairment diagnosis at CSHA-1, plus 3MS scores at CSHA-1 or 2 higher than 78	1=no change cognitively ($n=1$)
If there were no clinical assessments, two 3MS scores were used, if both over 78	1=no change cognitively ($n=34$)
Two 3MS scores with the more recent less than 78	2=cognitive change but no diagnosed dementia ($n=3$)
3MS or clinical assessment done only at CSHA-1 (i.e., no longitudinal information)	Missing ($n=5$)

Using the steps, cognitive decline scores were computed for all but 5 of the 127

participants. Eliminating the 5 participants, the distribution of scores was as follows: 35.4%

($n=45$) were recoded as having no cognitive decline; 26.8% ($n=34$) had cognitive decline

but no diagnosed dementia; and 33.9% ($n=43$) had a dementia diagnosis.

Last year of life

Participants were classified as in their last year of life if they died within 365 days (1 year) of their institutionalization date. Of the 127 study participants, 25 (19.7%) died within one year of their entry into the institution. This percentage is in accord with the findings of the National Population Health Survey 1996/1997 (Statistics Canada, 1999b) which reported a 29% mortality rate for senior institutional residents who died within two years of entering an institution.

Table 3.3

Independent Variables Showing Frequencies and Percentages.

BETWEEN-SUBJECT VARIABLES	Institutionalized After 1991 (<i>n</i> =127)	
	<i>n</i>	%
Sex (SEX) female	78	61.4
Live alone (LALONE)	63	50.0
Cognitive Change (COGCHG)		
no change	45	35.4
cognitive change, no diagnosed dementia	34	26.8
dementia	43	33.9
missing	5	3.9
Last year of life (LYL)	25	19.7

3.4 GLM Repeated Measures Analysis

A Generalized Linear Model (GLM) was used to perform repeated measures analyses of variance (ANOVA). The GLM automatically dummies codes categorical variables and their interactions, and uses multiple regression to assess the effects of these dummy variables together with quantitative independent variables vis-à-vis the outcome variable. The GLM

can perform a wide range of analyses, including repeated measures analyses (Tabachnick & Fidell, 2001).

A repeated measures design has the advantage of reducing overall variability by using a common participant pool for all variables whereby each participant functions as his/her own control thus limiting overall error (Howell, 1992) and reducing sample size requirements (Stevens, 2002).

A GLM analysis was applied to examine HSU costs during three pre-institutionalization periods and two post-institutionalization periods (as seen in Figure 3.1). Type III sum of squares (SS) were computed for the unbalanced models with no empty cells (i.e., all factor combinations are observed at least once). A Type III SS calculates the reduction in error sum of squares by adding the effect after all the other effects are adjusted. As an ANOVA assumes equal cell totals, a Type III SS corrects for violations of this assumption and correction for the potential bias.

Between-subject variables, SEX, LIVE ALONE, COGCHG and LYL were the categorical independent measures used in the model. Correlations between independent variables and CPDAR are shown in Table 3.4. Pearson correlations were calculated for dichotomous variables SEX, LYL and LIVE ALONE. Technically, point-biserial coefficients should be calculated between dichotomous and continuous variables; however, the Pearson coefficient provided by SPSS provides a good approximation (SPSS Inc., 2002). Spearman's correlations were used for correlations with the rank variable COGCHG.

Table 3.4

Correlations Between the Dependent Variable (CPDAR) and Independent Variables.

		Institutionalized After 1991 ($n=127$)			
Cost per day at risk period		Sex	Live Alone	COGC HG	LYL
TIME 1	CCARE	0.19*	-0.03	0.03	0.09
More than 365 days prior to institutionalization	MSP	0.10	-0.00	-0.10	0.22*
	PHARMA	-0.04	-0.12	-0.10	0.11
TIME 2	CCARE	0.19	0.19*	-0.03	0.29**
365 days pre-institutionalization	MSP	0.02	0.03	-0.08	0.16
	PHARMA	-0.08	-0.06	-0.06	0.10
TIME 3	CCARE	0.15	0.13	0.06	0.18*
180 days pre-institutionalization	MSP	-0.17	-0.06	-0.00	0.09
	PHARMA	-0.04	-0.05	0.01	0.07
TIME 4	CCARE	-0.00	-0.03	-0.04	0.15
180 days post institutionalization	MSP	0.00	-0.15	-0.12	0.37*
	PHARMA	-0.14	0.07	-0.18*	0.27**
TIME 5*	CCARE	0.16	-0.08	0.11	-0.16
365 days post institutionalization	MSP	-0.07	-0.16	0.03	-0.42**
	PHARMA	0.14	-0.10	-0.05	-0.31**

* $p < 0.05$ level (2-tailed).** $p < 0.01$ level (2-tailed).

The GLM was computed as a MANOVA with the dependent variable CPDAR composed of Continuing Care, MSP, and Pharmacare costs. The multivariate test statistic Wilks' lambda and corresponding significance level was used to test the between-subject effects in this study. Wilks, Pillai and Hotelling are asymptotically equivalent, so essentially the same for large samples yet Pillai is appropriate for unequal sample sizes. Following a significant overall F test, post hoc ANOVAs were completed on CPDAR to evaluate the differences

among specific variables. Profile plots of estimated marginal means are presented to assist in the interpretation of relationships among significant main effects and CPDAR.

Data analysis was performed with SPSS for Windows, version 11.5 (SPSS Inc., 2002).

3.4.1 GLM Assumptions

MANOVA assumptions to consider before continuing with the GLM were normality of the dependent and independent variables and homogeneity of variance (Tabachnick & Fidell, 2001). Additionally, a linear model involving all predictor variables with all two and three-way interactions was fitted. The residuals from the model were examined. These residuals failed to meet the normality assumption due to positive skewness. A logarithmic transformation of CPDAR [$\log(\text{CPDAR} + 1)$] did, however, produce normally distributed standardized residuals. It was necessary to add 1 to each value since some values of CPDAR were 0 and the logarithm of 0 is negative infinity. The logarithmic transformation normalized scores. Thus, the significance of the predictors is assessed using the logarithmic transformation of the CPDAR, but the interpretation of findings are based on the untransformed model.

A second ANOVA assumption for consideration, is homogeneity of variance across the groups. Given equal sample sizes in the groups ($N=127$), heterogeneity of variance will not make a difference to the probability of Type I errors. In this case, the sample sizes are equivalent and therefore the GLM can be considered robust (Tabachnick & Fidell, 2001).

Mauchly's Test of Sphericity tests for the condition in which the correlation between any two observations on the same participant are the same, but correlations between subjects are zero. Without sphericity, the ANOVA result has a liberal bias and the resulting F and degrees of freedom would yield a higher proportion of false positives or Type I errors.

Mauchly's W for all three CPDAR cost types was significant, therefore the Huynh-Feldt epsilon correction was applied to the degrees of freedom and the ANOVA F statistic.

CHAPTER IV

Results

4.1 Characterizing Continuing Care, MSP and Pharmacare Costs Pre and Post Institutionalization

GLM analyses were applied to test the hypothesis that a flurry of HSU activity was present immediately before institutionalization of participants. Table 4.1 shows the means and standard deviations (*SD*) for each period of time (TIME 1 to 5) for the three selected measures of cost data: Continuing Care (CCARE); medical services (MSP); and Pharmacare (PHARMA) costs.

The large standard deviations (*SDs*) relative to the means are the first indication that the cost data are not normally distributed. To help assess normality, skewness and kurtosis scores are also reported in Table 4.1. Because much of the data were positively skewed and kurtotic, it was necessary to apply a logarithmic transformation to CPDAR before the GLM analysis. This transformation yielded residuals that were within normal parameters. (See Table 4.1 for scores following log transformations.)

Table 4.1

Dependent Variable (CPDAR) Means, Standard Deviations (SD), Skewness and Kurtosis

		Institutionalized (<i>n</i> =127)					
Cost per day at risk period		CPDAR		Skewness	Kurtosis	After log transformation	
		Mean	SD			Skewness	Kurtosis
TIME 1 More than 365 days prior to institutionalization	CCARE	8.69	9.53	1.85	4.61	-0.17	-0.95
	MSP	0.95	0.64	1.00	1.73	0.07	-0.28
	PHARMA	0.74	0.81	2.19	6.54	0.94	0.58
TIME 2 365 days pre- institutionalization	CCARE	33.79	47.54	3.67	19.85	-0.50	-1.10
	MSP	2.84	3.91	2.53	7.01	0.61	-1.44
	PHARMA	1.69	2.05	2.66	10.07	0.50	-0.24
TIME 3 180 days pre- institutionalization	CCARE	48.82	54.05	2.33	6.73	-1.10	0.40
	MSP	3.65	5.03	2.31	5.91	0.48	-0.67
	PHARMA	2.01	3.10	4.31	27.84	0.75	0.17
TIME 4 180 days post institutionalization	CCARE	107.20	70.19	2.45	10.17	-1.40	3.20
	MSP	3.35	4.04	2.72	9.38	0.48	-0.03
	PHARMA	1.36	3.79	7.10	62.70	1.70	3.07
TIME 5* 365 days post institutionalization	CCARE	93.74	55.84	0.12	-0.35	-2.07	3.81
	MSP	1.45	1.45	1.59	3.13	0.34	-0.64
	PHARMA	0.85	1.36	2.83	11.59	1.12	0.48

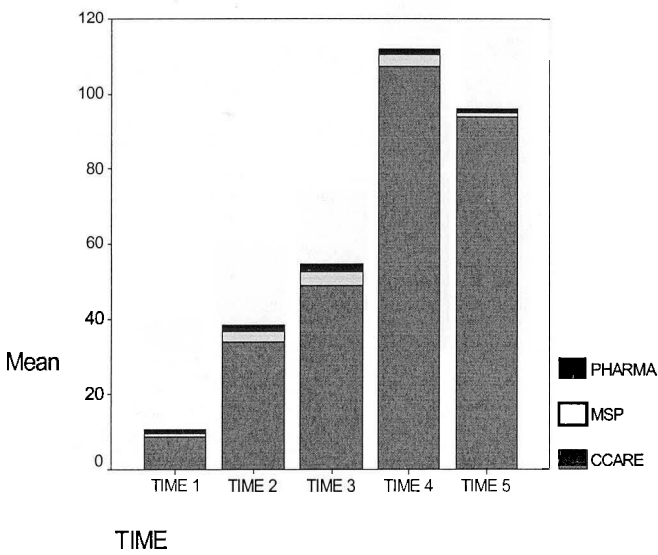
Note: * *n*= 114 participants who lived 180 + days after institutionalization

It is important to note that CCARE costs (composed of home care, hospitalizations and institutional costs) make up the largest proportion of HSU costs for this sample of

participants, while MSP and PHARMA costs constitute a notably smaller proportion of the total HSU costs over all time periods (see Figure 4.1).

Figure 4.1

Cost Components (CCARE, MSP, PHARMA) for TIMES 1 to 5



Figures 4.2, 4.3 and 4.4 depict the CPDAR means for CCARE costs, MSP costs and PHARMA costs for TIMES 1 to 5. These bar graphs help to depict change in HSU cost over time. All three measures of HSU costs show an increase in TIME 2 and TIME 3, the 365 days prior to institutionalization, from the baseline costs of TIME 1. This observation supports the hypothesis that there was an increase of HSU activity in the year prior to institutionalization. Continuing care costs (CCARE) at TIME 3 are six times those of

TIME 1 while comparatively, MSP and PHARMA costs at TIME 3 are three times those of TIME 1.

Figure 4.2

CCARE CPDAR Over Time

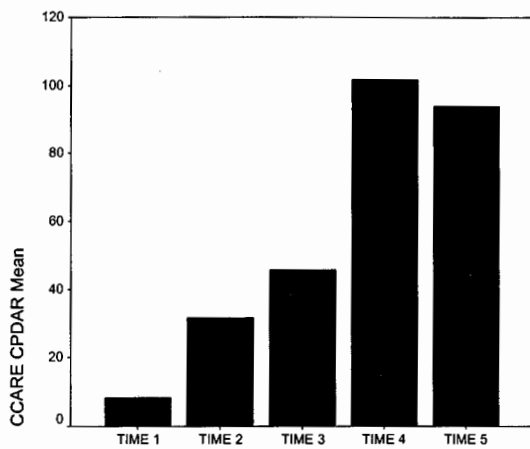


Figure 4.3

MSP CPDAR Over Time

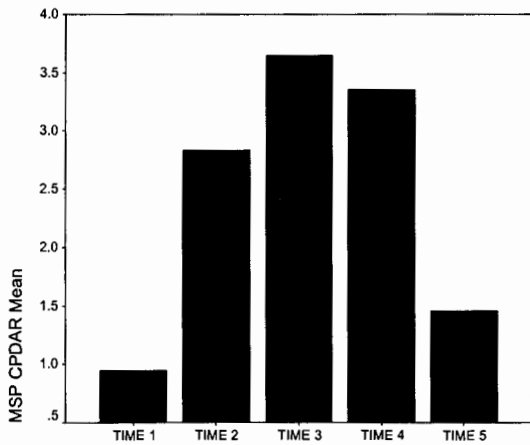
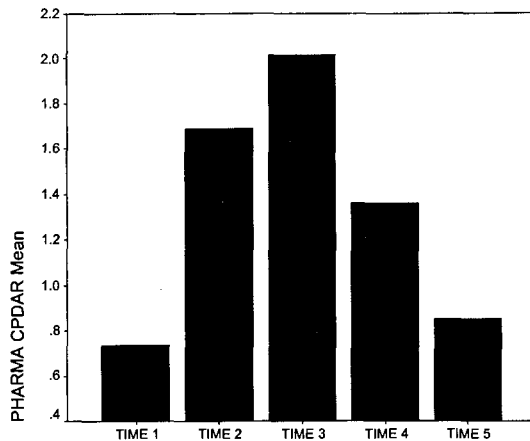


Figure 4.4

PHARMA CPDAR Over Time



Both MSP and PHARMA costs decline in TIME 5, as surviving participants approach their one year anniversary of institutionalization, indicating that costs may be lowered for medical services and prescriptions when the individual is in the care of one service provider (i.e., the institution). CCARE costs in TIMES 4 and 5 (made up of home care and institutional costs) reflect the increased cost of institutional placement. The GLM was used to determine if the increasing CPDAR over time was statistically significant.

4.2 Hypothesis 1 - A “Flurry of Activity” Prior to Institutionalization

4.2.1. Pre and Post Institutional Cost Comparisons

Based on the literature that institutional care is more costly than community care, it was hypothesized that an increase in CPDAR cost patterns over time (pre and post institutionalization) would be seen within subjects. Taking into account all three types of

HSU costs in the multivariate analysis of variance (MANOVA), Wilks' Lambda test for within-subjects differences indicated there was a significant time effect for CPDAR supporting the hypothesis of significant cost differences over time, $F(12,79)=20.40, p<0.01$, prior to and post institutionalization. As hypothesized, an increase in total costs occurred following institutionalization.

Given the result that there were significant differences in costs over time from the MANOVA, further univariate analyses for within-subject costs was completed to determine the patterns over time for the individual cost measures of CCARE, MSP and PHARMA (i.e., ANOVA).

The univariate results, with the degrees of freedom corrected for sphericity, for the within-subject model, indicated that the main effect for CCARE costs showed significant differences over time, $F(4,334)=28.55, MSE=7.28, p=0.01$; significant differences for MSP costs over time, $F(4,360)=11.76, MSE=0.78, p=0.01$; and significant differences in PHARMA costs over time, $F(4,336)=12.76, MSE=0.52, p=0.01$.

Post-hoc paired-sample t tests were computed with a Bonferroni adjusted alpha value of $\alpha=0.005$ for multiple comparisons; obtained by dividing the standard alpha (0.05) by the number of paired comparisons (10) and using this resulting value (0.005) as the critical alpha threshold for each of the tests. The mean CCARE paired comparisons for TIME 1 to 5 were all significantly different at $p=0.01$, while the pair-wise comparison of TIME 4-TIME 5 was significant at $p=0.004$, indicating that there were significant CCARE cost differences over the period pre and post institutionalization. Specifically, Time 2 and 3 are

both statistically different from each other and from baseline (TIME 1) and institutional care (TIME 3 and 4). Interestingly, TIME 4 and 5 differ significantly indicating costs once institutional placement has occurred are not necessarily stable. Indications from this data are that the costs decrease with extended institutional stays over a year.

These findings support the first hypothesis that there is an increase in Continuing Care HSU costs in the year prior to institutionalization that is higher than previous Continuing Care HSU costs and significantly different from CCARE costs following institutional placement.

4.3 Hypothesis 2 – MSP and PHARMA Costs After Institutionalization

Both Figures 4.3 and 4.4 show a decrease in MSP and PHARMA costs post institutionalization, and overall the MSP and PHARMA costs over time within-subjects differed significantly as seen in the univariate analyses. Post hoc paired sample *t* tests for mean MSP costs for TIME 1 to 5 were significantly different, $p=0.01$ (Bonferroni corrected $\alpha=.005$) for TIME 1 comparisons to TIME 2, 3 and 4 but did not differ from TIME 5 indicating that MSP costs were significantly higher during the transitional one year period prior to institutionalization and during the first six months in an institution, and decreased to baseline costs at TIME 5 after a year in an institution. Notably, MSP costs for the first 180 days in an institution (TIME 4) did not differ from the community MSP costs in TIME 2 and 3 suggesting that the levels of medical care received in the year prior to institutionalization were higher than previous baseline MSP use, and that this increase continued into the first 6 months of institutional living but significantly dropped after one year (i.e., TIME 5; see Table 4.2).

Table 4.2

Post-hoc MSP and PHARMA paired means *t* tests ($\alpha=.05$).

	TIME	<i>t</i> (df=126)	SEM	<i>p</i>
MSP	1 - 2	-5.83	0.03	.005
	1 - 3	-6.15	0.04	.005
	1 - 4	-8.79	0.03	.005
	2 - 5	3.01	0.04	.005
	3 - 5	3.74	0.04	.005
		<i>t</i> (df=125)		
PHARMA	1 - 2	-8.11	.02	.005
	1 - 3	-6.54	.02	.005
	2 - 4	4.32	.03	.005
	2 - 5	4.77	.03	.005
	3 - 4	5.17	.03	.005
	3 - 5	4.99	.03	.005

Additionally, post hoc paired sample *t* tests for PHARMA costs were significantly different ($p=0.01$) for TIME 2 and TIME 3 compared to TIME 1 (see Table 4.2). This supports the perception that the year prior to institutionalization is different than earlier pre-institutional baseline PHARMA costs. Interestingly, post institutional Pharmacare is significantly lower than the community based Pharmacare costs in the year prior to institutionalization, indicating that prescription costs decline once institutionalization occurs. No significant difference in Pharmacare costs can be seen over the first institutional year, meaning the Pharmacare cost drop is probably related to the move into an institution and the initial medical reevaluation at entry and not related to the ongoing care.

These findings support the second hypothesis that institutionalization can lead to a decrease in Pharmacare costs as these services are consolidated by the institution. However, the

same is not true for MSP costs which significantly increase in the year prior to institutionalization but do not significantly drop after moving into an institution and receiving medical care primarily via the institutional medical staff. Thus, the second hypothesis that institutionalization can lead to a decrease in HSU costs is accepted for Pharmicare costs but rejected for MSP costs.

4.4 Hypothesis 3 – Imminent Death and HSU Costs

The MANOVA interaction of TIME*LYL (last year of life) was significant within-subjects, $F(12,79)=3.69, p=0.01$ meaning that participants in their last year of life at the time of institutionalization had different CPDAR cost patterns over time. The interaction for TIME*LYL, $F(12,948)=3.90, p=0.01$ was also significant across all three cost measures, CCARE, MSP and PHARMA. The univariate analysis, with degrees of freedom corrected for sphericity using Huynh-Feldt epsilon, found that the CCARE costs showed significant interactions with TIME*LYL, $F(4,334)=3.40, MSE=0.86, p=0.012$. Significant interactions were also found for TIME*LYL for MSP costs, $F(4,360)=6.11, MSE=0.41, p=.01$ and for PHARMA costs $F(4,336)=4.82, MSE=0.20, p=.01$. This indicates a significant change in CCARE, MSP and PHARMA cost patterns pre and post institutionalization for those participants who die within one year of being institutionalized.

Figures 4.5, 4.6 and 4.7 show the estimated marginal means for each of cost measures, CCARE, MSP and PHARMA. Profile plots indicate the estimated marginal mean of the dependent variable and show the effect being studied without the error. Crossing lines signify a significant interaction among the factors TIME and LYL for all three cost types,

CCARE, MSP and PHARMA. The findings support the third hypothesis that there is an increase in HSU costs over time for individuals in their last year of life.

Figure 4.5

Estimated Marginal Means of CCARE

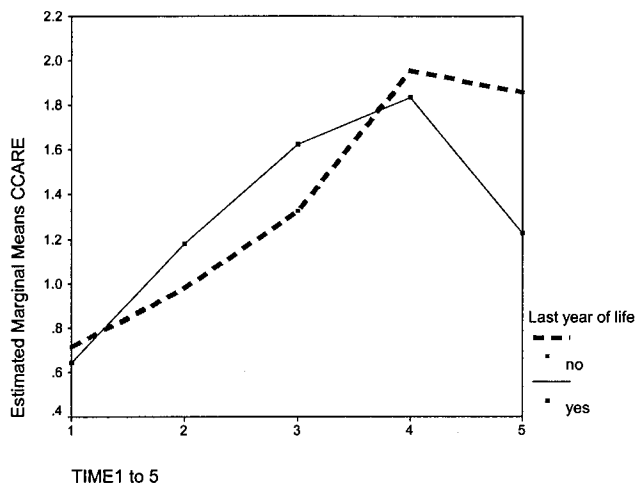


Figure 4.6

Estimated Marginal Means of MSP

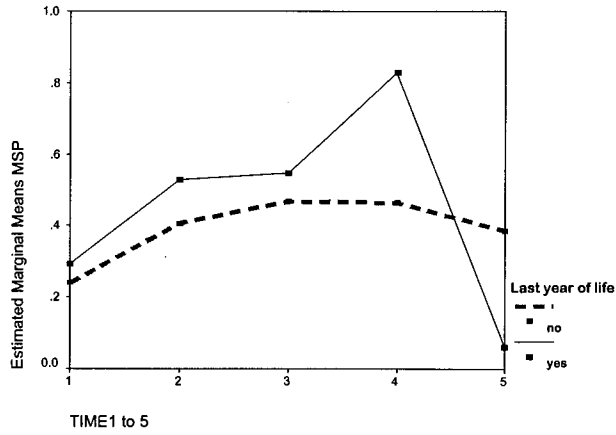
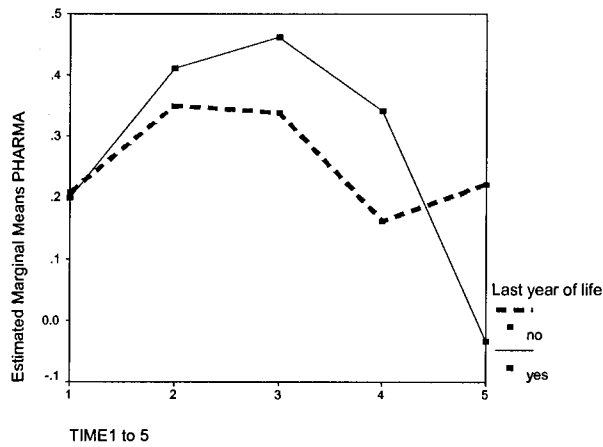


Figure 4.7

Estimated Marginal Means of PHARMA



Given a significant Levene's Test for Equality of Variance ($p < 0.01$) for the independent samples t tests for TIME 5, equal variances could not be assumed (homoskedasticity) and post hoc independent samples t tests with a Bonferroni adjustment did not yield significant differences in any of the mean CCARE costs over TIME 1 to 5 for those in their last year of life and those not in their last year of life ($t = 1.73$, $df = 11.8$, $p = 0.11$). These are contradictory results to the MANOVA which indicated significant differences for CCARE cost interaction with TIME. A plot of the data in Fig. 4.5 shows that at TIME 5, those participants in their LYL and those not in their LYL had differing means. A lack of significance in the post hoc analysis leads to a difficult interpretation conceptually and statistically. However, a repeated measures MANOVA has each participant acting as his/her own control making it a more robust test than a t test. Additionally, potentially, violating the assumption of equal variances can make a conservative post hoc independent samples t test subject to Type II error, even with a correction. Homoskedasticity was evident for TIME 1, 2, 3, 4 and using a non-parametric post hoc tests such as Scheffe for unequal sample size comparisons, though less robust, may have yielded results that support finding the main effect from the MANOVA analysis.

The post hoc t test for MSP costs found a significant difference between groups at TIME 4 ($t = -3.56$, $df = 125$, $p = 0.01$) and TIME 5 ($t = 9.70$, $df = 61.5$, $p = 0.00$), as depicted in Figure 4.6. MSP costs were higher for patients in their last year of life at TIME 4 than those not in their last year of life. The post hoc t test for PHARMA costs found a significant difference in between groups only for TIME 5 ($t = 9.53$, $df = 107.8$, $p < 0.005$) (see Figure 4.7). None of the

interactions of TIME*LYL for any of the three cost types CCARE, MSP and PHARMA were significant in the period prior to institutionalization (TIME 1 to 3). Most notable, however, are significant differences in MSP and PHARMA costs among those in their LYL post institutionalization (TIMES 4 and 5). This finding supports the third hypothesis, that imminent death (within one year of being institutionalized) among participants lead to significantly higher medical services and Pharmacare costs as compared to those who did not die within one year of being institutionalized. As seen in Figures 4.5, 4.6 and 4.7, costs for patients who died between TIMES 4 and 5 (i.e., those in their last year of life) decreased significantly.

4.5 Hypothesis 4 – Cognitive Status Decline and HSU Costs

The fourth hypothesis of this study was to determine if declining cognitive status (COGCHG) over time had a significant effect on HSU costs in the period surrounding institutionalization. Multivariate analyses did not provide evidence for a significant interaction of TIME*COGCHG over the transition from community to institutional care.

Therefore, the fourth and final hypothesis that declining cognitive status significantly increases HSU costs in the time period surrounding institutionalization is rejected.

In summary, there was an increase in HSU prior to institutionalization and a decrease in medical services and Pharmacare costs following institutionalization. HSU costs were higher for institutionalized elderly who died within 12 months of being institutionalized

than those who did not die in the first year. Cognitive decline did not appear to have an effect on HSU costs over the transition from community to institutional living.

CHAPTER V

Discussion

This study yielded several new observations that provide a more complete understanding of health service utilization (HSU) costs prior to and post institutionalization in a group of older Canadians. The objective of the study was to characterize HSU costs over the transition period from community to institutional care for a sample of BC Canadian Study of Health and Aging (CSHA-BC) participants. The hypotheses for the study was based on the clinical observation of a “flurry of activity” prior to institutionalization and the theoretical framework provided by the Network Episode model (Pescosolido, 1992) which framed the process of institutionalization over a period of time. The flurry of activity was operationalized as HSU costs for the purposes of this study and a comparison of HSU costs pre and post institutionalization within subjects was undertaken. HSU costs examined were Continuing Care costs (i.e., acute care, home care and institutional care), medical services (i.e., physicians, specialists and rehabilitation services) and Pharmacare costs.

It was first hypothesized that analyses of HSU costs pre and post institutionalization would reflect a significant increase between pre and post-institutional periods, supporting the belief that the transition from community to institutional care significantly effects healthcare costs. Additional hypotheses were developed to compare medical and Pharmacare costs in the community with those in institutional settings, and to determine if imminent death in newly institutionalized participants led to significant increases in HSU

costs in the year prior to death; and lastly to determine if declining cognitive status over time had a significant effect on HSU costs during the transition from community to institutional care.

5.1 Health Service Utilization in the Year Prior to Institutionalization

The results of this study support the hypothesis that for this group of BC elderly participants a “flurry of activity” in health service utilization occurred in the one year period prior to institutionalization. The presence of this flurry was demonstrated in two ways. First, by taking into account all three cost measures, Continuing Care services (CCARE), medical health services (MSP) and prescription costs (PHARMA), there was a significant effect on HSU costs within-subjects over the five time periods covering pre- and post-institutionalization (see Figure 4.1). Further analyses indicated that in the one year prior to institutionalization, Continuing Care costs were meaningfully different from previous “baseline” Continuing Care costs, and significantly different from post institutionalization Continuing Care costs. In Canada during 1996/97, 65% of elderly persons moving from community to institutions experienced the onset of health conditions such as incontinence, stroke, Alzheimer disease or other dementia. Daily healthcare costs associated with any of these health conditions can significantly increase when an elderly person continues to live in the community (Statistics Canada, 1999b).

The findings presented here provide support for what had previously been only a clinical impression, that elderly persons make use of considerably more Continuing Care services in the year immediately prior to being institutionalized than in earlier time periods. This

increase in Continuing Care costs immediately prior to institutionalization may reflect a number of factors as outlined in the theoretical framework. Families and healthcare professionals may attempt to stabilize elderly persons in the community to forestall committing them to institutions. Decisions are shaped by earlier decisions and choices are made in a forward and backward motion taking place time rather than immediately. The findings from this study support a Social Process framework as seen by the HSU changes over the transitional period from community to institutional care. Costs are not static pre-institutionalization but reflect a change over a period of a year in the health status for an elderly person. This result highlights the necessity of reviewing the institutional process as one that occurs over time, not just reflected in a placement date. Penrod and Dellasega (1998) reported that the institutional process is marked by caregivers' feelings of uncertainty, surrendering to the system, urgency and validation. These feelings occur over time and are partially reflected in the HSU changes for Continuing Care, medical services and Pharmacare costs pre-institutionalization as the family and caregiver attempt to stabilize the elderly person within the community. Future research should take into account the additional components to the Network Episode Model that note that the decision making process is contingent upon the background of the elderly person, the social support system in place, the health history and current health status of the elder and the status of the healthcare system treating the elderly person.

As assumed, the Continuing Care costs after institutionalization were significantly higher than for community living. This finding is in accord with previous research (e.g., Hollander, 2001; Chappell, 2004) indicating that institutionalization is a more expensive alternative to

community living. Importantly, the current study suggests that costs once institutionalization has occurred are not necessarily constant over the first year. Participants in this study showed a decrease in Continuing Care costs over the first year of living in an institution. Costs in the first six months of institutionalization were significantly more than in the second six months. The observed trend requires further study to ascertain any patterns or specific transitional costs that may exist (e.g., survival patterns, ambulance transfers, re-assessments, moves from available to preferred facilities). Additionally, this study's findings reiterate the importance of clearly documenting the time period from which cost data for institutional care is collected. Costs in the first year of institutionalization may not be an accurate reflection of the costs of long term residents. Though almost one third of elderly institutional residents have been found to die within two years following institutional placement (Statistics Canada, 1999b), the remaining two-thirds of residents may be at an institution for an average of five to seven years.

5.2 Health Service Utilization After Institutionalization

The second hypothesis of this study predicted that institutionalization would lead to a decrease in medical services or Pharmacare costs post institutionalization once these services are consolidated under the umbrella of a single service provider (i.e., the institution). Both Figures 4.3 and 4.4 show a decrease in MSP and prescription drug costs after institutionalization; though, overall, the differences in costs over time were not significant for MSP or prescription costs. This is likely because these costs constitute less than 10% of the total HSU costs at any one period of time. Post hoc analyses found significant differences in the MSP and prescription costs pre and post institutionalization,

supporting the hypothesis that these costs do decrease once an individual moves into an institution. Interestingly, in the late 1980's, researchers found that institutionalized elderly showed a 20% decrease in hospital admission rates and a 40% decrease in general physician visits in the first year following institutional admission (Ellencweig, Stark, Pagliccia, McCashin, & Tourigny, 1990). More recently, Alberta researchers have shown decreases in hospital and physician use after institutionalization (Wilson & Truman, 2004). Unfortunately, the Alberta study did not include Pharmacare services. The decrease noted in this study may reflect a consolidation of expenses, as the medical and Pharmacare services are controlled and dispensed via an institution's professional physician and nursing staff. Pharmacare costs may be reduced by changing prescriptions to generic, less expensive medications or by reducing dosage or eliminating the medication from the patient's care management plan. Once an individual moves into an institution, access to medical services is largely at the discretion of the nursing staff in attendance, even with family input. Whereas a health related situation in the community may previously have resulted in the family booking an appointment with a physician, in the institution, the same health situation is most often triaged by nursing staff before a physician is notified. The same is true for prescriptions. Clinical pharmacy services are mandated in nursing homes whereas they are not in the community setting with the result that inappropriate drug therapy is less likely in an institutional setting (Lane et al., 2004). Additionally, with mandated clinical pharmacy services available, generic substitutions initiated by the pharmacist would substantially reduce the Pharmacare costs (Morgan, Agnew, & Barer, 2004).

Indications that MSP costs do not change considerably between pre and post institutionalization is reassuring, as this suggests that residents are not marginalized in terms of medical care, and that access to medical care is consistent over the transitional period when moving from community to institution.

5.3 Last Year of Life and Health Service Utilization

It was hypothesized that imminent death in newly institutionalized participants would be characterized by a significant increase in HSU costs in the year prior to death. The results from this study supported this hypothesis. This study found that participants in their last year of life at the time of institutionalization had different cost patterns over the periods studied, compared to those not in their last year of life at the time of institutionalization. The difference was significant for all three cost measures: Continuing Care; MSP; and Pharmacare. A lack of significance in the post hoc analysis for Continuing Care costs complicates the interpretation of the findings; however, in addition to a robust repeated measures analysis, plots of the data show higher Continuing Care costs for those in their last year of life than those not in their last year of life following institutionalization. Future studies with other participant samples may determine if this is a statistical anomaly or an indicator of more complicated Continuing Care cost scenarios post institutionalization.

Medical services and prescription costs for those in their last year were highest in the last six months, and are most likely attributable to medical treatments received for life-threatening illness. This result supports previous findings with BC longitudinal data that

indicate that health service expenditures are inextricably linked with remaining lifetime (McGrail et al., 2000).

5.4 Declining Cognitive Status and Health Service Utilization

The final hypothesis of this study stated that declining cognitive status over time would have a significant effect on HSU costs in the time period surrounding institutionalization. There were no indications in this study that cognitive decline affected HSU costs during the transition period from community to institution. Researchers from the United States comparing costs for persons with and without dementia have found negative or no prescription cost differences, fewer physician services, but significantly greater inpatient expenses for persons with dementia (Gutterman, Markowitz, Lewis, & Fillit, 1999; Walsh, Wu, Mitchell, & Berkman, 2003). Previous Canadian studies (Østbye & Crosse, 1994; Shapiro & Tate, 1997) have suggested that persons with dementia have higher HSU costs.

The lack of noteworthy differences in HSU cost based on declining cognitive status is important. Participants in this study who did experience cognitive decline did not differ significantly in Continuing Care, MSP or PHARMA costs from those who did not show cognitive change over a 10 year period. Additionally, within-subjects cognitive change did not appear to significantly effect Continuing Care, MSP or PHARMA costs. The repeated measures, multivariate design of this study renders the finding robust. It is reassuring that, according to this data, elderly persons in BC regardless of declining cognitive status seem to have equal access to Continuing Care services, medical health services and prescription

medications though it is unknown if the current level of provided services are actually adequate for those with declining cognition.

5.5 Recommendations for Future Research

Recently published studies have shown that treating Alzheimer disease with cholinesterase inhibitors (CI) may delay institutionalization anywhere from 49 days to 20 months (Luong, Sambrook, & the COSID Investigators, 2002; Geldmacher, Provenzano, McRae, Mastey, & Ieni, 2003). However, more recent studies without pharmaceutical sponsorship indicate CIs therapy does not delay institutionalization (Courtney et al., 2004). As more effective treatments for AD are developed, delaying institutionalization could have a number of consequences in terms of HSU costs. It would be useful to perform computer modeling to forecast the Continuing Care, medical services costs and prescription costs for another six months to two years of living in the community for these patients. Caregiver costs for this extended period would need to be included as the care burden shifts from institutions back to the community. If community care costs in the extended period are still below institutional care costs, the cost savings from delaying institutionalization suggested by in Alzheimer disease treatment studies could be substantial. However, if community care costs in the extended time period continue to increase and potentially reach institutional cost levels, the cost saving from CI therapy by delaying institutionalization would be minimal or non-existent. Additionally, the cost savings seen post institutionalization for medical services and prescriptions, though relatively small compared to Continuing Care costs, would not necessarily be realized.

5.6 Strengths and Limitations of this Study

The core strength to this study is the linkage of administrative data with the CSHA clinical data, allowed for a combination of variables not available to previous researchers. The administrative data, composed of British Columbia health data collected under a public and universal healthcare system includes coverage for long term care institutions, a large portion of pharmaceutical prescriptions and medical services. The administrative data is reliable to the extent that it is the actual costs billed to the provincial medical plan for Continuing Care services, institutional services, medical services and pharmaceutical prescriptions for the linked CSHA participants. The robust nature of the data is enhanced by longitudinal collection of data and the repeated measures, multivariate analysis used in the data analysis.

Additionally, the theoretical context for the study is based on a social process theory, the Network Episode Model that incorporates the complexity of the institutionalization process and the fact that the decisions to institutionalize elderly family members are not made from one day to the next (Gaugler, Zarit, & Pearlin, 2003). The integration of time through the use of repeated measures of CPDAR is a key component to the robust nature of this study's findings.

On the other hand, as with any secondary data analyses there were limitations to the data that were available. For example, some variables necessary to thoroughly explore the

health utilization patterns just prior to transition from community to institution using a social network framework were not available. Cognitive status and transitions had to be determined through a series of cognition measures over the 10 year period. To make HSU determinations for specific dementias such as Alzheimer disease would have required data that included clinical examinations for all participants which were not part of the original CSHA protocol.

Interpreting past utilization figures to predict future utilization can be misleading. Changes in utilization can be associated with reductions in healthcare spending which affect accessibility and availability of health services and changing societal perspectives on healthcare. This CSHA-BC sample of newly institutionalized participants covers institutionalization over a 10 year span from 1991 to 2001 during which there were a number of healthcare policy changes that may make these findings cohort specific. In 1991, the Royal Commission on Health Care and Costs reported a serious lack of direction in healthcare in the province and criticized the system for its numerous barriers that resisted change or initiative and encouraged inequities (Seaton et al., 1991). Key recommendations that impacted institutional care in the province included bringing healthcare closer to home, putting the public first, measuring outcomes, and funding issues. The government's *New Directions for a Healthy British Columbia* strategic plan (British Columbia, 1993), tried to incorporate the Commission's recommendations and in so doing significantly reduced the number of institutional beds and hospital beds in the province (Sheps et al., 2000) and discharged many seniors from institutions and home care programs between 1992 and 1996

(Livadiotakis, Gutman & Hollander, 2003). By 1996, criticisms of New Directions was so widespread that the plan was suspended and a review undertaken (see Davidson, 1999). A revised health plan with a new streamlined regional healthcare model was introduced titled *Better Teamwork, Better Care* (McPhail, 1996). It advocated better and more timely access to healthcare, shorter hospital stays and shorter waiting lists. Overall, the flux within the provincial healthcare system from 1991-2001 has more than likely had a significant impact on how this study's cohort experienced the transition from community to institutional care. Potentially subsequent research using the BCLHD can determine if trends noted in this study are generalizable to other cohorts who have not experienced the same policy changes over time. However, community to institution transition research from Alberta which underwent its own policy changes (Wilson and Truman, 2004), supports the generalizability of these findings.

Another limitation was that this study was restricted to British Columbia data. Previous comparisons of institutionalization rates across provinces (Hébert, Dubois, Wolfson, Chambers, & Cohen, 2001) have found significantly shorter times to institutionalization in BC compared to Ontario and the Atlantic provinces. This is likely a reflection of the higher percentage of public expenditure and per capita funding for home care in Ontario and the Atlantic provinces. Future research would be warranted to determine if provinces that spend more on community home care prior to institutionalization have the same flurry of activity in the year prior to institutionalization or if community home care costs are balanced out over a longer period of time spent living in the community. Colleagues in

Alberta using a cohort institutionalized over the same time frame report similar findings for sustained decreasing hospital and physician costs after institutionalization (Wilson & Truman, 2004).

Most importantly, this analysis does not include informal HSU costs borne by elderly persons and their families and friends. One criticism of healthcare 'reform' in British Columbia has been that the withdrawal of health services has pushed care and associated costs onto the backs of clients and their families. Future studies should determine if changes in informal costs pre- and post-institutionalization occurred as a result of the healthcare changes of the 1980's and 1990's. McDaid (2001) provided a helpful article on costing informal care that may be applied for future research. Specifically, he noted the need for standardized methodology for valuing informal care and indirect care costs; combining caregiver burden measures within costing frameworks; and improving researchers' understanding of how willingness to care or whether care is provided out of obligation or love can impact the amount of care provided.

5.8 Summary

This study provides evidence of a one year pre-institutionalization flurry of HSU activity, highlighting that fact there is a costly transition period as individuals move from community care to institutional care. This finding warrants pause and reflection when comparing community and institutional care costs in that broad comparisons of the past need to be more sensitive to time issues in future research. Clearly, HSU in this time period

is distinctive to prior use and post institutionalization. Additionally, data indicate that HSU institutional costs may differ significantly in the first year for those in their last year of life compared to those who will be long term institutional residents.

This study used a cost per day at risk ratio as the dependent measure, which provides a more sensitive level of individual cost measurement than aggregate measures of HSU costs used in previous research. With this, as with previous studies, home care has been found to be less expensive than institutional care. What is distinct in this study is the demonstration of a distinctive HSU experience during the transition from community to institutional living. Not surprisingly, proximity to death has a significant influence on HSU cost patterns in a newly institutionalized persons. Finally, this study found that HSU among individuals whose cognitive status worsened over time did not differ from those who remained more cognitively stable. This is an important finding because if we consider HSU improper among a patient group such as elderly with cognitive impairment and dementia, healthcare policy and resource allocation may change to invoke an uncaring and hostile environment for that particular patient group.

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Appendix A - Continuing Care Codes and Costs

For Participant Care Status

H. Krueger Associates Inc., 2000

Code	Description	Estimated cost per day (\$)
100	No care	0.00
101	Home Nursing Care	42.00
102	PC (Community)	23.79
103	IC 1 (Community)	26.43
104	IC 2(Community)	37.00
105	IC 3 (Community)	58.14
106	EC (Community)	79.29
107	PC (Institution)	50.00
108	IC 1 (Institution)	72.77
109	IC 2 (Institution)	92.02
110	IC 3 (Institution)	127.70
111	EC (Institution)	178.61
112	Acute Care (Hospital)	518.00
113	Day Surgery (Hospital)	400.00
114	OT/PT	42.00
115	LTC (Hospital)	518.00
116	Extended (Hospital)	178.61
117	Rehab	518.00
118	DPU (Hospital)	518.00
119	ICU (Hospital)	1813.00
120	Death	0.00

Appendix B - List of Acronyms and Abbreviations

3MS: Modified Mini Mental State Examination.

AD: Alzheimer's disease

ADL: Activities of Daily Living

AGE: Age

ANOVA: Analysis of Variance

BCLHD: British Columbia Linked Health Dataset

CCARE: Continuing Care Costs (Home Care and Institutional Care Costs)

CHRONIC: Chronic Health Conditions

CIND: Cognitive Impairment No Dementia.

COGCHG: Cognitive Change

CPDAR: Cost Per Day At Risk

CSHA: Canadian Study of Health and Aging

EDUC: Education

GLM: General Linear Model

HSU: Health Service Utilization.

IADL: Instrumental Activities of Daily Living.

LALONE: Live Alone

LYL: Last Year of Life

MANOVA: Multivariate Analysis of Variance

MMSE: Mini Mental State Examination

MSP: Medical Services Plan Costs

NCI: No Cognitive Impairment

PHARMA: Pharmacare Costs

PHN: Personal Health Number

SEX: Sex

SRH: Self Rated Health

WALK: Walking Assisted / Unassisted