

**THE RELATIONSHIP BETWEEN CLIENT AND CONTEXTUAL
CHARACTERISTICS AND HIGH USERS OF HOME CARE SERVICES**

By

Lori Mitchell

A Thesis Submitted to the Faculty of Graduate Studies of
The University of Manitoba
In Partial Fulfillment of the Requirements for the Degree of

DOCTOR OF PHILOSOPHY

Department of Community Health Sciences
University of Manitoba

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DEDICATION

To Andrew, Peyton, and Cohen,
whose support and sacrifice allowed this thesis to be written.

ABSTRACT

Background: Home care is an important and growing sector within Canada's health care system. In light of anticipated future growth in home care programming, the objective of this study was to determine the client and contextual characteristics related to being a high user of home care services within an urban home care program in Winnipeg, Manitoba.

Methods: The study population consisted of 6071 older, long-term, community-coordinated home care clients in the Winnipeg Regional Health Authority (WRHA) Home Care program. Clients' assessment data and home care service records were linked to allow examination of client characteristics and service allocation patterns after assessment. High users of home care were identified separately for home support service, home nursing service and overall home care service (home support and nursing combined), based on the average amount of care scheduled per week. Multivariate logistic regression was used to assess the relationship between client and contextual characteristics and the likelihood of being a high user of home care services.

Results: Clients primarily received home support and very little nursing service. Visits to high users were longer in duration and more frequent than visits to other users. Characteristics associated with being a high user were unique to the particular service category studied. Predictors of being a high user of overall home care services and home support services included functional impairment indicators, but also health status, level of care need, informal support, and the specific home care office coordinating care. High users of nursing services were predicted mainly by clinical need variables, but also cognition, functional impairment, level of care need, and age.

Conclusions: In the WRHA Home Care program, long-term provision of home support plays a larger role in maintaining frail older clients in the community than does nursing service. Although there was greater reliance on provision of home support, service allocation decisions mainly were in response to the specific needs of the clients. These results have implications for structuring home care programs and for understanding the implications of providing increased levels of nursing and home support services to high need clients.

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CHAPTER 1: INTRODUCTION

Home care in Canada has been defined as “an array of services which enables clients incapacitated in whole or in part to live at home, often with the effect of preventing, delaying or substituting for long-term care or acute care alternatives” (Health Canada, 1999, p.2). The Health Canada definition also outlines three major models and intended impacts of home care services:

- 1) Maintenance and preventive model – when home care maintains independence in the community for individuals with health or functional difficulties, and prevents further health/functional decline and need for institutional care. The major intent of services is to compensate primarily for functional deficits;
- 2) Acute care substitution model – when home care meets the needs of individuals who would otherwise remain in or be admitted to an acute care facility. Service needs tend to be more medical in nature and required for a shorter period of time;
- 3) Long-term care substitution model - when home care meets the needs of individuals who would otherwise be institutionalized. This model differs from the maintenance and preventive model in that clients’ functional deficits may be more severe, and the clients would have severe difficulty remaining in the community without the home care services.

These models are not mutually exclusive. Most comprehensive home care programs promote elements of all three models and an individual client may receive care that fulfills the intent of two or even three of the models at the same time or sequentially. In Canada, the responsibility for provision of home care services falls to the provinces and territories, each of which has a publicly funded home care program (Health Canada,

1999). The funding, organization and delivery of home care services have become important provincial and national health policy issues as public home care programs have experienced dramatic growth. For home care reporting, the focus tends to be on public-sector home care, since private home care information tends to be challenged by data limitations or unavailability. The Canadian Institute for Health Information (CIHI, 2007) suggests that private home care accounts for approximately 22.0% of total home care expenditures. Therefore, a focus on public programs encompasses the majority of home care service use.

CIHI (2007) estimates that per capita total public spending on home care in Canada grew from \$54.75 in 1994/95 to \$93.60 in 2003/04, an average annual growth of 6.1%. Over the same time period, the number of public home care users increased from 23.9 to 26.1 per 1,000 population, an average annual increase of 1.0%. The report concludes that the number of home care users is slowly increasing, but that each user is consuming more resources than a decade ago. A slightly more dramatic picture of home care is presented in the report for Manitoba. From 1994 to 2004, per capita spending more than doubled from \$65.72 to \$140.15 per 1,000 population, an average annual growth of nearly 9.0%. The number of government-sponsored home care users increased 6.5% annually over the ten years to the 2003/04 level of 27.0 users per 1,000 population. Similar to the national picture, in Manitoba the increase in per capita spending on public home care is out pacing the increase in the number of home care users, which suggests that users are consuming increasing home care resources on a per capita basis in the province than in the past as well.

Many reasons are identified for growth in home care, such as population aging, changes in family patterns that have reduced availability of informal caregivers, and changes in technology and pharmacology that makes more forms of care in the home possible (Canadian Home Care Human Resources Study, 2002). However, a key factor in the growth is health policy shifts that have increased reliance on home care as an alternative to acute and long-term institutional care, policy shifts motivated by the belief that equal or better care can be realized in the community at a lower cost than institutional care (Coyte & McKeever, 2001).

Federal reports have also brought attention to home care as a key component of the health care system (Kirby, 2002; Romanow, 2002). However, both of these reports focus primarily on short-term, post-acute home care – the acute care substitution model. This focus has generated criticism for not directly addressing long-term home care services, and the role of home care for individuals with chronic conditions that necessitate ongoing care. Several organizations cite that the maintenance/preventative and long-term care substitution models of home care need to be better recognized and supported within Canada's health care system (Canadian Home Care Association (CHCA)), 2007; Health Council of Canada, 2008). Hollander (2003) argues that long-term home care is a central feature in improving efficiency and effectiveness of the health care system. In Manitoba, for example, the majority of home care users are older adults receiving long-term care¹ (Mitchell, Roos, & Shapiro, 2005). As the population ages and the number and proportion of Canadians over age 65 increases, many of whom will

¹ Hollander defines long-term home care as greater than 90 days while Mitchell and colleagues define long-term home care as greater than 60 days.

experience a chronic health condition, the number of people requiring some form of home care, particularly on a long-term basis, will likely continue to increase.

The demand on public home care has increased the need to identify who the users of home care are and how the services are being used. CIHI (2001) suggests that lack of good information on home care use is a barrier to effective planning, management and evaluation of home care services. Home care program planning and resource forecasting requires information on home care clients and their patterns of service utilization. It is important for health care professionals and policy makers to have knowledge of the factors that account for the amount of care that home care clients receive. Therefore, the trajectory of home care clients needs to be better understood, from access, to assessment, allocation of service, and level of service consumption. Who is accessing home care is fairly well examined. The vast majority of previous investigations have assessed predictors of the use versus non-use of home care services (Kadushin, 2004; Meinow, Kareholt, & Lagergren, 2005). However, allocation patterns in home care have not been systematically studied in Canada. Little attention has been devoted to determining how home care client characteristics are associated with the volume and the types of home care services they receive. This is in contrast to other health care services, such as hospital or primary care, where the high-level consumption of service has been repeatedly studied.

Due to gaps and limitations in the Canadian literature and data, research undertaken in a Canadian context that explores the allocation of home care services is lacking. The aim of this study is to address these issues in home care by developing a better

understanding of the factors associated with public home care services allocated to older adults assessed as eligible for long term service. The objectives of this study are:

- 1) To describe the characteristics of older, long-term clients receiving public home care in Winnipeg;
- 2) To describe the range and type of services provided to older, long-term clients and the variation in service levels;
- 3) To examine the relationship that client, caregiver, and program characteristics have on high levels of service provision overall and high levels of provision of particular types of service, namely home health (nursing) and home support.

The study population in this research consists of older adults in receipt of public home care in Winnipeg, the largest health region in Manitoba. The focus is on the older, long-term home care client (clients enrolled in home care for more than 60 days) since they represent the bulk of the public clientele in Manitoba and would provide the greatest insight into utilization. These individuals are receiving care that is reflective of the maintenance/preventative and long-term care substitution models of home care. Given the aging population, the growth in home care programs, and the increased number of frail individuals needing health care services for lengthy periods, research on these models of home care utilization among older adults seems particularly relevant. This research will provide some context around the growth in public home care by profiling the older long-term users of home care and their service patterns in a Canadian region. Key to highlighting the association between user profiles and their service consumption is understanding whether or not some appropriate measure of need is determining service use or if other factors are affecting receipt of service. The results of this study can help to

estimate service needs in the near future and to evaluate the extent that resources are currently allocated in a manner consistent with program policy.

CHAPTER 2: LITERATURE REVIEW

This chapter provides an overview of the home care utilization literature most relevant to the aim of the present study. It examines the continuum of home care use for older adults from entry into a home care program to the final result for some clients of being a high consumer of the service. The first section briefly explores the factors shown to be related to use of home care to provide an understanding of why an older adult begins to use home care. The second section of the chapter explores the Canadian literature related to the types of service home care clients in Canada receive. The third section of the chapter identifies which factors influence the amount of home care an elderly client will receive once in a home care program. The final section of the chapter reviews the high health care service use literature in an effort to identify who could be the high users of home care and the methods that can distinguish when a client enters into a high-use category based on volume of care. This thesis focuses on older adults (defined as individuals age 65 and older) using public home care and the review of the literature focuses on studies with older populations, when possible.

2.1 Determinants of Home Care Utilization

Extensive study of home care utilization has occurred with researchers comparing individuals who use home care to those who do not in an attempt to identify reasons behind home care utilization. Kadushin (2004) conducted a thorough systematic review of the literature to identify the variables associated with home care utilization. Sixty-four studies published between 1985 and 2000 were reviewed, of which 48 examined use versus non-use of home care. Of the literature in that review, all but four studies focused

on older populations – 11 studies on adults aged 55 and older and 33 studies on adults aged 65 or older. As a result, Kadushin's review was able to provide a good characterization of the older individual who uses home care. A duplication of that systematic review will not be undertaken in this section, but instead a summary of Kadushin's conclusions are presented and studies that have occurred since that review, and specific to older populations, are examined and compared to Kadushin's findings. Kadushin used the Andersen-Newman Behavioral Model of Health Services Use (Andersen & Newman, 1973) as a framework for the home care literature review. Factors studied for association with home care utilization were grouped into three conceptual domains of the model – predisposing factors, enabling factors, and need factors. The components of the Andersen-Newman model will be used to structure the literature review in this thesis as well.

Table 2.1 summarizes 12 studies since 2000 that examine older adults' use of home care specifically and are reviewed in addition to Kadushin's findings. It is important to note the variety of methodological approaches in the studies, and the array of home care use definitions in particular. These different approaches do have an impact on the conclusions that can be drawn and the generalizability of the findings.

Table 2.1: Recent Studies of Older Adults and Home Care Utilization

Authors; Country	Design	Population	Home Care Unit of Analysis	Independent Variables
Alkema, Reyes, & Wilber (2006); United States	Cross- sectional	Age 65+; community-dwelling high-risk older adults in Medicare managed care (n=224)	Use of any formal home care service; Use of specific categories of formal home care (1-year period of observation)	Older adult: predisposing, enabling, and need
Carrière et al. (2001); Canada	Cross- sectional	Age 65+; community-dwelling older adults receiving assistance for daily activities (n=1380)	Use of formal home care for housework, shopping for groceries, meal preparation or personal care	Older adult: predisposing, enabling, and need; Caregiver predisposing
Finlayson (2002); Canada	Longitudinal	Age 85+; community-dwelling older adults (n=616)	Use of undifferentiated home care service at time of final interview	Older adult: predisposing, enabling, and need
Fortinsky, Fenster, & Judge (2004); United States	Longitudinal	Age 65+; individuals enrolled in Connecticut's Medicaid home and community-based services waiver program for the aged (n=5,232)	Use of Medicare home health services; Use of Medicaid home health services; Use of Medicaid waiver services; (any use in a 30- month observation period)	Older adult: predisposing, enabling, and need
Hawranik (2002); Canada	Cross- sectional	Age 65+; community-dwelling older adults (n=380)	Use of undifferentiated home care services; Use of differentiated home care services. (1-year period of observation)	Older adult: predisposing, enabling, and need; Caregiver predisposing, enabling, and need; Community enabling
Langa et al. (2001); United States	Longitudinal	Age 70+; community-dwelling older adults with ADL or IADL impairment (n= 3,109 in period 1; n=2,426 in period 2)	Use of paid home care for ADL or IADL assistance in 1- month period	Older adult: predisposing, enabling, and need
Larsson, Thorslund, & Forsell (2004); Sweden	Cross- sectional	Age 81+; community-dwelling older adults (n=502)	Use of public home help at time of interview	Older adult: predisposing, enabling, and need
McAuley et al. (2004); United States	Cross- sectional	Age 65+; community-dwelling older adults (n=2,584)	Use of formal home care; Use of Medicare home health care. (1-year period of observation)	Community enabling

Authors; Country	Design	Population	Home Care Unit of Analysis	Independent Variables
McCusker et al. (2001); Canada	Longitudinal	Age 65+; community-dwelling older adults visiting emergency departments (n=1207)	Use of public home care in 3-month period after ED visit	Older adult: predisposing, enabling, and need
Mitchell, Strain, & Blandford (2007); Canada	Longitudinal	Age 65+; community-dwelling older adults (n=855)	Use of public home care services in 1- year period	Older adult: predisposing, enabling, and need
Roelands et al. (2003); Belgium	Cross- sectional	Age 65+; community-dwelling older adults (n=1134)	Use of specific home care services in 4- week period	Older adult: predisposing, enabling, and need
Wilkins & Beaudet (2000); Canada	Longitudinal	Age 65+; community-dwelling older adults (n=2,044)	Use of government- supported home care in 1-year period	Older adult: predisposing, enabling, and need

2.1.1 Predisposing Variables

The Kadushin review commenced by summarizing the findings on predisposing variables. Predisposing variables represent individual characteristics that can predict some individuals' inclination to rely on health services more than other individuals, even before becoming ill (Andersen & Newman, 1973). Kadushin included age, gender, marital status, education, and race as predisposing variables.

Among the predisposing variables, the Kadushin review found probability of home care use increased with age, but there was enough contradiction in study results to classify the relationship of age with use as "uncertain." Inconclusive results were found for gender, while no relationship was found for marital status, education, and race.

The recent literature in Table 2.1 presents similar conclusions. Several studies did not find an association with age (Alkema, Reyes, & Weber, 2006; Carrière, Martel, Légaré, & Morin, 2001; Finlayson, 2002; Larsson, Thorslund, & Forsell, 2004; McCusker et al., 2001) while others found likelihood of home care use increased with age

(Fortinsky, Fenster, & Judge, 2004; Hawranik, 2002; Langa, Chernew, Kabeto, & Katz, 2001; Mitchell, Strain, & Blandford, 2007; Wilkins and Beaudet, 2000). Gender was not a significant predictor in most of the recent studies reviewed in Table 2.1 and marital status was significant in some research (Langa et al., 2001) but not in others (Finlayson, 2002; Hawranik, 2002; McCusker et al., 2001). Information on marital status was limited likely because some studies examined living arrangement instead of marital status (Mitchell et al., 2007). Two studies found that as level of education increased, odds of using home care decreased (Alkema et al., 2006; Carrière et al., 2001) while others found no such relationship (Hawranik, 2002; Larsson et al., 2004; McCusker et al., 2004; Mitchell et al., 2007). Race/ethnicity was not considered in most of the studies but in the two studies that examined it, race emerged as positively associated with Medicaid home health use in one study ((for African Americans) Fortinsky et al., 2004) and had no effect on paid home care use in the other (Langa et al., 2001).

2.1.2 Enabling Variables

The next group of variables Kadushin (2004) summarized was the enabling variables. Enabling variables are those conditions that allow an individual to act on a value concerning, or address a need for, health service use (Andersen & Newman, 1973). The enabling variables in the Kadushin review were categorized into living arrangement, informal support/social support, income (and health insurance for American studies), and population density (i.e., rural location of residence).

Living arrangement variables produced conflicting results in the Kadushin review and similar inconsistencies exist in the recent results. In the recent literature, older adults

living alone were more likely to use home care in several studies (Carrière et al., 2001; Hawranik, 2002; Langa et al., 2001; Larsson et al., 2004; McCusker et al., 2001; Roelands, Van Oyen, Depoorter, Baro, & Van Oost, 2003), but not others (Alkema et al., 2006; Finlayson, 2002; Mitchell et al., 2007; Wilkins and Beaudet, 2000). In some cases, specific interactions were found. Fortinsky and colleagues (2004) indicated that older adults who lived with relatives who were not a spouse or child were less likely to use home care than older adults living alone, but older adults who lived with both a spouse and child(ren) were more than twice as likely to use Medicaid home health services than older adults living alone.

Several studies in the Kadushin (2004) review included informal support/social support variables. Kadushin concluded that individuals receiving informal support were significantly less likely to initiate use of home care. Some recent studies in Table 2.1 are able to provide further evidence to support this conclusion among older populations, although few measured these factors. Langa and colleagues (2001) found informal support decreased the odds of receiving formal home care, as did Larsson and colleagues (2004), particularly among elders living alone. However, Hawranik (2002) did not find a relationship between informal support and use of home care. Similarly, social support, such as contact with friends and social outings, was not related to use (Alkema et al., 2006; Finlayson, 2002; Larsson et al.; McCusker et al., 2001; Wilkins and Beaudet, 2000), nor was emotional support (Wilkins and Beaudet).

Inconclusive results were found for income in the Kadushin review. In the recent literature, no association was discovered between income adequacy with home care use (Finlayson, 2002; McCusker et al., 2001) and net worth produced inconsistent results for

Langa and colleagues (2001) in their study. Yet Wilkins and Beaudet (2000) reported lower income elders were more likely to begin using home care.

Only a few studies in Kadushin's (2004) review and in the recent literature considered community or system characteristics among the independent variables. Community characteristics are characteristics that tap into an indication of health service resources in the individual's community, such as health care system-related or market variables or rural/urban residence of the older adult (Andersen and Newman, 1973). In Kadushin's review, population density (based largely on crude definitions of urban and rural) was not associated with home care use and recent literature provides inconsistent results. Hawranik (2002) did not find urban versus rural location of residence to be significant while Mitchell and colleagues (2007) found that older adults in urban locations were significantly more likely to use home care than older adults living in predominantly rural areas. McAuley, Spector, Van Nostrand and Shaffer (2004) found the opposite, with older adults in the most rural counties more likely to use home care than older adults in metropolitan locations. Often the varied and crude definitions of urban or rural residence contribute to inconsistent conclusions between studies (Mitchell et al., 2007).

2.1.3 Need Variables

The final variables that Kadushin (2004) summarized were the need variables. Need variables are the illness and disability variables, both as perceived by the individual or evaluated by a health professional. The need variables in the Kadushin review were categorized into physical impairment, cognitive impairment, depression of home care

recipient, and caregiver need (e.g., task burden and subjective burden). Physical impairment captured a wide range of measures, including health status (medical diagnoses, disabilities, incontinence, use of assistive devices), self-reported health, number of hospitalizations in a fixed period, impairments in activities of daily living (ADL), impairments in instrumental activities of daily living (IADL), and functional impairment, which is a combination of ADL and IADL impairments.

Kadushin (2004) concluded that the most significant variable influencing use of home care is physical impairment. Among the many different definitions for physical impairment in the literature, Kadushin found that functional impairment – the impairment in IADLs and/or impairment in ADLs – was the most significant factor. The studies with older adults since the Kadushin review report similar findings. All but two of the studies in Table 2.1 measuring physical impairment found that level of functional impairment is the most significant factor related to use of home care (exceptions were Alkema et al., (2006) and Finlayson (2002)). When measured separately, level of ADL disability was the more important predictor than level of IADL disability in several studies (Fortinsky, Fenster, & Judge, 2004; Hawranik, 2002; McCusker et al., 2001; Wilkins and Beaudet, 2000) although less rarely, IADL disability emerged as the prominent determinant of home care use instead of ADL disability (Langa et al., 2001; Larsson et al., 2004).

No other need factors measured in the Kadushin literature review or in the recent literature were as consistently associated with home care use. In the Kadushin review, cognitive impairment produced inconsistent results for association with home care use and in the recent literature, results are similarly inconclusive. Several studies did not find an association between cognitive impairment and home care use in general (Hawranik,

2002; McCusker et al., 2001; Roelands et al., 2003). Moreover, Fortinsky and colleagues (2004) found older adults with severe cognitive impairment were less likely to use Medicare home health care and level of cognitive impairment was not a factor in use of Medicaid home health care. Others discovered a positive relationship with cognitive impairment and only specific types of service, such as personal care (Hawranik, 2002) and home cleaning (Roelands et al., 2003) or in specific situations such as when the older adult was living alone (Larsson et al., 2004). In a longitudinal study, development of cognitive impairment over time was positively associated with use of home care (Mitchell et al., 2007).

Too few studies examined depression in the Kadushin review to allow for any conclusions on its association with home care use. The recent literature does not provide a clearer or more consistent relationship between depression and home care use among older adults than does previous studies. An elder's presence of depression was not a factor in some recent utilization studies (Hawranik, 2002; Roelands et al., 2003), and in other research its presence lowered the probability of using home care (Fortinsky et al., 2004). Conversely, Mitchell and colleagues (2007) found that older adults with depression appearing over time were more likely to use home care, while Larsson and colleagues (2004) found that depression was associated with receipt of home care among older adults with less education who were living alone.

The Kadushin (2004) review did not comment on specific health status indicators such as disease diagnoses or health service use since they were combined into the physical impairment category, but some of the more recent studies explicitly examined these indicators. For example, Finlayson (2002) found that self-rated health was an

important predictor of home care use instead of other physical impairment variables. Certain disease diagnoses were significant in several studies, although no particular disease emerged consistently or was measured in all studies to provide conclusive evidence. Significant diseases included stroke, heart disease, lung disease (Fortinsky et al., 2004; Langa et al., 2001), urinary tract infection, diabetes, alcohol/substance abuse, osteoporosis, and pneumonia, (Fortinsky et al.) even after controlling for level of functional impairment. Number of medical conditions or chronic conditions tended to produce inconsistent results with home care use (Finlayson, 2002; Larsson et al., 2004) or at times produced a significant positive association (Wilkins and Beaudet, 2000). Also, incontinence was reported as an important determinant of home care use in some studies (Alkema et al., 2006; Fortinsky et al.; McCusker et al., 2001).

Other health service use as a need predictor of home care produced inconsistent results in the recent literature as well. McCusker and colleagues (2001) found that hospital admission after a visit to an emergency department was predictive of home care use in the following three-month period. Wilkins and Beaudet (2000) found a hospitalization in the previous year was significant but others did not (Langa et al., 2001). The divergent results in the literature suggest that disease, health service use, and health status indicators are not a proxy for functional impairment and they are therefore less reliable as predictors of need for home care service.

The caregiver need variables in the Kadushin review typically were caregiver burden indicators. Kadushin concluded that caregiver burden was significantly associated with home care use. Only one study in the recent literature included caregiver need variables, and to some extent confirms Kadushin's conclusion. The Hawranik study

(2002) examined a number of caregiver need variables, which included caregiver burden, caregiver health problems, caregiver depression, caregiver self-rated health and caregiver health beliefs. None of the caregiver need variables was found to be related to a composite measure of home care used in the study, but use of specific services was affected by such needs. While this study suggests that caregiver need is associated with some specific types of home care more than others, no conclusions can be drawn from the recent literature with only one study measuring these associations.

2.1.4 Summary

With the exception of functional impairment, it is evident that no other indicator is consistently associated with home care use among older adults. The lack of consistency in the findings may be due to the noted methodological differences among the studies. For example, use of home care is not measured the same way in all studies. In Table 2.1, use is measured as use/non-use of any type of home care service or particular types of services, with what is defined as a home care service varying by jurisdiction. The study populations vary as well. Age 65 and older is the age group most often selected for study, but in the Kadushin (2004) review, some older populations were defined as age 55+ (Diwan, Berger, and Manns, 1997) while in recent literature, Finlayson (2002) focused only on those aged 85 and older. Similarly, the studies vary in the independent variables that were included, or if similar variables were included in different studies, they often were not measured in the same manner.

Table 2.2 summarizes the conclusions drawn from the literature for the relationship between variables and home care use. The Kadushin (2004) review

concluded that the individual who is most likely to use home care is older, has a high level of functional impairment in ADL/IADLs, lives alone and has a low level of informal support. The caregivers of home care users have health problems, burden and distress due to the tasks they are completing, the social and emotional effects of caregiving, and their own physical changes. Possible community or system characteristics may have an impact on an older adult accessing home care, but sparse and inconsistent results hamper conclusions in this area. In addition, Kadushin (2004) suggests that need indicators, namely those related to physical impairment, interact with the enabling variables of informal support and living arrangement. When informal support is available, formal support is delayed until physical impairment is greater, but when informal support is lacking or a person lives alone, formal support is implemented at lower levels of impairment.

The limited numbers of recent studies, and the inconsistent results they reported, are insufficient to challenge Kadushin's conclusion about who uses home care among older adults, although some of the conclusions were apparent in the recent studies. However, it is evident that functional impairment plays the greatest role in whether an older adult will seek out and/or ultimately receive home care. Even though the intent of home care is to respond to health and social needs (Forbes, Jansen, et al., 2008), it is the physical functioning of the older adult that garners the greatest home care response.

Table 2.2: Summary of Characteristics and Association with Home Care Use

Characteristic	Kadushin Review	Synthesis of Recent Literature
Predisposing		
Age	Inconclusive results	Inconclusive results
Gender	Inconclusive results	No association
Marital Status	No association	Inconclusive results
Education	No association	No association
Race	No association	Inconclusive results
Enabling		
Living Arrangement	Inconclusive results	Inconclusive results
Informal/Social Support	Negative association	Inconclusive Results
Income	Inconclusive results	Inconclusive results
Population Density	No association	Inconclusive results
Need		
Functional Impairment	Positive association	Positive association
Physical Impairment ² (other than ADL and IADL)	No conclusion available*	Inconclusive results
Cognitive Impairment	Inconclusive results	Inconclusive results
Depression	No conclusion - too few studies	Inconclusive results
Caregiver Need	Positive association	No conclusion - too few studies

* **Note:** Kadushin (2004) cited specific findings for functional impairment but not physical impairment

2.2 Types of Home Care Service Utilized

The previous section provided an indication of why an older adult would begin to need home care. This section explores the types of service older adults are provided once they begin using home care. Several recent Canadian studies examined home care use for descriptive purposes, which afford some insight into the types of service Canadians receive. Although some studies do not focus explicitly on older Canadians, most do address public home care use and their findings still illustrate where home care service is allocated among a clientele that is predominantly older adults.

² Physical impairment indicators included self-reported health, health status indicators (such as medical diagnoses, disability indicators, or incontinence) and hospital use.

2.2.1 National Utilization

An examination of publicly funded home care in the 1990's used three Statistics Canada National Population Health Surveys (NPHS) from the mid- to late-1990's (Forbes et al., 2003). Among adults age 18 and older, 2.4% of Canadians used home care in 1994/95, 2.3% in 1996/97, and 2.7% in 1998/99. The authors focused on two specific services among home care users, home nursing and housework assistance, since too few of the respondents used other home care categories (health-care providers (e.g., occupational and physical therapists), personal care, meal preparation, shopping and respite). Over the respective survey years, nursing was used by 39.0%, 46.0% and 41.0% of home care users, while housework assistance was used by 49.0%, 42.0%, and 42.0% of clients.

CIHI reports more recent statistics on national home care use in their analysis of home care expenditures. Home care users among adults age 18 and older were identified from 2003 national survey data, the Canadian Community Health Survey (CCHS). The prevalence of adult home care users ranged from 2.0% to 3.0% across Canada in 2003, similar to the previous estimate reported by Forbes and colleagues (2003). The CIHI report divided home care services into home health (nursing care, health services, medical equipment, or supplies) and home support (personal care, housework, meals, shopping, respite care, and other). Among the provinces, just less than 1.0% to 1.8% of adults used public home support services, while 0.9% to 1.9% of adults used public home health in 2003, indicating a fairly equivalent split between home nursing and home support need.

Statistics Canada used the CCHS data from 2003 to specifically report on older adult's use of home care (Carrière, 2006). The study revealed that 15.0% of older adults were receiving some form of home care, with 2.0% of older adults receiving a mix of informal and formal home care and 9.0% of older adults receiving only formal home care. For the older clients receiving only formal care, housework was the most common type of care provided (to 53.0%), followed by nursing care (38.0%) and personal care (29.0%).

2.2.2 Provincial Utilization

Different home care service complements and eligibility criteria will affect service allocation patterns in different jurisdictions. Several provincial examinations provide some regional perspective of home care utilization. An Alberta study that analyzed home care data from 1991/92 to 2000/01 for all home care clients found that home care provided by home support aides was most frequent (Wilson et al., 2005). Personal care and home support were the services consuming most of Alberta's home care hours, with personal care being the greatest service overall in the years examined. Skilled nursing care was a distant third. In British Columbia in a similar time period, 1990 to 2000, again home support services (e.g., assistance with ADLs, meal programs) comprised a greater number of home care claims compared to home nursing (Penning, Brackley, & Allan, 2006). Relatively few British Columbians received rehabilitation services, such as physical and occupational therapy.

In Manitoba, Hawranik (2002) examined in-home service use among a sample of older Manitobans (age 65 and older) with caregivers. Four services were examined for

use in 1991/92 – homemaking, personal care, nursing, and home delivered meals. Forty-one percent of the sample used in-home services in the previous 6 months; homemaking was the most frequently used in-home service (36.3%), followed by personal care (16.8%), nursing (10.0%), and home delivered meals (9.0%). Mitchell, Strain, and Blandford (2007) used similar service groupings to examine home care use at a later date. Older adults not using home care in 1991/92 were assessed for home care use five years later. In 1996/97, 14.0% of the sample had used home care services in the previous six months. Homemaker services were most frequently used, followed by equivalent use of attendant/orderly service and nursing service. Use of a social worker/counsellor/psychologist was rarely identified.

2.2.3 Utilization by Specific Populations

Specific populations have been examined for their use of home care in Canadian studies as well, with results that indicate there are differences in the services used by different populations. Forbes and colleagues described home care provision to adults in urban and rural settings (Forbes & Janzen, 2004) and adults with dementia (Forbes, Jansen et al., 2008; Forbes, Morgan, and Janzen, 2006). Again with NPHS data, Forbes and Janzen (2004) identified that in 1998/99 that urban and rural adults on home care received nursing service in similar proportions, at approximately 40.0% each. A larger proportion of rural clients received housework (50.0%) than urban clients (40.0%) but urban clients were much more likely to receive personal care assistance (40.0%) than rural clients (11.5%). Using CCHS data from 2000/01 Forbes and colleagues (2006) found that older persons without dementia most frequently received nursing services

while those with dementia most frequently received personal care assistance. However, with the next cycle of CCHS data (2003), a different result was found for adults with dementia. Among those who did receive publicly funded home care, nursing was the most frequent service followed by personal care, housework, meal assistance, and respite care.

Laporte, Croxford, and Coyte (2007) examined publicly funded home care in Ontario among adults in general and made the distinction between short-term clients (home care episodes of 13 weeks or less) and long-term clients (home care episodes of 17 weeks or greater). Among short-term clients, 66.0% received nursing, 15.0% received personal support and/or homemaking, 34.0% received physical and/or occupational therapy and 9.0% received other services. Among long-term clients, 57.0% received nursing, 75.0% received personal support and/or homemaking, 40.0% received physical and/or occupational therapy and 18.0% received other services. The authors concluded that, relative to short-term services, long-term home care services are more focused on providing home-making service, which corresponds with long-term care usually being required by clients with chronic care needs. The authors also stressed that it is important to make a distinction between short- and long-term home care when examining home care utilization since the importance and strength of some of the client variables they examined in their study were found to differ between the two types of care.

2.2.4 Summary

These Canadian studies indicate that home care services are frequently considered within two broad categories – home nursing and home support. Most Canadian

researchers have not attempted examination of more discrete categories of home care service. This is a limitation that Laporte and colleagues (2007) point to in their study. The administrative data they relied upon did not report important information needed to fully examine home care service allocation such as information on the specific services provided within each of their service categories (e.g., wound care or meal preparation). In addition, another limitation in many utilization studies that Forbes and colleagues (2003) note is the lack of information on the amount of home care received, due to restrictions in the data often available, such as in some survey data. The authors suggest that revealing what types of services are used is only part of the story. Critical information on the amount of home care used would enhance the decision-making ability of policy makers within organizations and/or jurisdictions.

2.3 Determinants of Home Care Volume

Fewer studies have examined utilization specifically among home care clients already receiving care in a program. The main objective of these latter studies is to identify factors associated with the amount of home care service clients are receiving. Kadushin (2004) refers to this as “volume” literature. Henton, Hays, Walker, and Atwood (2002) argue that the advantage of volume measures of home care use, in comparison to use/non-use measures, is that they provide better information for home care agency administrators because of the ability to monitor changes in the amounts of service used. Kadushin’s (2004) review included 22 studies predicting volume or the amount of service received. Twelve of the studies focused on populations aged 65 and older and an additional seven focused on individuals age 55+, thereby providing a good

indication of factors associated with amount of care received by elderly clients. As was done for the home care use review, the Andersen-Newman model groups of predisposing, enabling, and need variables similarly categorized the volume literature. Again, literature with older populations published since 2000 are reviewed in this section and compared to Kadushin's findings. Table 2.3 outlines the more current literature reviewed and it is important to note the presence of only two Canadian studies with a focus on older adults among the eight studies (Hawranik, 2002; Lafrenière, Carrière, Martel, & Bélanger, 2003). None of the volume studies Kadushin reviewed were Canadian.

Before examining the findings, it should be stressed for the volume literature as well that the study methods varied. There are a diverse number of home care volume definitions in the literature. Even though the common goal is to determine the extent of home care use, there are many ways to achieve this. The more recent volume literature and the volume literature in Kadushin's review measured home care amount in terms of hours of service, days of service, number of services, number of visits or total expenditures. Volume was also measured in varying time frames, such as per week, per month, per several months, per year, or per episode. There is no standardized method for measuring amount of home care; the definition of home care utilization is a function of the study's purpose (Madigan, Tullai-McGuinness, & Neff, 2002).

Table 2.3: Recent Studies of Older Adults and Home Care Volume

Authors (Country)	Design	Population	Home Care Unit of Analysis	Independent Variables
Brega, Jordan, & Schlenker (2003); United States	Longitudinal	Age 65+; clients of Medicare-certified home care agencies with CHF or Diabetes diagnosis (n=1217)	Number of visits/day in episode; Length of episode; Number of disciplines involved; Number of alternative/ community services	Client predisposing, enabling, and need; Community enabling; Health care system
Davitt et al. (2002); United States	Cross- sectional	Age 60+; clients of Medicaid Home and Community Based- Waiver Program (n=723)	Total amount of service units in episode; Total number of services in episode	Client predisposing, enabling, and need
Fortinsky, Fenster, & Judge (2004); United States	Longitudinal	Age 65+; individuals enrolled in Connecticut's Medicaid home and community-based services waiver program for the aged (n=5,232)	Average Medicare home health expenditures; Average Medicaid home health expenditures; Average Medicaid waiver expenditures. (average per client per month based on max. 30-month observation)	Client predisposing, enabling, and need
Hawranik (2002); Canada	Cross- sectional	Age 65+; users of inhome services (n=141)	Use of 2+ services versus use of only 1 service in 6-month period	Client predisposing, enabling, and need; Caregiver predisposing, enabling, and need; Community enabling
Henton et al. (2002); United States	Cross- sectional	Age 65+; national sample of Medicare home health care clients (n=239)	Annual Medicare expenditures per client; Number of days of care per year	Client predisposing, enabling, and need; Community enabling
Lafrenière et al. (2003); Canada	Cross- sectional	Age 65+; community- dwelling older adults with a chronic health problem (n=1089)	Receiving help with housework, meal preparation, shopping or personal care	Client predisposing, enabling, and need
Langa et al. (2001); United States	Longitudinal	Age 70+; community- dwelling older adults using formal home care for ADL or IADL assistance (n= 388 in period 1; n=270 in period 2)	Average hours of service/week (based on a 1-month observation period)	Client predisposing, enabling, and need
Meinow, Kareholt, & Lagergren (2005); Sweden	Cross- sectional	Age 65+; home care clients in a district of Stockholm (n=943)	Average hours of undifferentiated service/week	Client predisposing, enabling, and need

2.3.1 Predisposing Variables

Among the predisposing variables, age was classified as uncertain in Kadushin's (2004) volume review, while gender, marital status, education, and race were not associated with volume of home care. The recent studies in Table 2.3 do little to update these conclusions. An increase in age was significantly associated with home health care expenditures and amount of service in two studies (Henton et al., 2002; Meinow et al., 2005). In opposition, Brega, Jordan, and Schlenker (2003) found older clients received significantly fewer visits per day on average than younger clients, and age was not associated with the other measures of direct care – length of stay, the number of disciplines involved in client care, and the number of alternative services provided during the episode of care. Age did not influence the volume measures in other studies as well (Hawranik, 2002; Lafrenière et al., 2003; Langa et al., 2001).

Gender continues to be an insignificant predictor in the recent volume literature (Brega et al., 2003; Henton et al., 2002; Lafrenière et al., 2003; Meinow et al., 2005). Marital status was rarely examined in the recent literature since living arrangement was considered instead. Of the three studies that did include marital status, two studies found no association with home care volume (Hawranik, 2002; Henton et al., 2002) and one study found married clients received significantly lower volumes of home care compared to non-married clients (Langa et al., 2001). Education was rare in the recent studies as well and all three studies that examined the variable did not find a significant association with volume (Hawranik, 2002; Henton et al., 2002; Lafrenière et al., 2003). Race was not widely studied either but it was a significant predictor in two studies. Henton and colleagues (2002) found greater days of use among non-white older clients and Brega and

colleagues found longer episodes of use among non-white older clients. In contrast, Davitt, Kaye, Bagati, and Graub (2002) found older Hispanic clients received the fewest number of services compared to older white or African American clients.

2.3.2 Enabling Variables

In Kadushin's (2004) volume review, living arrangement produced conflicting results. Currently the variable still has an inconsistent association with home care volume. Brega and colleagues (2003) indicated that clients living alone had more frequent home care visits. While the clients living alone were less functionally impaired compared to those living with others, they had less informal support and less assistance from primary caregivers, therefore they had more needs to be met by formal care. Fortinsky and colleagues (2004) found that older clients who lived alone were fairly consistent in generating greater home care expenditures among several different groupings of home care service. Clients who lived with someone had significantly fewer hours of home care in the study by Meinow and colleagues (2005) and Hawranik (2002) found that older clients not living with their caregivers used a larger number of services. Contrary to those studies, Davitt and colleagues (2002) established that older clients living alone received a lower amount of service than the older clients living with others. The authors suggested that older adults living alone have higher functional capacity, and/or that clients living with others have greater advocacy for procuring more service. Lafrenière and colleagues (2003) did not find a significant association with living arrangement and Langa and colleagues (2001) found conflicting results around living arrangement even within their own study. At one time period, results of a national survey

revealed that unmarried elders living with others received significantly less weekly hours of home care than elders living alone. The same national survey conducted two years later indicated that unmarried elders living with others received significantly more weekly hours of home care than elders living alone.

In the Kadushin review, receipt of informal support drew inconsistent results in studies but Kadushin noted that it came close to being significant. Kadushin added that in the majority of the studies that did find a relationship between informal support and amount of care, clients with informal support were more likely to use less service than clients without informal support. This factor is not addressed in many of the recent studies and when present the results are inconsistent. Brega and colleagues (2003) discovered older clients with frequent assistance from a primary caregiver received significantly more of 18 alternative care services available, such as meals on wheels, homemaking services, respite care, and adult day care, but this factor did not have an impact on home care episode length or intensity of home care visits. Similarly, Hawranik (2002) and Meinow and colleagues (2005) did not find a relationship between receipt of informal support and volume of home care.

In Kadushin's (2004) volume review, income-related variables were not associated with volume of home care. Income variables were not studied in most of the recent volume literature, and the studies that examined it produced different results. Davitt and colleagues (2002) identified that older clients with the lowest monthly income received the lowest amount of service while those with the highest monthly income received much more. However, others found no association with annual income (Meinow et al., 2005) or net worth (Langa et al., 2001).

The effect of community characteristics on home care volume is not well studied in recent literature either. Kadushin (2004) concluded that the community characteristic of population density (again, based mostly on crude definitions of urban and rural) was not associated with amount of home care. More recently, two studies indicated the same non-significant association (Brega et al., 2003; Henton et al., 2002). However, Brega and colleagues found significance in another community characteristic. Older clients in their study who lived in areas with greater income had significantly shorter home care episodes than clients in lower income areas. Whether area income is a proxy for client income and related to health or if it is an indication of potential richer community resources to draw on for health care is not clear in the study. However, Brega and colleagues cite that the availability of community resources can affect volume of home care as well since their older clients in communities with more community resources had greater visit intensity and more disciplines involved in their home care.

2.3.3 Need Variables

Regardless of definition, one consistent finding emerges in the literature for association with volume of home care. Similar to the conclusion from the literature on use, the Kadushin (2004) review concluded that physical impairment, particularly functional measurements of IADLs or ADLs, had the strongest and most consistent influence on the amount of home care that a client received. Recent research supports this conclusion for older populations. Older clients with greater functional disability received significantly more frequent visits, had an increased number of days of care, had significantly more disciplines involved in their care, received a greater volume of formal

home care hours and higher total expenditures (Brega et al., 2003; Henton et al., 2002; Lafrenière et al., 2003). Two recent studies found that IADL limitations were the strongest predictor of hours of home care service per week, followed by ADL limitations (Langa et al., 2001; Meinow et al., 2005). Hawranik (2002) found ADL needs were significantly associated with a greater number of inhome services and Fortinsky and colleagues (2004) found ADL dependencies were the most consistent factors associated with Medicare and Medicaid home health service expenditures. One notable exception to the importance of functional impairment came from a study of older clients in a Medicaid Home and Community Based Waiver Program (HCBS) in Philadelphia County in the United States. Davitt and colleagues (2002) found that older clients who were most limited in their ADLs received significantly fewer services and in some cases a lower amount of service than older clients with less limitations. The authors speculated this unexpected finding was due to the fact that the clients who were more dependent in ADLs had a limited need for the particular services they examined in their study. However, the authors acknowledged that a lack of statistical control and models in their study may have contributed to the result. Nonetheless, they concluded that functional status variables alone cannot accurately predict service need and consumption for diverse client populations.

Some of the volume literature in Table 2.3 examined the relationship between specific diagnoses or a comorbidity measure and home care volume, in addition to ADL and IADL measures. Even after controlling for level of functioning, some diagnoses and conditions, though not consistent, did influence amount and type of home care use, such as stage 1-4 ulcers, nervous system diseases, musculoskeletal system diseases, and

fractures (Brega et al., 2003). Fortinsky and colleagues (2004) pointed to stroke, urinary tract infections, congestive heart failure, and diabetes specifically and Langa and colleagues (2001) found an association with diabetes as well. Brega and colleagues suggested that ulcers would require more visits and disciplines to assist with wound care and dressing changes. None of the studies split out home support from home nursing service, which would assist in determining whether disease and clinical indicators are significant due to an association with nursing service.

Kadushin (2004) concluded that cognitive impairment had an uncertain affect on home care volume, and too few studies in that systematic review examined depression to be able to draw any conclusion. The recent literature reviewed in Table 2.3 is inconclusive as well but there is some support towards greater home care volume with greater cognitive impairment. Two studies found that older clients with higher levels of cognitive impairment received a greater amount of service (Davitt et al., 2002; Meinow et al., 2005). According to Hawranik (2002) older adults with dementia use a greater number of services than older adults with no cognitive impairment. However, Henton and colleagues (2002) revealed no relationship between cognitive impairment and home health care expenditures or amount of service, and Fortinsky and colleagues (2004) found cognitive impairment was related to greater expenditures for some Medicaid home care services, but not for others. Hawranik's (2002) study is the only recent study that specifically examined depression, which revealed no association to number of in-home services. Moreover, neither psychiatric symptom index nor a client's perceived mental health status were found to be associated with amount of home care or home care expenditures either (Henton et al., 2002; Meinow et al., 2005).

Only three studies examined caregiver need in the Kadushin (2004) review and therefore no conclusions were made about caregiver need and volume of home care, although it was indicated that the three studies did not find an association. Lack of attention to caregiver need continues since only Hawranik (2002) addresses any caregiver characteristics in recent research. Hawranik cites that an older client whose caregiver has greater burden and/or an increased number of health problems uses more in-home services. In addition, Hawranik found that caregiver health beliefs could affect the number of services the older client receives.

2.3.4 Health Care System Variables

Client characteristics are the main factors examined in the home care volume literature. Looking beyond client characteristics is rare. For example, the Kadushin review did not address health care or home care system characteristics even though this component exists in the Andersen-Newman model (Andersen, 1995). Kadushin did acknowledge that system characteristics might have an impact on home care use, particularly when it comes to the type and amount of care a client receives. Indeed, home care planning can be influenced by many factors, such as organizational systems, professional disciplines, and variations between case managers in their allocation of resources (Lemire & Austin, 1996). The amount and type of care a home care client receives is based on decisions made by home care professionals. Case managers serve as gatekeepers to the continuing care system. As a result, case managers play an important role in the allocation of services. Although they were not looking at home care volume, several U.S. studies included case manager/provider characteristics to examine factors

influencing allocation of home care service. In a study of both client and case manager characteristics on care plan decisions, Corazzini-Gomez (2002) found that case manager characteristics such as sex and education level can affect care plan eligibility level. In a subsequent study, Corazzini (2003) identified that patterns of home care resource allocation for older clients are the result of individual and joint effects of client, case manager, and home care agency characteristics. The majority of variability in care plan decision was due to client characteristics, yet important variability at the case manager level existed.

Brega and colleagues (2003), in their examination of service volume, included the impact of client, formal home care service provider, agency and market factors on practice variations for home health care. Similar to Corazzini's (2003) results, the client factors were the strongest predictors of home health practices, but characteristics of formal care providers, while less strongly associated with care practices, did have some influence. Clients had a significantly longer length of stay if the provider who assessed their care needs had more years of experience in home care. In addition, the authors noted that agency factors relevant to the United States had greater influence on practice patterns than provider factors. For example, being a proprietary agency, being a hospital-based agency, and the agencies length of operation influenced care practices.

Fraser and Estabrooks (2008) recently undertook a systematic review of the literature related to the factors that influence home care case manager's resource allocation decisions. Their review of 11 articles produced ambiguous and inconclusive results. The authors concluded that more research is needed in the area of case manager's

decision-making before conclusions can be drawn on its association with home care resource allocation.

2.3.5 Methodological Considerations in the Volume Literature

It would be expected that amount and type of home care service would be affected by a program's policy since policy dictates who can receive care, how much care can be delivered in the community and which type of care is available. Kadushin (2004) explicitly points to this factor when trying to explain the high level of inconsistency in findings across volume studies. Kadushin considers additional methodological differences influencing divergent findings, such as the study populations, different data sources and self-report problems for some data. Inconsistent findings may be due to problems in data relying on client recall of service use which is likely a greater problem for recalling volume or frequency of home care service rather than whether there was use or non-use of home care services. But Kadushin stresses the particular variation in how home care was operationalized as contributing to conflicting findings.

Madigan et al. (2002) consider the definition of home care service utilization as one of the challenges within home care research. Home care could be one particular service or an aggregate of two or more types of service. Similarly, volume of use is measured in many different manners as well as in a wide range of time frames. Henton and colleagues (2002) questioned the appropriateness of the one-year time period they used for their volume measures of home health care expenditures and days of care. They were able to explain 21.0% to 25.0% of the variance in their volume measures, but the authors suggested that their time period may be too long of a time to precisely evaluate

the relationship between population characteristics and amount of home care use. Henton and colleagues felt that they would achieve more precision by shortening the time period to 60 days. They pointed to an earlier study by Bass, Looman, and Ehrlich (1992) where the authors explained 43.0% of the variance in total hours of home health care service to older adults in a 60-day period.

The study by Fortinsky and colleagues (2004) is a good example of how different definitions of service utilization produce different results. In their study, correlates to expenditures were determined for older adults using home health services. Three different aggregations of service were measured: 1) Medicare home health services which included skilled nursing, home health aid, physical therapy, occupational therapy, speech therapy, and medical social work; 2) Medicaid home health services which included skilled nursing and home health aide; and 3) Medicaid waiver services which included in-home and community-based services, dominated by (in order of frequency) homemaker, case management, adult day health, home-delivered meals, and personal emergency response systems.

Fortinsky and colleagues (2004) found different client characteristics were associated with expenditures among the users of these three different types of service aggregations. The number of personal care ADL dependencies was significantly and positively associated with expenditures for Medicare home health and Medicaid home health expenditures, while cognitive impairment severity was not a significant factor. However, for Medicaid waiver services, cognitive impairment severity was significantly and positively associated with expenditures, while IADL dependency was the functional disability measure most associated with expenditures. Older adults with the greatest

ADL disability generated less service expenditures than older clients with no ADL dependencies.

Earlier research questioned the appropriateness of aggregating service users in studies under the assumption that they have the same predictive factors and the practice of aggregating various home care services together, again under the assumption that the services would have the same predictive factors. Bass and colleagues (1992) emphasized that older adults may be using services for different reasons. As stated earlier, home care can serve several purposes – a substitute for acute care, nursing home care or provide a maintenance/preventive function. Similarly, the authors assumed that different classes of services would have different predictors. Their study of factors related to different community service volumes confirmed their assumption, since different variables predicted different types and amount of community services. Diwan and colleagues (1997) stressed the same issue as Bass and associates. They suggested that most studies fail to adequately describe the nature of, and variation within, services being used by study populations. They argue that aggregation of home care services limits knowledge about use of home care by obscuring variations in use of different types of service. Many years ago Wolinsky (1994) issued a similar statement in that use and volume measures of home care service that are undifferentiated are limited in their utility and are “more likely to shroud rather than enlighten policy discussions (p.473).”

2.3.6 Summary

Upon review of the volume literature and the home care utilization literature, Kadushin (2004) concluded that the variables influencing amount of home care service

did not differ from the variables influencing use of home care. Namely, physical impairment, and in particular, ADL and IADL impairment, had the most significant connection with amount of service received, just as it did with home care utilization. Kadushin did acknowledge that less information was available on variables influencing amount of service and that the significant associations with amount of service must be regarded somewhat cautiously. The other studies in Table 2.3 support this caution since evidence does point to different factors being associated with use versus volume of service.

Several of the recent studies first determined the factors associated with home care use among an elderly population, and then examined the factors associated with amount of home care among the elderly recipients. The authors found different factors within their studies identified use of home care and volume of home care (Fortinsky et al., 2004; Hawranik, 2002; Langa et al., 2001). The significant factors were not greatly dissimilar, but they did differ nonetheless. The recent studies do suggest that different factors determine use of home care and volume of home care in an older population. Therefore, results from home care use literature cannot be generalized to home care volume.

Table 2.4 summarizes the conclusions drawn about factors associated with home care volume, based on the Kadushin review and the review of more recent literature. Home care volume does share the common feature with home care use in that functional impairment is the most significant, consistent predictor. Among older adults, volume of care is not associated with gender, and there are no consistent patterns among any of the remaining predisposing, enabling, or need variables.

Table 2.4: Summary of Characteristics and Association with Home Care Volume

Characteristic	Kadushin Review	Synthesis of Recent Literature
Predisposing		
Age	Inconclusive results	Inconclusive results
Gender	No association	No association
Marital Status	No association	No conclusion - too few studies
Education	No association	No conclusion - too few studies
Race	No association	Inconclusive results
Enabling		
Living Arrangement	Inconclusive results	Inconclusive results
Informal/Social Support	Inconclusive results	Inconclusive Results
Income	No association	Inconclusive results
Population Density	No association	Inconclusive results
Need		
Functional Impairment	Positive association	Positive association
Physical Impairment ³ (other than ADL and IADL)	No conclusion available*	Inconclusive results
Cognitive Impairment	Inconclusive results	Inconclusive results
Depression	No conclusion - too few studies	No conclusion - too few studies
Caregiver Need	No conclusion - too few studies	No conclusion - too few studies
Health Care System	Did not review	No conclusion - too few studies

* **Note:** Kadushin (2004) cited specific findings for functional impairment but not physical impairment

The review of the volume literature reveals that this form of home care research is limited in older populations, particularly in a Canadian context. The literature that is present focuses heavily on older client characteristics and omits other contextual factors that can have an impact on amount of service. The literature does little to identify the types of services being used by older adults since often home care is measured based on an aggregate of many different types of service. Meinow and colleagues (2005) lament that their study could not identify the kind of help recipients actually received.

³ Physical impairment indicators included self-reported health, health status indicators (such as medical diagnoses, disability indicators, or incontinence) and hospital use.

2.4 High Use of Health Care Services: Applicability to Home Care

When considering the volume or amount of health care services consumed by individuals, often the category of the “high user” is profiled in the literature. High utilization of service has been a focus of study for many health care services, but to date has not been a focus of research in home care. In 1994, Spector and Kemper made reference to a high, or “heavy” use category of home care clients, but none of the studies examined in Section 2.3 refer to this category of client when considering volume of care. Due to this dearth of high home care user literature to refer to for this thesis, this section will review the literature on high users published for other studies of health service utilization. Although high users in other health service sectors may not be generalizable to home care clients, the literature will still be a useful source of information regarding the utility of examining such a category of health service user, the methodology most prevalent in high user studies, and an indication of the utility of results from such studies. Most importantly, the high user literature review will identify relevant approaches for this home care study.

2.4.1 Why Examine High Users of Health Care?

Studies of high health care use have targeted many particular services, but review of the literature reveals that primary care and acute care service utilization is the focus of many high/frequent use studies. A sample of relevant literature is summarized in Table 2.5. In addition to the studies outlined in the table, two additional literature reviews are available that examine publications devoted to frequent consulters in general practice, those individuals who frequently visit their general practitioners. Gill and Sharpe (1999)

undertook a systematic review of 34 studies published between 1954 and 1996, and Vedsted and Christensen (2005) review 61 publications between 1954 and 2003.

The literature offers many reasons why examination of high use is useful and relevant. A main argument is to identify whether higher use of health care resources is appropriate for the high users. McColl and Shortt (2006) cite that it is valid to be concerned about high users of health care, chiefly to ensure that the individuals receiving the greatest attention from the health care system are in fact those who are in greatest need. The objective of many studies is to describe high users and the factors contributing to use, so that high use could be explained (e.g., Kozyrskyj, Lix, Dahl, & Soodeen, 2005; Reid et al., 2003; Roos, Burchill, & Carriere, 2003; Shenkman, Knapp, Sappington, Vogel, & Schatz, 2007). Identifying if high use is unjustified is also a common objective (e.g., Blank et al., 2005; Hansagi, Olsson, Sjoberb, Tomson, & Goransson, 2001).

As healthcare costs continue to rise, cost-containment is another reason cited by studies. If high use of care is found to be unjustified then deterrence measures for unnecessary care can be put in place (Reid et al., 2003). Strategies that encourage more prudent use or economical alternative care methods can be developed in light of high-use findings (Liptak et al., 2006). Examination of high health care use can also identify if programs need to be developed to address the needs of high risk or sicker populations (Black, Roos, Havens, & MacWilliam, 1995; Kozyrskyj et al., 2005; Reid et al., 2003; Shenkman et al., 2007).

Table 2.5: High Health Care Service Utilization Literature

Authors	Health Care Service(s) include	Population	Methodology for service utilization	High User Definition
Blank et al. (2005)	Emergency department	All ages who visited ED	ED visits in a 1-year period	12+ visits in study period
Broemeling, Watson, & Black (2005)	Medical services; Hospital services; Home care; PharmaCare	Adults, age 18+ (n=2,933,305)	Total number of visits of identified services in a 1-year period.	Top 5%
Foster, Jordan, & Croft (2006)	Primary care	Adults age 18+ consulting primary care (n=9000)	Consultations in 1-year period	High = top 20%; Very high= top 5%.
Hansagi et al. (2001)	Emergency department	All individuals who visited study's hospital (47,349)	Number of visits in 1-year period	4+ ED visits (equivalent to 4% of total patients in study)
Kozyrskyj et al. (2005)	Prescription medications	Persons receiving 1+ prescriptions (n=780,293)	Expenditures for prescription medications in a 1-year period	Top 5%
Liptak et al. (2006)	Hospital inpatient & outpatient services; other ambulatory services; dental services; prescription medication; diagnostic tests; medical equipment and supplies; medical care at home	Children < 18 yrs. old (n=2938)	Total medical expenditures of identified services for a 1-year period, observed over 2 years.	Top 10%
McColl & Shortt (2006)	General practitioner	Adults age 20-65 (n=10,898)	Number of visits in 1-year period	Top 10%
Ovens & Chan (2001)	Emergency department	All ages who visited ED	ED visits in a 1-year period	12+ visits in study period
Pearlman et al. (1997)	Hospital inpatient care; Emergency department; Home health care; Inpatient skilled nursing care; Inpatient rehabilitation; Medicare services	Frail older adults (age 65+) receiving physician-prescribed homecare service (n=450)	Total health care expenditures of identified services at 6-month intervals over an 18-month period	Expenditures in 6-month period = \$20,000+

Authors	Health Care Service(s) include	Population	Methodology for service utilization	High User Definition
Reid et al. (2003)	Physician services	Adult age 18+ (n=2,997,808)	Physician service costs in a 1-year period	Top 5%
Roos, Burchill, & Carriere (2003)	Hospital	All ages (n=658,715)	# of hospital days in a 1-year period	Top 1%
Roos, Shapiro, & Tate (1989)	Hospitals; Nursing Homes	Older adults (age 65+) (n=4209)	# of hospital days in a 1-yr and 16-yr period; # of nursing home days in a 1-year and 16-year period; combined cost of hospital and nursing home use	Top 5%
Shenkman et al. (2007)	Medicaid-covered health care services	Children $\leq$ 18 years old (n=1,160,020)	Total health care expenditures in a 1-year period, observed over three years	Top 10%

2.4.2 High Use Methodology

High use of health care has been studied in all age groups, from children, to adults, to older adults (Table 2.5). High use is examined based on use of health services, such as visits to a physician or emergency department, or volume of service, such as days in hospital, hours of home care, or total health care expenditures. How high use or a high user is defined varies greatly in the literature, and for the most part, no explanation is provided as to why a particular definition is used. Both Foster, Jordan, and Croft (2006) and Reid and colleagues (2003) indicate there is no generally accepted definition of high users. Several studies chose their high user definition to be similar with previous studies in their area (Broemeling, Watson, & Black, 2005; Liptak et al., 2006; McColl & Shortt, 2006; Reid et al., 2003). Based on their systematic review of frequent consulters in

general practice, Gill and Sharpe (1999) noted that due to the continuous distribution of rates in most studies, any definitions adopted must be arbitrary. However, two methods emerged in their review that are applicable to most high use studies. One method is to define a cut-off in the service distribution under observation and individuals that exceed that cut-off become the high users. A percentile measures the cut-off. The most frequent percentiles used in the literature in Table 2.5 are the top 5% and top 10%. The top 10% was used most frequently in studies in the two systematic reviews of consulters in general practice.

The other method used in the literature is to identify an absolute number or count in a given time period and individuals who exceed that number become the high users. Fewer studies in Table 2.5 used this method, although it was the more common method in the systematic reviews of the general practice literature. For example, in those studies the common counts were between 9 and 14 consultations in a one-year period to define frequent consulters (Gill & Sharpe, 1999).

Foster and colleagues (2006) used a percentile approach in their study of frequent attendance in primary care since they felt the use of percentiles rather than an absolute figure allowed for more meaningful comparisons between practices due to potential variation in consultation rates, which is certainly an important consideration for any health care utilization research. Both McColl and Shortt (2006) and Monheit (2003) indicated that using the top 10% to define users in their respective studies provided a sufficiently large group to render stable estimates. Therefore, while choosing a cut-off to define high users may be arbitrary, there are implications to consider when a particular method is used.

2.4.3 Who Are High Health Care Users?

Regardless of the methods, population, or service under study, high utilization research is consistent in several findings. Only a minority of individuals account for the large use and cost of health care services (Reid et al., 2003; Roos, Shapiro, & Tate, 1989). High users are individuals most in need. High users have complex health needs in the form of one, or often more, chronic health conditions (Broemeling et al., 2005; Reid et al., 2003; Shenkman et al., 2007). Thus, high users are not frivolously abusing the health care system. High health care use is persistent over time, due to the complex, chronic nature of their conditions. Many high users have a pattern of high use over several years (Liptak et al., 2006; Roos et al., 1989; Shenkman et al., 2007). High use of one form of health care service is associated with high use of other health care services. For example, frequent users of emergency departments are also more frequent visitors to general practitioners and have a higher number of specialist referrals (Blank et al., 2005; Chan & Ovens, 2002; Hansagi et al., 2001), while high general practitioner use is significantly associated with specialist and other physician use (McColl & Shortt, 2006). In response to the finding that high health care use is persistent, Liptak and colleagues (2006) suggest that clinicians should regularly review the care provided to high need/high cost patients. The conclusion of the high utilization literature is that high use of health care is mostly appropriate, but it still needs to be identified, monitored, and possibly reconfigured to improve effectiveness of services.

2.4.4 Extending High Use to Home Care

Several studies in the high use literature included home care service when examining total health care use or expenditures, but only one study focused solely on home care. Spector and Kemper (1994) combined formal and informal home care hours per week to determine who were the heavier users among older home care clients. The combined hours were grouped into Light (≤ 21 hours), Moderate (22-35 hours), Heavy (36-55 hours), and Very Heavy (56+ hours) categories of home care hours. The authors found a strong relationship between the number of ADL impairments and cognitive impairment and mean hours of home care per week, although they did not look at any other factors beyond these two indicators. Since Spector and Kemper did not focus solely on public home care service, the amount of formal care that composed each category was not identified. Yet, their study does provide a precedent for using hours of service in a week to define high users. This does seem to be the most appropriate method to extend to high use of public home care, since volume of home care is often defined in the literature by hours in a distinct period, as was shown in the previous home care volume section.

High use of health care has been studied to address days in hospital (Roos et al., 2003) and number of prescription medications (Kozyrskyj et al., 2005), both types of health care that an individual does not freely control, in contrast to some visits to an emergency department, for example. Amount of public home care received, just like days in hospital or prescriptions, is dictated by a health care professional.

2.4.5 Summary

The review of the high use literature reveals that a focus on high users of public home care in research is both relevant and lacking. The research approach is applicable to public home care but there has not been such a study to date. Examination of high users of home care will determine if need is in fact the factor driving high use while providing insight into service allocation.

2.5 Literature Review Summary

The review of the literature paints a picture of the sequence of events that lead to high use of home care. Use with the formal home care system is initiated by older adults experiencing a high level of physical impairment, who have little informal support or whose care needs have exhausted the abilities of the caregiver. Once admitted to home care, the amount of formal care the older adult receives is predicted by, once again, level of need, primarily the level of physical impairment. However, far less research has been conducted in the area of home care volume to conclusively define the role of other factors as they may relate to volume. High users of home care cannot be adequately characterized since the literature on high users of health care does not currently extend itself to home care. The home care volume research and high use literature for other health services suggests that high use of care would again be a product of need, but the services allocated to high users is unknown. In fact, very little is known about services allocated to clients in general. Few allocation studies examine service categories beyond the two broad groups of home nursing and home support service. Currently the home care literature cannot identify what the composition of care looks like for clients most in

need. By addressing service allocation among high users, this study will provide important information lacking in the literature and will provide an indication of whether home care services are allocated in accordance with need.

CHAPTER 3: CONCEPTUAL MODEL

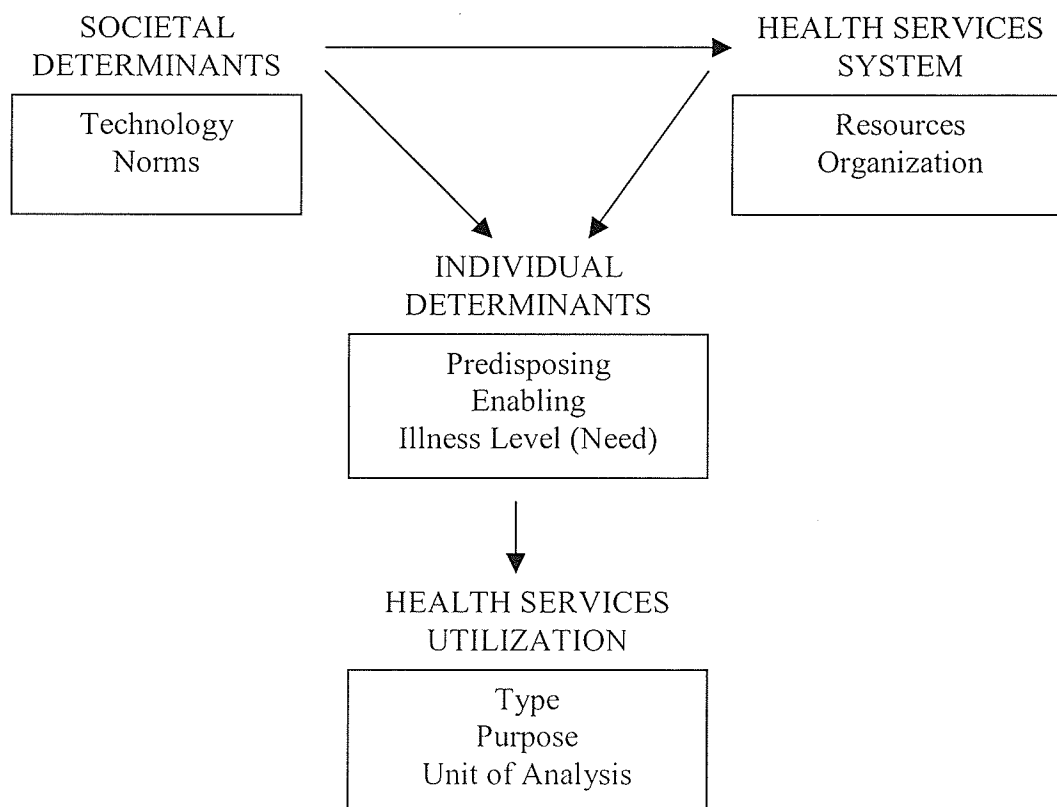
Porter (2000) indicates that analyzing a complex phenomenon entails identifying the combined parts, determining the relation of the parts, and identifying changes in the parts and their relationships. In research, the study of a complex phenomenon can be facilitated by the use of a conceptual model or theoretical framework. A conceptual model aids in the task of selecting appropriate constructs, developing hypotheses, testing the hypothesized relationships among the constructs, and choosing an appropriate research design. Models can provide a theoretical context for the choice of variables selected for study or the interpretation of findings. To conceptually organize the present research, the Andersen and Newman (1973) Behavioral Model of Health Services Use was used as a framework to provide a structure for the study variables and analyses. This model was introduced in the previous literature review sections of this thesis. This section discusses the origins and adaptations of the Andersen-Newman model that will be applied to the present research.

3.1 Andersen and Newman Behavioral Model of Health Services Use

The most frequently applied conceptual model in health service utilization research in general, and in home care utilization research in specific, is the Andersen and Newman (1973) Behavioral Model of Health Services Use. A recent review of home care literature found that nearly all the studies reviewed applied the Andersen-Newman model if a model was cited (Kadushin, 2004). The Andersen-Newman model takes into consideration multiple determinants of health service utilization. The main components of their initial model and their relationship to each other are outlined in Figure 3.1.

According to the model, health service utilization is a function of societal determinants, the health care system, and individual determinants. Societal determinants of utilization have a direct affect on individual determinants, as well as an indirect effect through the health services system. Health service use is then influenced by these individual determinants. The main societal determinants are technology and norms. Changes and advances in technology can have tremendous influence on the health services system and use of services, whereas societal norms can exert their influence, for example, through values and beliefs that are reflected in formal legislation or how services are financed.

Figure 3.1: Behavioral Model of Health Services Use



Source: Andersen & Newman (1973)

The health services system provides the structure for provision of formal health care goods and services. In the Andersen-Newman model, the two major components of a health services system are: 1) resources of the system, and 2) organization, or what the system does with its resources. For resources the model considers both the volume of resources available to a population and the geographic distribution of the resources in the jurisdiction under consideration. Components of organization in the model are access and structure. Access refers to the process or requirements an individual goes through to gain entry to the system for a particular health service. Structure refers to the characteristics of the system that dictate what happens to the individual once they have accessed the system.

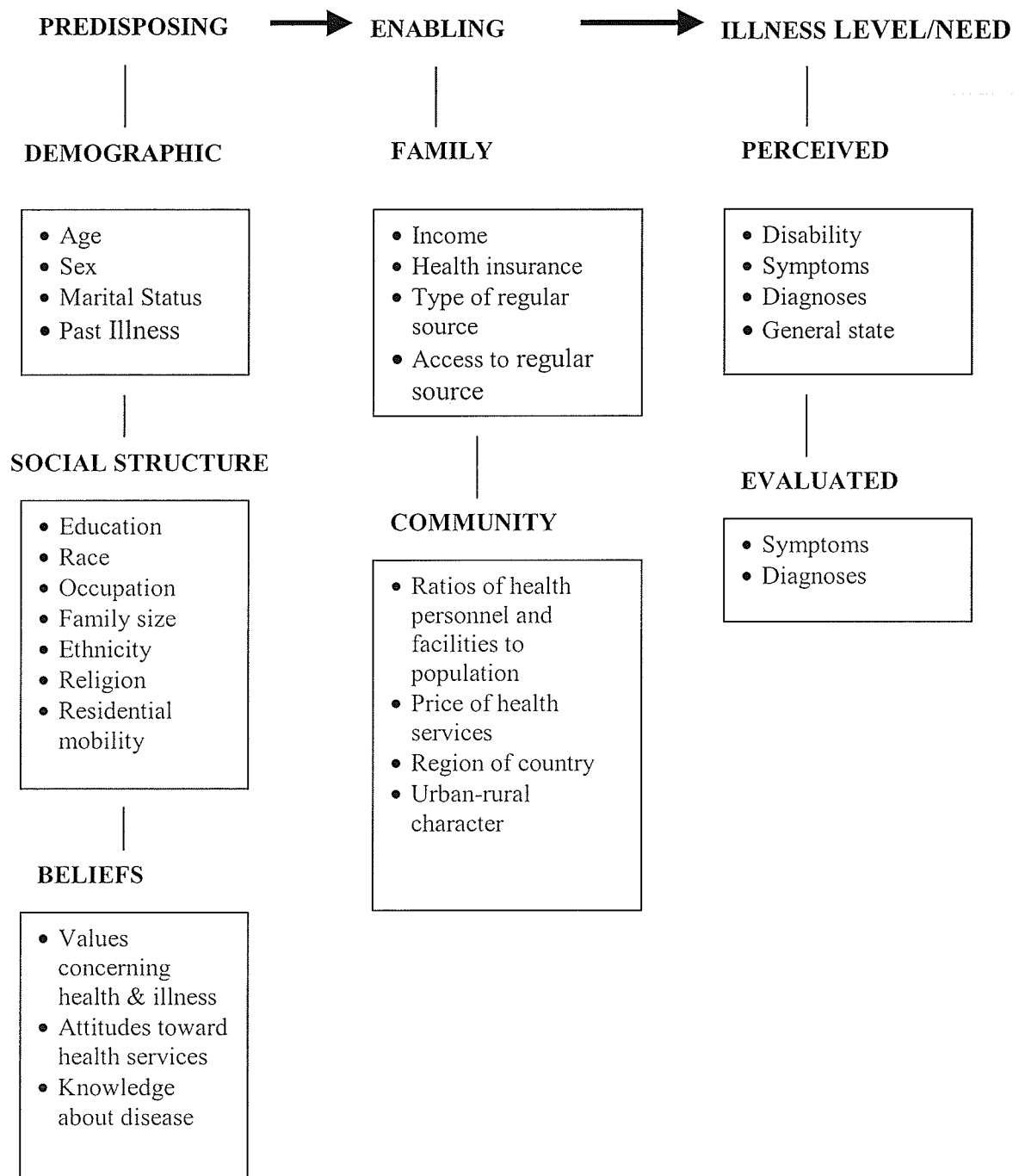
The individual determinants of health service utilization in the model have received the most attention and consideration in health services research. Individual determinants are the characteristics of people which may determine the health care they receive. The model outlines a sequence of conditions that can contribute to the volume of services used. The conditions are categorized as predisposing (an individual's predisposition to use services), enabling (his/her ability to secure services), and illness level or "need" (the individual's level of illness or disability). These three components of the model and the categories that Andersen and Newman suggest to operationalize them are outlined in Figure 3.2.

The predisposing variables represent individual characteristics that can predict some individuals' inclination to rely on health services more than other individuals, even before onset of illness. Suggested predisposing characteristics include demographic, social structural, and attitudinal-belief variables. Enabling variables are those conditions

that allow an individual to act on a value concerning, or address a need for, health service use. These conditions make health services available to an individual. The model categorizes enabling variables into family attributes/resources, and community characteristics in which the individual lives.

The illness level component, most commonly referred to as “need”, represents that health service use is preceded by the perception of illness by an individual (or her/his family member) or the possibility of its occurrence. Andersen and Newman (1973) indicate that illness level is the most immediate cause of health service use. In the model, illness variables include perceived illness by the individual as well as evaluated illness by a health professional.

Figure 3.2: Individual Determinants of Health Service Utilization



Source: Andersen & Newman (1973)

The last major component of the Andersen-Newman (1973) model is the defined unit of health service utilization in the analyses. Andersen and Newman indicate that this is an important dimension of the model because the predictive variables in the framework may vary to a great degree depending on the characteristics of health service use being analyzed. The determinants of health service use will vary as well depending on the service's purpose, whether it is primary, secondary, tertiary, or custodial care. Similarly, the authors indicate that characteristics associated with utilization will vary depending on the unit of analysis, for example, whether a service is received or not, or if the number of different services used, or if the volume of service is the outcome under study.

3.2 Model Enhancements and Modifications

With its wide application the Andersen-Newman model has received much critical examination from researchers and direction for modifications. A review of the home care literature has exposed several areas where the Andersen-Newman model can be enhanced or modified specifically for home care utilization research. These areas of focus are mostly informal support and caregiver issues, the need for interaction terms to clarify relationships between components of the model, and system considerations.

3.2.1. Informal Support and Caregiver Issues

Late in the 1980's Bass and Noelker (1987) commented that a widely recognized deficiency of the Andersen-Newman model was lack of attention to the influence of informal support on service utilization. The authors argued that family members are a major source of assistance to older adults in need and can influence the older adult's use

of formal services. They suggest that family can fulfill mediating, referral, and gatekeeping functions in the older adult's knowledge and use of services. They viewed the primary caregiver as the logical person to focus on for incorporating an enhanced measurement of informal support into the Andersen-Newman model. The findings from their study lent support to including the primary caregiver's characteristics in the model, as has other research as reported in the literature review section. These studies underscore the need to incorporate such measures into a model of home care utilization.

3.2.2. Interaction Terms

Bradley and colleagues (2002) expressed that although the Andersen-Newman model identifies predisposing, enabling, and need factors as determinants of service use, it does not fully explore how these domains are related. Omission of interrelationships may oversimplify the role of various factors in service use. Others have suggested that the explanatory power of the model could be improved by the inclusion of interaction terms (Calsyn & Winter, 2000). Most authors point to exploring interaction of factors with need variables. Calsyn and Winter found that by including interaction terms with need in a regression equation, they were better able to understand who was likely to use services such as home care. For example they found that having ADL limitations and living alone resulted in greater service use. Bass and colleagues (1992) demonstrated similar results by exploring interactions with cognitive impairment level. Important interactions between cognitive need and other factors such as living arrangement, level of informal support, depression, and caregiver burden furthered the prediction of service

use. These studies highlight the complex interactions between components of the Andersen-Newman model, which may not be adequately indicated in the model.

3.2.3. System Considerations

The literature has often criticized the Andersen-Newman model for its lack of power in explaining significant amounts of variance in health services utilization, including home care use. For example, Wolinsky and Johnson (1991) issued such a criticism when they obtained R^2 levels that were consistent with previous research (14% for home health services) despite what they felt was inclusion of a broader array of predisposing, enabling, and need characteristics. However, the authors did acknowledge that perhaps traditional measures of the individual characteristics are not the optimal approach to improving the variance explained by the model. Evashwick, Rowe, Diehr, and Branch (1984) recognized that a possible reason for lack of explanatory power could possibly be due to use of incomplete or sub-optimal variables in the model and that major explanatory dimensions of health service utilization were not examined. In particular they point to the fact that the Andersen-Newman model has other components that are seen as influencers of service use, in particular the health services system component. The authors suggest that future studies should involve the system component.

As was previously noted and indicated in Figure 3.1, the health services system provides the structure for provision of formal health care goods and services, with two major dimensions of resources and organization. The influence of the health care system on the use of home care is an important aspect to acknowledge in a model. In the

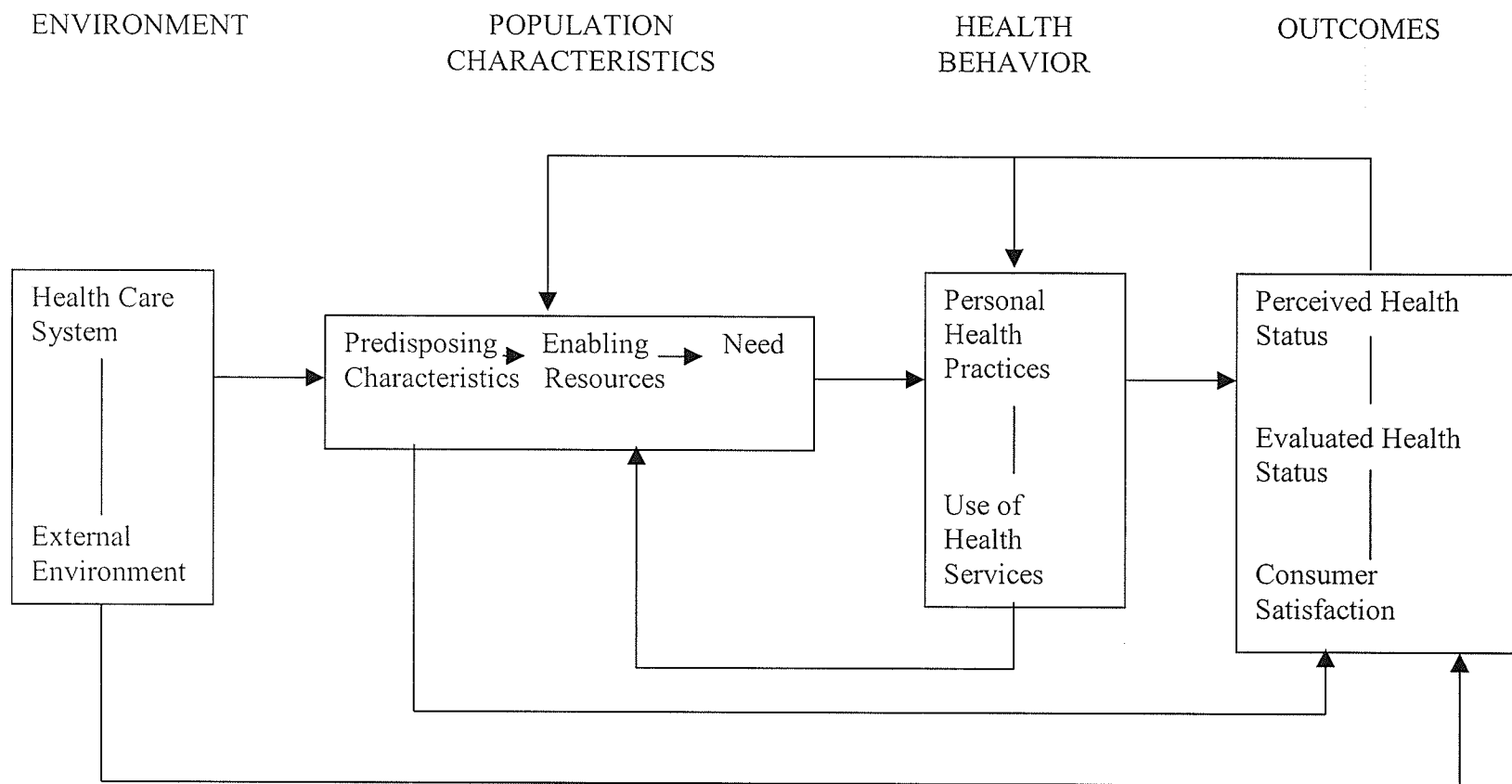
literature section, studies had found that the health system characteristics influenced home care volume, due to policy and other system characteristics.

3.3 Andersen's Emerging Model

Andersen (1995) reviewed the critical examinations of his model over 25 years and responded by indicating how the model has continued to develop over that time to ensure its continued relevance. A component that Andersen indicated could be added into predisposing characteristics is psychological characteristics such as mental dysfunction or cognitive impairment. Andersen recognized the importance of including social relationships as an enabling resource, since they can facilitate or impede health services' use. This would address the concerns for better recognition of informal support as an enabling factor.

In subsequent revisions to the model an explicit outcome of health services in the form of consumer satisfaction was added since an individual's outcome can have an impact on future health service use. In the most current model, the Emerging model, Andersen (1995) explains that the dynamic and recurring nature of health services' use is emphasized along with health outcomes. The model (Figure 3.3) highlights the multiple influences on service use, and as a result, on health status. The feedback loops portray the interactive nature of the components, in that many factors influence outcome, but that outcome can in return, affect predisposing factors, need factors, and health behaviour. Andersen admits that this model is more conceptually challenging but it allows for better understanding of health behaviour such as health service utilization.

Figure 3.3: An Emerging Model of the Behavioral Model of Health Service Use



Source: Andersen (1995)

3.4 Model Modifications For The Present Study

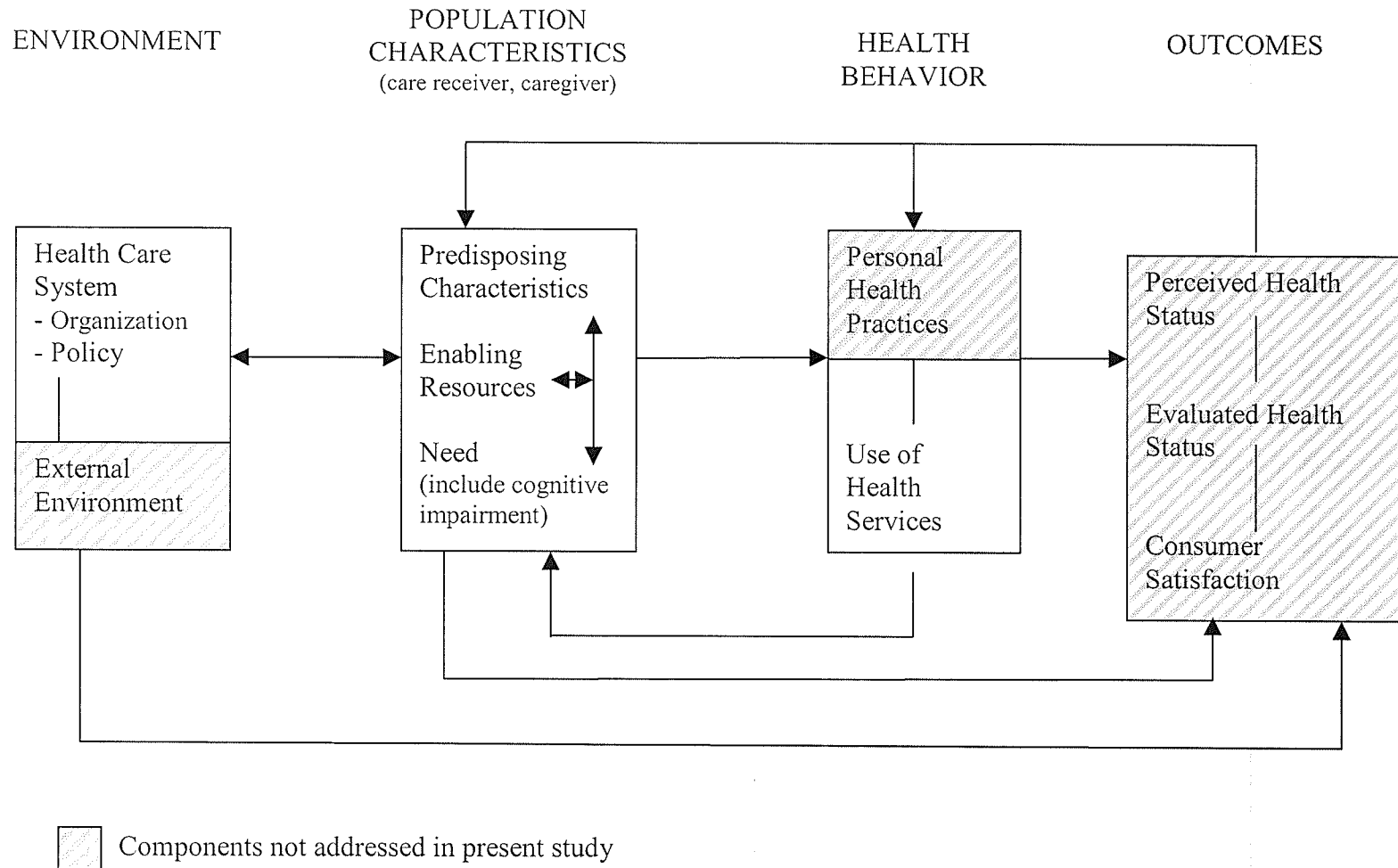
Andersen's (1995) Emerging model is the result of research findings and emerging theories at different time periods. The Emerging model is relevant to the current health care climate and not based solely on dated health care systems and environments. For home care, Henton and colleagues (2002) state that the Andersen Behavioral Model remains useful in explaining variation in important factors of home care service use. In addition, studies have revealed the applicability of the model in other countries to study home care service use, including Canada (e.g., Chappell & Blandford, 1987; Hawranik, 1998; Penning, 1995). The criticisms levied against the Andersen-Newman model are mainly resolved in the Emerging model. Nonetheless, there are some model modifications required for this study. Andersen suggests that cognitive impairment is a predisposing characteristic, but researchers such as Hawranik (1998) include cognitive impairment as a need indicator. Cognitive impairment is better conceptualized as a need indicator and it is included in that domain in this study. As well, given previous research findings, it is important that not only informal support be attended to in the model, which Andersen (1995) readily supports as an enabling feature, but that caregiver characteristics need to be explicitly addressed in the model as enabling variables as well. The components of policy and organization should remain as important dimensions of the health care system in recognition of their important contribution to home care utilization.

Another modification is a more explicit indication of the interactions that take place between many of the components to influence home care use. The Emerging model depicts the individual characteristics (now called population characteristics) as

sequential in their influence on each other, even though a previous phase of the model had eliminated this sequential notion (Andersen, 1995). The literature has demonstrated the interactive nature of these components and this indication needs to remain. Similarly, previously the model did not depict any sequential relationship between the health care system, population characteristics and external environment as is currently suggested in the Emerging model. Again, a more interactive depiction seems to be a more appropriate conceptualization of the relationship between these three components since they can strongly influence, and be influenced, by each other. The suggested revisions to the Emerging model are depicted in Figure 3.4.

The outcomes component of the model is beyond the scope of operationalization and study in the present research. Similarly, the external environment component under Environment and the personal health practices under Health Behaviour will not be able to be studied. Shading in Figure 3.4 denotes these model exclusions in the present research. While study of the full model cannot be achieved in this research it is still important to highlight all associations in the model so that their contribution to home care utilization can be recognized. The Emerging model will serve in guiding the operationalization of factors that are obtainable in this research while continuing to illuminate other factors, which though not measured, cannot be ignored when considering the results of the research.

Figure 3.4: Emerging Model for Home Care Utilization



CHAPTER 4: METHODS

As noted in the Introduction, the objectives of this study are to examine older, long-term clients' use of public home care in Winnipeg and to determine the relationship that client, caregiver, and program characteristics have on high levels of service provision. This chapter outlines the data sources and methodology used to achieve the study objectives.

4.1 Research Questions

This thesis is guided by several research questions:

1. What is the profile of older, long-term clients receiving public home care?
2. What types and amount of public service are provided to older, long-term clients?
3.
 - a. What are the differences in provision patterns between clients with high use of public home care and clients with lesser use of public home care (total home care)?
 - b. What is the relationship between client, caregiver, and program characteristics and high users of public home care (total home care)?
4.
 - a. What are the differences in provision patterns between clients with high use of public home support service and clients with lesser use of public home support service?
 - b. What is the relationship between client, caregiver, and program characteristics and high users of public home support service?

5.
 - a. What are the differences in provision patterns between clients with high use of public home nursing service and clients with lesser use of public home nursing service?
 - b. What is the relationship between client, caregiver, and program characteristics and high users of public home nursing service?

4.2 Study Design

This analytical study is an observational, cross-sectional study that utilizes secondary data. The individual (i.e., the home care client) is the unit of analysis. The relationship between client characteristics and type and amount of home care received is examined. This study received ethical approval from both the University of Manitoba Health Research Ethics Board and the Winnipeg Regional Health Authority Research Review Committee.

4.3 Data Sources

4.3.1 The Home Care Program in the Winnipeg Health Region

This study relies on public home care data routinely collected in the Winnipeg Health Region. The Home Care program in Winnipeg stems from a well-established provincial program initiated in 1974. The program's mandate is to provide effective, reliable and responsive community health care services to support independent living, develop appropriate care options with clients and/or family, and facilitate admission into long term care facilities when living in the community is no longer possible (WRHA, 2008). Home care is considered a core service that Manitoba's twelve Regional Health

Authorities (RHAs) are obligated to deliver. The RHAs are responsible for the assessment, co-ordination, and delivery of home care services and for maintaining standards, with Manitoba Health retaining responsibility for overall policy and program standards. In Winnipeg, home care is delivered by the Winnipeg Regional Health Authority (WRHA).

Home Care programs and services offered in Winnipeg include:

- Long Term Programs (60 days or more);
- Short Term programs (less than 60 days);
- Dialysis and Ostomy Care;
- Community Intravenous Therapy;
- Self and Family Managed Care;
- Specialty services such as respiratory, children's and palliative care programs.

Home Care services include:

- Personal care;
- Nursing services;
- Counselling/Problem Solving;
- Household assistance;
- Respite/Family Relief;
- Occupation Therapy Assessment;
- Physiotherapy Assessment;
- Referral to other agencies;
- Coordination of internal and external services in the community;
- Assessment for long-term care and specialty services such as the Adult Day program, Companion Care program and Supportive Housing program.

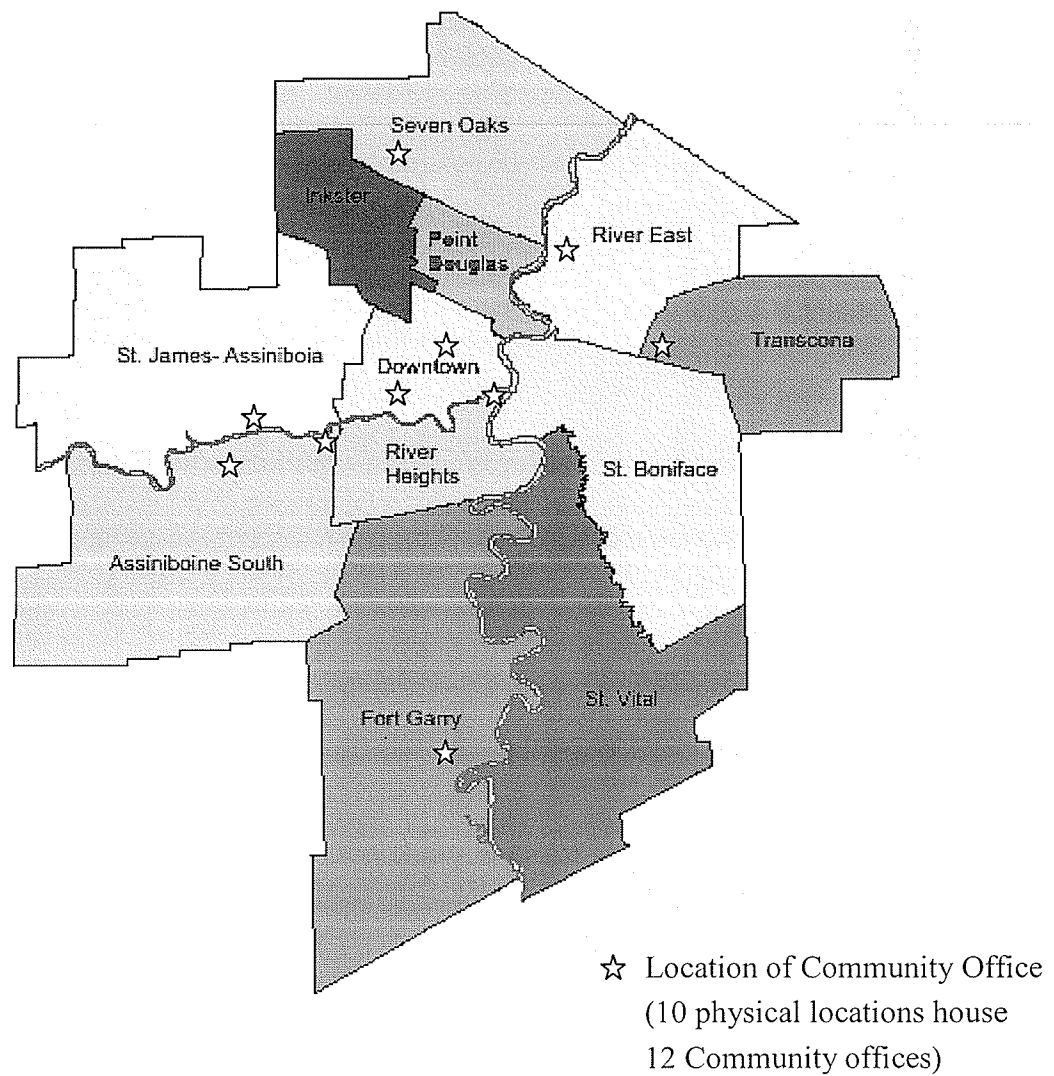
The Home Care programs in Winnipeg are grouped into three coordination types – Community coordinated, Nursing coordinated, and Specialty Program coordinated. To be eligible for home care, individuals must be a Manitoba resident, registered with Manitoba Health, require health services or assistance with activities of daily living, require service to remain safely in their homes and require more assistance than available

from existing supports and community resources. Access to home care is determined by a professional assessment of needs. Decisions about the type and amount of home care services provided at home are based on the assessed need by case coordinators in collaboration with clients and their informal caregivers (Manitoba Health, 2007). If the individual is assessed as requiring home care, the home care services are provided free-of-charge.

Home care staff is located at community/district sites, hospitals and specialty teams. The Winnipeg Health Region is divided into 12 Community Areas and there is a community Home Care office aligned to each Community Area (Johnson, 2005) (Figure 4.1). Home care service delivery for community-coordinated, long-term home care clients is coordinated out of these 12 offices. Home care services in the Region fall into the two categories of home support service or nursing service.

Home support services are provided by home care attendants (HCA) and home support workers (HSW). An HSW provides client supervision, housekeeping and laundry, and meal preparation services. No specialized training is required as training is provided in a WRHA orientation program. The HCA provides personal care services, such as bathing, feeding, and toileting assistance, as well as the services indicated for HSWs. An HCA requires a Health Care Aide/Home Care Attendant certificate from a recognized educational institution. Nursing services are provided by registered nurses (RN) and licensed practical nurses (LPN). The types of tasks these direct service staff provide are outlined in Section 4.5.2.1. The provider and tasks assigned to a client are based on the clinical judgment of the case coordinator following an in-depth assessment of the client.

Figure 4.1 Winnipeg Community Areas and Location of Community Offices in 2004



Source: Johnson, 2005

A previous study of home care clients indicated that the majority of home care users in Winnipeg (79.0%) were aged 65 or older. Older adults ages 75 to 84 comprised the largest group of home care clients. As well, most of Winnipeg's home care clients (73.0%) are receiving long-term care in the home (>60 days) (Mitchell et al., 2005). Two sources of home care data routinely collected by the WRHA Home Care program on community-coordinated, long-term clients are utilized in this study: 1) Resident Assessment Instrument for Home Care (RAI-HC) data; and 2) service provision information from the program's scheduling software called Procura.

4.3.1.1 RAI-HC Data

To address home care data requirements, the WRHA began implementation of the RAI-HC in the year 2000. The RAI-HC is a standardized assessment that provides data on client characteristics, health status and needs (Morris et al., 1999). The RAI-HC was implemented since it addressed numerous service provision and program management issues by providing the framework and mechanisms for a standardized approach to home care assessment and care planning across multiple sites (Kyle & Pringle, 2001). The instrument is currently used to assess all community-coordinated home care clients expected to receive long-term care (61 days or more). Over 300 assessment items are categorized into the following areas:

- Demographic items
- Referral items
- Assessment information
- Cognitive patterns
- Communication/hearing patterns
- Vision patterns
- Mood and behaviour patterns
- Social functioning
- Continence
- Disease diagnosis
- Health conditions and preventative health measures
- Nutrition/hydration status
- Oral health
- Skin condition
- Environmental assessment

- Informal support services
- Physical functioning – IADL/ADL
- Service utilization
- Medications

In addition, embedded within the RAI-HC assessment instrument are a series of scales and indices that can be used to evaluate the clinical status of a client or group of clients. A number of these measures and algorithms have been developed and validated in previous instruments from the RAI series as well as in the RAI-HC. The scales and indices most relevant to the present study include:

- Activities of Daily Living (ADL) Self-Performance Hierarchy Scale – a hierarchical scale based on four RAI-HC ADL items that measure ADL performance (personal hygiene, locomotion, toilet use, and eating). The scale reflects the disablement process and scores range from 0 to 6 with higher values indicating greater ADL dependence (Morris, Fries, & Morris, 1999);
- Instrumental Activities of Daily Living (IADL) Capacity Scale – a hierarchical scale ranging from 0 to 6 that captures difficulty performing three IADLs (housework, meal preparation, and phone use), with higher scores indicating greater IADL difficulty (Morris, Carpenter, Berg, & Jones, 2000);
- Cognitive Performance Scale (CPS) – a hierarchical scale ranging from 0 to 6 that rates the cognitive status of individuals, with increasing values indicating more cognitive impairment (Morris et al., 1994);
- Depression Rating Scale (DRS) – a scale based on 7 items embedded in the RAI-HC that can be used as a clinical indicator of depression. Scores of three or greater on the DRS indicate presence of major and minor depressive disorders (Burrows, Morris, Simon, Hirdes, & Phillips, 2000).

- Changes in Health, End-stage disease and Signs and Symptoms (CHESS) Scale – a scale developed to detect frailty and instability in health. The scale ranges from 0 to 5 with higher scores indicating higher levels of health instability and at risk of serious decline (Hirdes, Frijters, & Teare, 2003);
- Pain Scale – based on two pain items in the RAI-HC, this scale ranges from 0 to 3 with higher scores indicating greater pain severity (Fries, Simon, Morris, Flodstrom, & Bookstein, 2001);
- Method for Assigning Priority Levels (MAPLe) – this algorithm is based on a broad range of clinical variables in the RAI-HC. MAPLe scores provide an indication of the level of priority for a client to receive community care or to be placed in a long term care facility with scores ranging from 1 (low) to 5 (very high) (Hirdes, Poss, & Curtin-Telegdi, 2008);

The RAI-HC has widespread use in other jurisdictions in Canada and internationally. Several studies have established the interrater reliability and validity of the assessment in multiple trials and in different settings. Initial testing of the RAI-HC instrument showed good consistency with weighted kappa of 0.7 or more in dual independent home care assessments in five countries, including Canada (Morris et al., 1997). Additional studies have confirmed these initial findings (Kwan, Chi, Lam, Lam, & Chou, 2000; Landi et al., 2000). The RAI-HC has been tested for content validity by using stakeholder opinions and expert clinicians to determine the relevance and clinical utility of the assessment items (Hawes, Fries, James, & Guihan, 2007). Convergent validity testing has found that RAI-HC items and scales compare well to established

measures of ADL, IADL, and cognitive functioning with Pearson's correlations starting from 0.74 and higher (Landi et al., 2000).

All clients in this study were assessed with Version 2 of the RAI-HC (Morris et al., 2002). The home care case coordinators conducted the assessments in-person with clients during home visits. The assessments are collected electronically on automated software developed specifically for the WRHA Home Care program.

4.3.1.2 Procura Service Data

To further address home care data requirements, in 2002 the WRHA expanded implementation of the Procura Health Management System in the region to include scheduling of home support services. Prior to 2002, only nursing visits were scheduled in the automated system. By the end of 2003, all but one of the community home care offices in Winnipeg started using the Procura system to maintain records on both support services and nursing services provided to home care clients. The final office started scheduling home support visits in Procura by March, 2004 (D. Thiessen, personal communication, July 29, 2004). Pertinent to this study, the Procura system contains data on the different types of services scheduled for clients, the type of service provider, and the number of days and hours per week the service is provided, in a standardized format. For example, the data indicate which service providers delivered client care at visits (e.g., home care attendant (HCA), home support worker (HSW), registered nurse (RN), licensed practical nurse (LPN)); the dates of visits; the hours of service provided at each visit; and the task(s) provided to the client at each visit (e.g., assistance with bath, meal preparation, laundry, etc). Since therapy services are contracted out in the Region, no

information on therapy services is available in Procura. Therefore, this study was restricted to examination of home support and nursing service allocation. All of the scheduling information in Procura is verified for support services (services provided by HCAs and HSWs) for payroll purposes but the scheduled nursing service is unverified. As a result, the nursing service data in Procura reflects assessed need and what is scheduled for clients; it may not accurately reflect what the client actually received. However, scheduled nursing services tend to be only minimally, and infrequently altered, and what is contained in Procura is considered an accurate depiction of what clients receive (D. Hilder, personal communication, March 17, 2007). At a minimum, the Procura data reflects what services a case coordinator indicated were needed.

4.4 Study Population

The population selected for this study was older adults (defined as age 65 or older) receiving public home care service. The study's sample was drawn from all clients in the WRHA's Home Care program in the 2004 calendar year. The inclusion criteria for the study participants were:

- 1) registered in the WRHA Home Care program in 2004;
- 2) age 65 or older at time of assessment in 2004;
- 3) possessed a fully completed RAI-HC assessment from 2004;
- 4) had service information scheduled in the Procura system in a 14-week period following the 2004 assessment.

4.4.1 Data Extraction of Study Population

All data for this thesis were identified and extracted by the WRHA Home Care program. For the extraction of the RAI-HC data, the above criteria numbers 1, 2, and 3, were applied. A total of 9233 older clients were identified as having a complete RAI-HC assessment in 2004 and were extracted by the WRHA for inclusion in this study. The assessment data were anonymized (all client-, caregiver-, and employee-identifying information was removed) and a unique study code (i.e., client identifier) was assigned to each client. In instances where a client had multiple assessments, the most recent assessment was extracted.

To identify the appropriate service data to extract, the assessment date from the RAI-HC guided which service records to extract from the Procura system. Since service provision data was sought in a 14-week period after assessment, the time period for the service data encompassed January 2004 to April 2005. All of the community offices were not fully utilizing the Procura system for scheduling home support services in this time period. It was recognized that service records would not be available for all clients with a RAI-HC assessment, or that records would be incomplete for some clients when only nursing service data would be available but not support service data. Where available, all service records that followed in a 14-week period after clients' RAI-HC date of assessment were extracted by the WRHA for use in this study. This is consistent with previous research with WRHA service data from Procura that used a similar service episode of 13 weeks (Hirdes, Poss, & Reidel, 2005). Sensitivity testing in that earlier research concluded that a 3-month time period produced similar and stable results to longer time frames for home care utilization research. A slightly longer episode of 14

weeks was considered in this study since for new clients, services do not always start immediately after assessment. It can sometimes take a few days or much longer to get service providers fully scheduled for clients (L. Orlikow, personal communication, November 1, 2004).

Seven Procura data elements from each service record were extracted for this study: study code, date of start of home care visit, date of end of home care visit, unique visit identification code, visit duration, provider code (HSW, HCA, RN, LPN), and task code (identifying the type of home care task provided at the visit). The unique, anonymous study code (client identifier) was similarly assigned by the WRHA to the Procura service records to allow linkage of the RAI-HC assessment data and Procura service data. Service records for 6963 clients, at a total of 2,546,384 records, were extracted by the WRHA for use in this study.

4.4.2 Exclusion Criteria

Clients were excluded from the study based on the following criteria:

- 1) there was less than two weeks of **complete** home care service information available in the client's Procura service records in the 14-week period after the date of RAI-HC assessment;
- 2) the client was a Nursing-coordinated client, i.e., was receiving only nursing services while on home care.

Clients were excluded from the study if their service records were incomplete. Since scheduling of home support services was a new process in the WRHA during the time of this study, some clients only had nursing visits recorded in Procura and not home

support visits. A section in the RAI-HC assessment indicates the types of home care services a client is receiving. If the assessment indicated the client was receiving home support service (indicated as home health aide or homemaking service in the RAI-HC) but such service was not reflected in the Procura records, the service data were considered incomplete and the client was excluded.

A client needed to have a minimum of two weeks of home care service in the 14-week episode after assessment to be included in the study. The minimum two weeks of home care service was defined as 14 days from the date of the client's first home care service visit to the date of the client's last visit. It was felt that such a minimal service provision requirement was appropriate since several unanticipated scenarios could result in only two weeks of service being recorded for clients anticipated to be long-term clients (and therefore assessed with the RAI-HC), such as hospitalization, sudden transfer to a different program, or death. Two weeks were required as a minimum service episode since there are some home care services that are only offered to clients once every two weeks, such as light housekeeping and laundry. Examination of service allocation on episodes less than two weeks would potentially under detect the use of housekeeping and laundry services. To test for stability in different lengths of service observation, key features of the study population were examined by three categories of home care episodes: 1) 14 to 30 days in length, 2) 31 to 60 days in length, and 3) 61 to 98 days in length. This categorical 'service observation' variable was also examined in regression analyses for its potential confounding association with high use of home care.

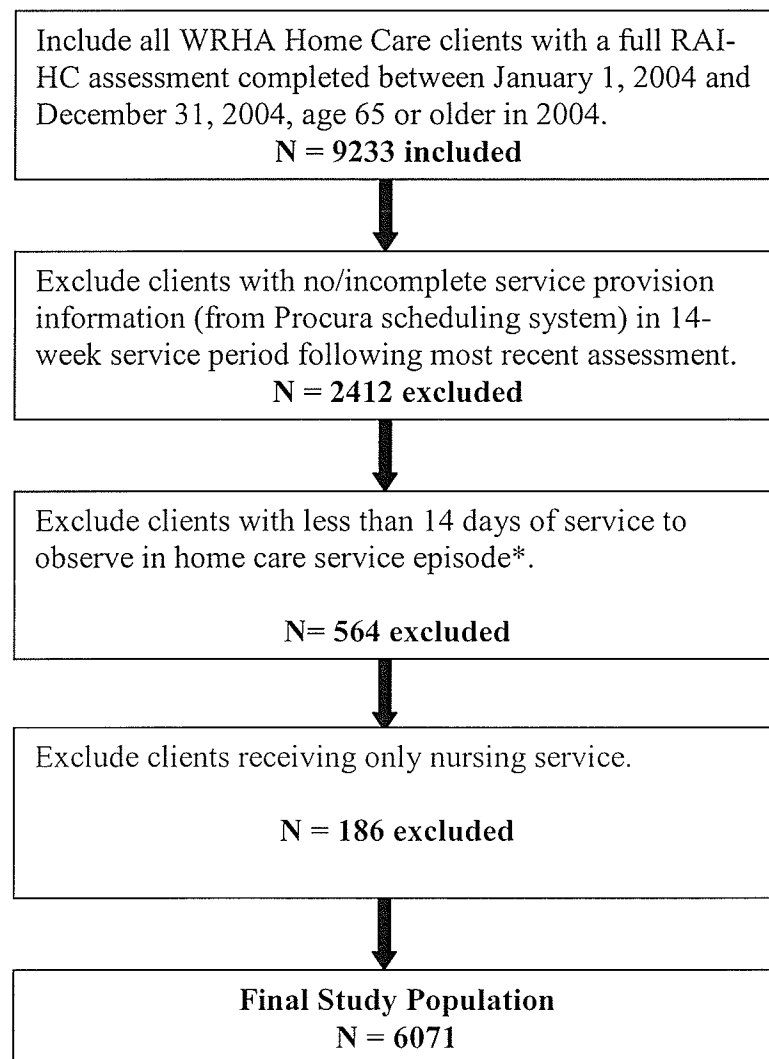
Nursing coordinated clients are home care clients that only receive nursing services. These clients tend to be short-term clients but a small proportion of nursing

clients have long-term nursing needs. Some long-term nursing coordinated clients received assessment with the RAI-HC since its implementation in the program, but by 2005, this practice had ceased (L. Orlikow, personal communication, April 4, 2006). Due to lack of consistency in assessing long-term nursing coordinated clients, and to be consistent with the current policy of using the RAI-HC to assess only long-term community coordinated home care clients, nursing-only clients were excluded from this study. These clients were identified first through the Procura data, where only nursing services were recorded. Examination of the RAI-HC assessment for these clients identified that they had not received any support services in the week before their assessment. This examination resulted in only 186 nursing-only clients being excluded from the final study population.

A total of 6071 home care clients and their 2,480,586 service records met the criteria for inclusion in the study. There were 9233 older home care clients who possessed a completed full RAI-HC assessment in 2004, but 3162 clients were excluded from analyses due to lack of appropriate service provision information in the Procura system or not meeting the inclusion criteria. Figure 4.2 outlines the inclusion and exclusion process that led to the final study population. A fuller reporting of data cleaning and client inclusion methods is in Appendix A.

As part of the data quality checks, excluded long-term, community-coordinated clients were compared to the final study population on several key characteristics. This comparison provided evidence that the study population reflected the population of longer stay community-coordinated clients in the WRHA Home Care program.

Figure 4.2: Study Population – Criteria for Inclusion/Exclusion



* Home care service episode is determined from the Procura service data and is defined as number of days from first home care visit to last home care visit in the 14-week service observation period after assessment.

4.5 Study Variables

4.5.1 Independent Variables

The literature identified numerous client, caregiver, and health system characteristics that are associated with home care use and volume. The literature aided in selecting variables to include as independent variables and the Andersen-Newman model adapted for this study was used to organize the independent variables into meaningful groupings for description and analysis. Nearly all of the client characteristics in the RAI-HC are categorical items. However, some of the outcome scales, composite indices, and summary scores created from the RAI-HC items are continuous in nature.

4.5.1.1 Client Predisposing Characteristics

Client information was obtained from the RAI-HC assessment data. Several of the assessment items fit into the predisposing component of the Andersen-Newman model. The client characteristics considered predisposing in this study are:

- Age: at time of assessment
- Gender
- Marital status: at time of referral to Home Care program
- Education: highest level completed

4.5.1.2 Client Enabling Characteristics

The RAI-HC assessment items categorized as enabling characteristics are:

- Living arrangement: at time of referral to the Home Care program
- Primary caregiver lives with client
- Primary caregiver's relationship to client
- Emotional support from primary caregiver
- IADL care from primary caregiver
- ADL care from primary caregiver
- Hours of informal support: for ADLs and IADLs in a 7-day period

4.5.1.3 Client Need Characteristics

Client need characteristics dominated the home care utilization literature and the RAI-HC assessment collects a large amount of information that falls into this domain.

Several single data elements from the RAI-HC were examined as need characteristics in this study as well as outcome and other composite measures that are derived from items in the RAI-HC:

- Length of time on home care: calculated from the date case was opened (client's intake into home care) to the date of client's most recent assessment
- New client: type of assessment is 'Initial Assessment'
- Post-acute client: reason for referral indicates client referred to program for post hospital care
- Self-reported poor health: client feels he/she is in poor health when asked
- Disease diagnoses: based on 26 disease diagnoses in RAI-HC assessment checklist
- Co-morbidity index: summary number of disease diagnoses identified in assessment disease checklist
- Number of medications: number of prescription and over the counter medications taken in a week
- Bladder incontinence
- Bowel incontinence
- Ulcers: presence of any pressure or stasis ulcers
- Falls: client had a fall in last 90 days
- Receipt of psychotropic medication: receipt of antipsychotic/neuroleptic, antidepressant, anxiolytic, or hypnotic medication in a week
- Behaviour problems present: client exhibits behavioural symptoms of wandering, verbally abusive behaviour, physically abusive behaviour, socially inappropriate/disruptive behaviour, or resists care in 3-day period
- Changes/worsening of behaviour symptoms in past 90 days
- Cognitive impairment: level of cognitive impairment on Cognitive Performance Scale
- Worsening of decision-making in past 90 days
- ADL impairment: level of difficulty performing ADLs based on ADL Self-Performance Hierarchy Scale
- ADL decline in the past 90 days
- IADL impairment: level of difficulty performing IADLs based on IADL Capacity Scale
- Depression: clinical indication of depression based on Depression Rating Scale
- Mood indicators are worse than 90 days ago
- Pain: level of pain client is experiencing based on Pain Scale

- Health instability: indication of client level of frailty/health instability based on CHES Scale
- Presence of conditions that make health unstable
- Priority level: level of need for community/institutional care based on MAPLe algorithm
- Overnight hospital stay in last 90 days
- Emergency room visit in last 90 days
- Emergent care visit in last 90 days
- Need for any special treatments in a 7-day period (includes respiratory treatments, alcohol/drug treatment, blood transfusions, chemotherapy, dialysis, IV infusion, medication by injection, ostomy care, radiation, tracheostomy care; these treatments were combined in one indicator since too few clients received any one type of treatment to stand on its own in analyses)
- Need for any therapies (exercise, occupational, or physical therapy)

Needs for home care service arise from the inability to perform activities

necessary to manage independently at home, regardless of the cause for the inability.

Therefore, measures of function and physical disability indicating need for help with household and self-care tasks may be more appropriate than specific disease diagnoses.

However, the associations of disease conditions were examined to see if they covered additional dimensions of disability than those covered by ADLs and IADLs, similar to previous research (e.g., see Meinow et al., 2005).

In addition, the assessment data identified who were new home care clients versus established clients based on a code for reason for assessment. If the reason for assessment was coded as 'Initial Assessment' the client was considered a new client in need. As well, the RAI-HC reason for referral at intake into the Home Care program was used to identify if the client was referred to the program due to need after a hospitalization.

4.5.1.4 Caregiver Need

From the RAI-HC data, there are two items applicable to caregiver need:

- Caregiver unable to continue in caring duties (e.g., due to declining health)
- Caregiver expresses feelings of distress

4.5.1.5 Health System Characteristics

A health system component is examined by including a home care office variable that identifies the office coordinating client care. Using home care office as an independent variable will be useful to identify if unmeasured home care office characteristics and policies may be influencing home care service use. Office codes are recorded in the RAI-HC software. However, there is one caution with this variable. This indicator in the RAI-HC identifies the office coordinating clients' care at the time the data were extracted for this study by the WRHA (in May 2005). Since the software only maintains information on the most current home care coordinating office, historical home care office information is overwritten when a client transfers between coordination sites. As a result, the office identified as coordinating care for clients in this study may not necessarily be the office that conducted the assessment on the client. Communication with WRHA personnel indicated that for the vast majority, the home care office identified at extract in May 2005 would be the office that conducted the assessment since there is little transitioning between offices among long-term, community-coordinated clients (Keir Johnson, personal communication, June 17, 2005).

4.5.2 Home Care Service Use and Dependent Variables

All dependent variables were derived from service provision data in Procura.

The type of service, type of service providers, and amount of service indicated in the data provided the foundation for examination of home care service allocation.

4.5.2.1 Home Care Services

Task codes in the Procura data identify the various tasks clients receive in their service visits. For support services, tasks can be grouped into specific categories that the Home Care program developed. Since no categories existed for nursing services a Home Care Manager for Central Nursing Services created relevant categories to group nursing tasks. The support tasks and categories are summarized in Table 4.6 and the nursing tasks and categories are summarized in Table 4.7. Use of service tasks or service categories was examined based on both binary and continuous variables. A binary variable for each service task was created based on use (at least once) or non-use in the service episode. A continuous variable for each service task was created by summing the number of times the client used the task in the service episode and calculating the mean weekly use of the task based on the number of weeks in the service episode. This same process was used to create binary and continuous variables for the task categories.

4.5.2.2 Service Providers

Along with task codes the service data identified the type of service provider who rendered the services. Two codes identified the two types of support service providers in the Home Care program – HCA (home care attendant) and HSW (home support worker).

Two codes identified the two types of nursing service providers in the Home Care program – RN (registered nurse) and LPN (licensed practical nurse). Service provision was examined based on all four provider codes separately as well as through groupings. HCA and HSW codes were grouped together to indicate support service provision and RN and LPN codes were grouped together to indicate nursing service provision.

Table 4.6: Support Services Categories in WRHA 2004/05 Procura Data

Support Services Category - Code	Task Code	Activity Description
HX ⁴ – Assist Client: Hygiene	H1	Tub bath, stool, bath board
	H2	Sponge bath
	H3	Shaving
	H4	Hair care
	H5	Care of hands and feet
	H6	Mouth and denture care
	H7	Skin care
	H8	Assist with toileting
	H9	Assist with perineal care
AX – Assist Client: Move Around Home	A1	Assisting to walk
	A2	Assisting in-out of bed-chair
	A3	Assist with positioning
MX – Cleaning of Living Area	M1	Sponge mop floors-Kitchen-Bath
	M2	Disposing of garbage
	M3	Clean bathroom sink, toilet, tub
	M4	Vacuuming
	M5	Dusting
	M6	Cleaning of kitchen
	M7	Clean oven - defrost fridge
CX – Assist Client: Dressing	C1	Assist client to dress-undress
WX – Laundry	W1	Making bed
	W2	Washing laundry by machine
	W3	Hanging-drying laundry
FX – Nutrition	F0	Special Diet
	F1	Cooking meal
	F2	Heat and serve
	F3	Storing of food
	F4	Washing dishes after meal prep
	F5	Meal planning
	F6	Leaving prepared meals
	F7	Bulk meal preparation
PX ⁵ – Provide Personal Care	F8	Escort to/from congregate meal
	P1	Complete tub & sponge bath
	P2	Perineal care
	P3	Shaving
	P4	Hair Care
	P5	Care of hands and feet
	P6	Mouth and denture care

⁴ This category of service provides assistance to client, such as set-up, or performance of some of the task, but does not do the entire task for the client.

⁵ This category of service performs the task for the client; the client cannot do the care, it is done for him/her.

Support Services Category - Code	Task Code	Activity Description
PX – Provide Personal Care (continued)	P7	Skin care
	P8	Dressing - Undressing
	P9	Transfer
	PA	Transfer-mechanical lift
	PB	Positioning
	PC	Passive exercises
	PD	Apply topical cream-ointment
	PE	Administer eye or ear drops
	PF	Feeding client
	PG	Gastrostomy feeding
	PH	clean respiratory equipment
	PI	Tracheostomy dressing change
	PJ	Turn on-off oxygen gauge
	PK	Provide bladder-bowel routine
	PL	Provide bedpan-urinal-commode
	PM	Indwelling catheter care
	PN	Condom catheter care
	PO	Ostomy care
	PP	Bowel routines e.g. disimpaction
DX ⁶ – Supervision	D1	Assist Client with eating
	D2	Assist Client with moving
	D3	Supervision of toileting
	D4	Social interaction & activity
	D5	Taking Client for a walk
	D6	Oral medication reminder
	D7	Stand-by bath assistance

⁶ This category of service provides only monitoring and/or direction – there should be no hands on performance of the task.

Table 4.7: Nursing Categories in WRHA 2004/05 Procura Data

Nursing Category - Code	Task Code	Activity Description
Assessment - AS	AS	Assessment
Hygiene & ADL - HN	HC	Hygiene Care
Elimination - EN	BC	Bowel Care
	UC	Urinary Care
	OC	Ostomy Care
Diabetes - DN	FBS	Fasting Blood Sugar
	RBS	Random Blood Sugar
Intravenous Therapy - IN	IV AD	IV Admission
	IV BW	IV Blood Work
	IV DC	IV Discharge
	IV HT	IV Health Teaching
	IV LC	IV Limited Care
	IV MA	IV Medication Administration
	IV MC	IV Med Change
	IV NC	IV Nurse Care (Non Self Care)
	IV PC	IV Peripheral Change
	IV PD	IV Picc Dressing
	IV PP	IV Program Pump
	IV PR	IV Picc Removal
	IV SC	IV Self Care
	LCSP	Central Line Or Port
Medications - QN	ECEC	Eye Care
	MI	Medication Injection
	MM	Medication Monitoring
	MO	Medication Oral Essential
	MS	Medication Set Up
	MT	Medication Topical
Airway Maintenance/Respiratory - RN	OX	Oxygen Therapy
	RAS	Respiratory Assessment
	TRC	Tracheostomy Care
Palliative Care - PN	BV	Bereavement
	PC AD	PC Admission
	PC BC	PC Bowel Care
	PC FB	PC Fasting Blood Sugar
	PC HS	PC Health Supervision
	PC HT	PC Health Teaching
	PC MI	PC Medication Injection
	PC MM	PC Medication Monitoring
	PC MO	PC Medication Oral
	PC MS	PC Medication Set up
	PC MT	PC Medication Topical
	PC OA	PC Other Activities
	PC OX	PC Oxygen Therapy

Nursing Category - Code	Task Code	Activity Description
Palliative Care – PN (continued)	PC RB	PC Random Blood Sugar
	PC RE	PC Resume
	PC SC	PC Supportive Care
	PC UC	PC Urinary Care
	PC WC	PC Wound Care
Therapeutic Measures - TN	PT	Physiotherapy
	SC	Supportive Care
	HS	Health Supervision
	HT	Health Teaching
Nutrition - NN	TF	Tube Feed Essential
Wound Care - YN	WCC	WC Consult
	WCF	WC Follow Up
	WCWC	Wound Care
Other - ON	CMRA	Case Management Reassessment
	TH	Telehealth Services
	OA	Other Activity

4.5.2.3 Volume of Home Care Service

The Procura data indicated in hours the duration of each home care visit that a client received for direct service. For this study, the hours for each home care visit were summed for each client and then divided by the number of weeks in the client's service episode to create a rate of average hours of total home care service per week. To examine volume of support service use and nursing service use separately, the same methodology was applied for each client while focusing on support service visits only (identified as visits with a HSW or HCA provider code) and then nursing visits only (identified as visits with a RN or LPN provider code). This methodology created three continuous variables for volume of home care use: 1) average hours of total home care service per week, 2) average hours of home support service per week, and 3) average hours of nursing service per week.

4.5.2.4 Identification of High Users of Home Care

Identification of high users of home care relied upon the three continuous variables depicting average hours of combined and specific home care service per week. Based on examination of frequency distributions of average hours per week and descriptive statistics for percentiles, high users were defined as individuals in the top 10% of average weekly home care service hours. The value indicated at the 90th percentile was used as the cut-point for identifying where high use started. This method is consistent with many studies in the high health care user literature and provides a group large enough to produce stable estimates in analyses. The frequency distribution and descriptive statistics of average total home care hours per week, support service hours per week, and nursing hours per week were examined separately to determine three categories of high users – high users of total home care service, high users of home support service, and high users of nursing service. A dichotomous high use variable was formed for each service category, with ‘1’ indicating ‘high user’ and ‘0’ indicating ‘other user.’ These three service high user outcome measures were the main dependent variables in analyses.

While the definition of high use in this study is consistent with other literature, sensitivity analysis was undertaken to ensure the top 10% of high users were in fact different from other users. Chi-square tests were employed to test for differences in the distribution of specific characteristics between the top 10% and the bottom 50% of clients based on average weekly hours of home care service. This method is consistent with a high user comparison approach described by Monheit (2003). However, to ensure a cut point of the top 10% was sufficiently unique, different high use cut points were examined

against the bottom 50th percentile group to see if high users emerged at a specific point (the top 10%, 15%, 20%, and 25%). This methodology is consistent with that of Shenkman and colleagues (2007). For nursing service, 69.0% of clients did not receive any nursing service. It was this 69.0% of clients that became the comparison group against the various high use cut points in the sensitivity analysis, instead of the bottom 50% that were used for the total home care hours sensitivity analysis. Sensitivity analysis was not conducted on high use of home support service since preliminary examinations identified nearly identical clients as high users of overall home care service and high users of home support service. Since no clear pattern of high use emerged from this comparative analysis, high users remained defined as the top 10% of clients in each of the three different service dependent variables. Additional information on the high user sensitivity analysis is included in Appendix B.

4.6 Data Analysis

Data analysis for this thesis included several phases related to the objectives of characterizing home care clients and high users of the service, and allocation of services in the Home Care program:

- Examination of data quality and creating the final study population;
- Development of variables for describing the study population, service allocation, and service utilization outcomes;
- Construction of models to predict high users of public home care service.

All data were examined for quality problems and cleaned where necessary. Since Procura service data had only limited previous use for research purposes, the data were

examined thoroughly for quality issues. Data quality checks on the data and derivation of the final study datasets are outlined in Appendix A.

All assessment and service variables were initially examined through descriptive statistics and frequency distributions. Continuous variables were expressed as means and categorical variables were expressed as proportions. The examination of the study population identified characteristics where there was very little variation in the population.

Binary logistic regression was used to model the event that a client was a high user of home care services. Logistic regression is a form of statistical modeling that is appropriate for dichotomous outcome variables (Stokes, Davis, & Koch, 2000). Three binary logistic models were generated to determine the client and contextual characteristics predictive of the three high user outcome variables.

Spearman rank correlations were used to determine the strength and association between the independent variables and the three dependent variables. Potential correlation, or collinearity, between independent variables was revealed by these analyses. When the degree of correlation between independent variables entered into a multiple regression model exceeds a certain level, the strong correlation between the variables has a detrimental effect on the precision of variable estimates and model fit (Stokes et al., 2000). Additional collinearity diagnostics were examined for potential presence of collinearity between independent variables. Linear regression was employed with all the variables against each particular high use outcome. The variance inflation factor (VIF), tolerance and condition index statistic options were calculated in the regression procedure. This method procedurally puts each independent variable as the

dependent variable and identifies correlation between variables. The general rule is that the VIF should not exceed 10, the tolerance should not be lower than 0.1 and the condition index should not be 10 or more (Yu, 2000). Variables not meeting these requirements are not independent of another variable in the model.

Two-way frequency tables of independent variables by high user categories were examined to identify when regrouping of variable categories was necessary to provide appropriate cell sizes for analysis. These frequency tables also identified when potential curvilinearity was present in variables and a squared term should be tested in analyses. The population frequency distributions identified variables where little variance in the population occurred (i.e., < 5% of the study population presented with a particular characteristic) and were not suitable variables for analysis.

Independent variables were identified for inclusion in the three logistic regression models based on unadjusted significant associations with each respective outcome. Continuous variables were expressed as means and compared with a t-test or Wilcoxon-Mann-Whitney test where appropriate. Categorical variables were expressed as proportions and compared with the Pearson chi-square test. Variables that had p values of less than 0.20 were retained for inclusion in multivariate analyses. Greenland (2008) suggests that an appropriate approach to model building is to omit independent variables initially from the model only if they have minimal impact on the outcome under examination. The use of a p value less than 0.05 to identify significant variables to include in models often leads to deletion of important covariates. Use of a higher alpha level for variable selection addresses this problem, which Greenland suggests should be a p value of less than 0.20.

The reference group selected for categorical variables was based on the size of the sample for that group and whether it represented a meaningful reference group, which was usually a 'control' state, i.e., the non-problem category, such as disease not present, no cognitive impairment, or no caregiver distress. The reference group for the home care office variable was the office with the largest proportion of clients.

Based on the Andersen-Newman model, groups of independent variables were entered into the regression in blocks in a hierarchical manner by conceptual groupings, a method of variable entry used in previous research (Hawranik, 2002; Henton et al., 2002). The health care system variable (only home care office was in this conceptual group) was entered first, followed by client need, caregiver need, client enabling and client predisposing variable groupings. The entry order was reflective of the decision-making process whereby an individual first must perceive a need for service, then have the ability to use the service, and finally, be predisposed to use the service (Hawranik, 2002). The health care system variable was entered before need to illustrate that first a particular service must exist before an individual recognizes the need for it.

The variables in each of the five conceptual groupings were entered as blocks. With each successive entry of conceptual blocks the model discrimination and calibration statistics were reviewed to determine overall model significance and goodness of fit. Moreover, the independent variable statistics were examined for significant associations and changes in association as each new block of variables were entered. The hierarchical entry of blocks of variables allowed for examination of the contribution that each conceptual group brought to the model. Once all of the five blocks of variables were entered into the model, non-significant variables were removed from the model. The

variables were removed one at a time based on the p value with least significance. The coefficients for each independent variable were examined after removal of each non-significant variable. Variables in the regression model needed to remain significant at the .05 level to remain in the model.

Once a main effects model was identified, interaction terms were introduced into the model. Interaction terms found to be significant in the home care utilization literature guided which interactions to test, although other interactions were tested that made practical sense. Interactions between two variables not found to be significant for the main model were tested as well. Interaction terms were all tested individually with the main model. Interactions found to be significant ($p \leq 0.05$) or marginally significant ($p < 0.10$) were then entered as a block into the main model. Variables and interaction terms not significant ($p \leq 0.05$) at this stage were removed to produce a final fitted model. This methodology was applied to construction of the final model for each of the three high user outcome variables. After generation of the final fitted model, overall performance was assessed using measures of model significant, calibration and discrimination. Model significance was assessed with the Likelihood Ratio Chi-Square test. Calibration was assessed with the Hosmer and Lemeshow's goodness-of-fit test. A non-significant p value on the Hosmer and Lemeshow test indicates the model fit is good (Stokes et al., 2000). Discrimination was reported using the c statistic, which is equivalent to the area under the receiver operating characteristic (ROC) curve. The c statistic ranges from 0.5 to 1, where 0.5 corresponds to the model randomly predicting the response, and a 1 corresponds to the model perfectly discriminating the response (Hanley & McNeil,

1982). All analyses were performed with SAS 9.1 for Windows (SAS Institute Inc., Cary, NC).

CHAPTER 5: RESULTS

The first section of this chapter provides results on the data used in this study in terms of quality, applicability and ability to answer the thesis research questions. The results in section 5.2 identify the characteristics of long-term, community-coordinated home care clients in the WRHA Home Care program. The findings in section 5.3 describe the service allocation to long-term, community-coordinated home care clients. The next three sections of the results chapter provide results of high use of home care service as examined in the three areas defined in the research questions: 1) high users of total home care service (section 5.4); 2) high users of home support service (section 5.5); and 3) high users of home nursing (section 5.6). Section 5.7 provides a summary of the key findings.

5.1 Data Quality

5.1.1 Coding Issues

Data quality checks and data cleaning are presented in Appendix A but key findings from those exercises are highlighted here. The RAI-HC data were found to be of very good quality overall. There were no out of range values and very few missing values were found. The checks for associations in the data through correlations and reliability statistics produced good results in the expected directions that were consistent with previous research with RAI-HC data. The logical coding checks did flag some items with inconsistencies, namely in Section P, Service Utilization, where the number of days of particular services were indicated but not the hours or minutes. Less than four percent of assessments were affected by service utilization discrepancies. The overall

proportion of assessments affected was minor and the affected items were not important in this study.

The Procura service data did require more cleaning and seemed to have more quality issues, but given the very large number of records involved (over two million) the proportion of affected records was actually very small. The two largest issues with these data were an excessive number of tasks assigned at visits and durations that were out of the acceptable range. However, respectively, these issues affected only 1.0% and 0.3% of records. The remedy for those data quality issues was assigning a missing value to number of tasks or durations in those cases, but this alteration had little effect on client information since many other visit records were available for most clients that accurately reflected the home care provision pattern. Overall both the RAI-HC and the Procura data were found to be of good quality to support this research.

5.1.2 Service Episode Examination

The clients' service episodes utilized in this research to examine patterns in home care service allocation and to define high users ranged from 2 to 14 weeks. To test for stability in different lengths of service episodes retained in this study, categories of home care episodes were examined among several features. Again, length of the service episode was calculated for each client as the number of days from their first home care visit identified in the service data following assessment to the date of their last home care visit in the data. This comparison provided the initial evidence to keep service episodes in the study that were as minimal as two weeks in length. The results are displayed in Table 5.1. Very little difference was found between the three episode length categories.

Differences that were found provided an indication of why only a shorter service episode was available for some clients, such as occurrences of discharge to a long term care facility or death. The comparison of client characteristics by length of service episode did not identify discrepancies that merited removing clients with 30 days of service or less from the study population. However, as a final assessment of any possible influence, the 3-category variable of service episode length depicted in Table 5.1 was entered into any multivariate regressions modeling high users of home care service.

Table 5.1: Study Population Features by Length of Service Episode

Study Population (N=6071)	Service Episode Length		
	14-30 days	31-60 days	61-98 days
# of Clients	608	1014	4449
Proportion of Total Sample (%)	10.0	16.7	73.3
New Clients (%)	27.3	33.8	23.7
Length of Time on Home Care ⁷ < 6 Months (%)	31.9	36.7	26.4
Post-Acute Client (%)	20.4	19.0	20.8
Have Discharge Record (%)	30.0	31.5	30.4
Discharged to Personal Care Home (%)	8.1	8.7	3.9
Died (%)	7.6	6.7	5.0
Receiving Home Support and Nursing Service (vs. Home Support Service Only) (%)	23.9	29.2	31.7
High Users of Total Home Care Services (%)	9.2	11.0	9.9
High Users of Home Support Services (%)	9.4	11.0	9.9
High Users of Home Nursing Services (%)	8.4	10.0	10.3
Mean Hours of Total Home Care per Week (standard deviation)	6.2 (8.4)	6.9 (9.1)	6.5 (8.7)
Mean Hours of Home Support Service per Week (standard deviation)	5.7 (8.1)	6.4 (8.9)	5.9 (8.4)
Mean Hours of Nursing Service per Week (standard deviation)	0.4 (1.4)	0.5 (1.4)	0.5 (1.5)

⁷ The length of time from the date the client entered into home care (intake date) and the date of the client's most recent assessment.

5.1.3 Comparison of Included and Excluded Home Care Clients

As part of the data quality checks, clients with a RAI-HC assessment on file but not included in the study were compared to the final study population on several key characteristics. Most of these excluded clients did not have any or had only partial service information in Procura but had a RAI-HC assessment, which indicated they were identified as an individual likely requiring long-term home care. Lack of Procura service information for the excluded group is most likely due to the timing of this project since the data were extracted when Procura was still being implemented in the community home care offices. This comparison assisted in determining the representativeness of the study population to the larger population of long-term community-coordinated clients in the community. Nursing-only clients were excluded from the final study population and were not included in the 'Clients Excluded' category (n=186) for comparison since they were not representative of the intended population for study, that of long-term community-coordinated clients.

Overall, the included (n=6071) and excluded clients (n=2976) did not differ substantially on several key characteristics (Table 5.2). The greatest discrepancy was seen in a higher proportion of excluded clients exhibiting moderate to very severe cognitive impairment than included clients (26.6% vs. 18.0% respectively). Likely that proportion is reflective of clients in supportive housing, where the majority present with moderate impairment on the CPS scale (score=3) according to previous research (Mitchell, Blandford, Menec, & Nowicki, 2008). This is the CPS level where the greatest discrepancy was found between the excluded and included clients examined for this study (21.4% vs. 14.8% respectively, data not shown). Supportive housing clients receive the

RAI-HC assessment since the Home Care program coordinates access to supportive housing. However, fewer supportive housing clients receive home care services beyond professional nursing since the staff in the supported environment can meet many of their care needs. With only nursing service information in Procura, the client would be excluded from this study. There was no indicator in the RAI-HC or Procura data extracted for this study that could identify which clients were supportive housing clients. Nonetheless, given the proximity of proportions in the other characteristics examined, it was concluded that the study population reflected the larger population of longer stay community-coordinated clients in the WRHA Home Care program.

Table 5.2: Characteristics of Clients Included and Excluded for Study

Client Characteristics	Clients Included (N=6071)	Clients Excluded (N=2976)
Age - Mean Age (SD)	82.1 (7.2) years	81.9 (7.2) years
Age Group (%)		
• Age 65-74	16.2	16.0
• Age 75-84	45.5	46.9
• Age 85+	38.3	37.0
Gender (%)		
• Female	73.0	68.6
Marital Status (%)		
• Married	27.7	33.4
Length of Time in Home Care Program (%)		
• 1 day – 6 months	28.7	37.0
• > 6 months – 2 years	30.6	28.6
• Over 2 years	40.8	34.4
IADL Impairment (%)		
• Great Difficulty in 1 or more IADLs	75.6	75.1
ADL Impairment (%)		
• Extensive Assistance to Total Dependence	7.9	10.5
Cognitive Impairment (%)		
• Moderate to Very Severe	18.0	26.6

5.2 Characteristics of the Study Population

The characteristics of the study population are presented in the following subsections based on their conceptual groupings according to the Andersen-Newman model, and in the order as outlined for entry into a logistic model in the methods section: health system, client need, caregiver need, client enabling, and finally client predisposing.

5.2.1 Environment Component - Health Care System

Only one variable measured a component of the health care system environment – the home care office indicator. For a small proportion of the clients, their coordination office fell into the Other category since they were identified as being coordinated by a hospital, a specialty program, or the Long Term Care Access Centre, all places that do not use the full RAI-HC for assessment (Table 5.3). To have RAI-HC assessment data on these clients indicates they were assessed by a case coordinator in a community office before a transfer to one of these other sites for coordination. Most (74.0%) of the clients in the Other Home Care Office category were coordinated by the Long Term Care Access Centre, which manages the clients that become paneled for placement in a long term care facility.

Table 5.3: Andersen-Newman Model: Environment Component - Health Care System

Home Care Office Coordinating Care	Number (N=6071)	Percent
Office 1	736	12.1
Office 2	359	5.9
Office 3	400	6.6
Office 4	309	5.1
Office 5	652	10.7
Office 6	255	4.2
Office 7	496	8.2
Office 8	983	16.2
Office 9	351	5.8
Office 10	758	12.5
Office 11	456	7.5
Office 12	101	1.7
Other Office	215	3.5

* Other includes hospitals, Long Term Care Access Centre, & specialty home care programs

5.2.2 Population Characteristics Component

5.2.2.1 Client Need

A total of 52 client characteristics contained within and derived from the RAI-HC data were initially examined for the client need component. Table 5.4 provides a summary of these study population characteristics.

One-quarter of the study population were new clients, while over 40.0% of the clients had been on home care for more than two years. A minority (20.5%) came to home care after a hospital episode (post-acute).

Nearly 20.0% of the clients reported being in poor health. Functional impairment was mostly seen in IADLs not ADLs in this study population. While nearly 72.0% of the

clients were independent in ADL functioning, according to their ADL Hierarchy Scale scores, over 75.0% had great difficulty in performing at least one IADL, according to their IADL Capacity Scale scores. However, nearly one-third of clients were considered to be showing some level of decline in ADL functioning compared to their status 90 days previously. Some level of bladder incontinence was present in one-quarter of the clients, but bowel incontinence was more rare (10.2% of clients).

Over half (57.1%) of the clients were cognitively intact on the Cognitive Performance Scale and 18.0% presented with moderate to very severe cognitive impairment. Less than 9.0% of the clients exhibited a worsening in their decision-making at their most recent assessment compared to their status 90 days earlier.

Few of the clients exhibited behaviour problems (4.3%) such as resisting care, verbal or physical abusiveness, socially inappropriate behaviour, or wandering. Even fewer of the clients (2.3%) were experiencing any kind of change or worsening in their behaviours compared to their status 90 days before.

Fewer than 8.0% of the clients presented with scores of 3 or greater on the RAI Depression Rating Scale, the score that is indicative of potential minor or major depressive disorders. A similar proportion of the clients (8.4%) experienced a worsening of their mood indicators compared to their mood status 90 days previously.

Nearly 35.0% of the study population had no indicators of unstable health at assessment, according to their CHESS score. Since only a few clients were in the highest CHESS score category of 5 they were grouped in with the clients scoring 4 on the CHESS scale in Table 5.4. The majority of the clients (57.4%) showed a minor level of

unstable health with their scores of 1 or 2 on the CHESS scale. Overall, only 23.0% of the clients were assessed as having conditions that make health unstable.

Symptoms of pain are common in this population. Less than one-third of the clients had no pain while nearly 40.0% experienced daily pain, although it was not severe, and an additional 14.2% of the clients experienced severe daily pain.

Presence of skin ulcers was rare among these clients with less than 5.0% having a pressure ulcer or stasis ulcer present. Falls were more common. One-quarter of the clients recorded a fall within the 90 days before their assessment.

The majority of this study population was taking several medications. One-third of the clients took 9 or more medications in the week preceding their assessment. An additional 42.0% of the clients took 5 to 8 medications in the week before their assessment. Nearly one-third of the clients (32.4%) received a psychotropic medication in the week preceding their assessment.

Few of the clients (8.2%) received or were scheduled to receive a respiratory treatment or other special treatment (such as intravenous infusion, dialysis, or chemotherapy) in the week before their assessment. A similarly small proportion (7.0%) received any special therapies - exercise, occupational, or physical therapy - in the same time period.

One-quarter of the study population were admitted to hospital with an overnight stay in the 90 days prior to their assessment. An emergency room visit was a lesser occurrence (8.1% of clients) and any form of emergent care, such as an unscheduled visit to a nurse or physician, was rare (occurred for only 1.9% of clients).

A disease diagnosis from the RAI-HC disease checklist (Section J) was present in nearly all of the study population. The 10 most common disease diagnoses were:

- Arthritis – 61.2%
- Hypertension – 56.3%
- Diabetes – 20.9%
- Coronary Artery Disease – 20.5%
- Cataract – 20.4%
- CVA (Stroke) – 18.9%
- Osteoporosis – 18.8%
- Heart Failure – 17.6%
- Emphysema/COPD/Asthma – 17.2%
- Thyroid Disease – 16.0%

Nearly all of the clients in the study population had more than one disease diagnosis from the disease checklist as well. Less than 10.0% of the clients had no, or only one, disease. Over three-quarters (76.5%) of the clients had two to five disease diagnoses from the RAI-HC disease checklist.

This study population consisted of clients with a wide range of care needs and this is reflected in their MAPLe scores. One-quarter of the clients presented with a low need for priority level of care based on the MAPLe algorithm (MAPLe score=1). The largest proportion of clients fell into the moderate need category for priority level of care (score=3). Only a small proportion of clients were considered very high need on the MAPLe algorithm (score=5; 6.6%), but a considerable number were identified as high need (score=4; 22.9%).

Table 5.4: Population Characteristics Component - Client Need Characteristics

Need Characteristics	Client Number (N=6071)	Percent
Client Status		
New Client	1565	25.8
Post-Acute Home Care Client	1244	20.5
Length of Time on Home Care		
6 months or less	1742	28.7
> 6 months to 2 years	1856	30.6
More than 2 years	2473	40.7
Mean (SD) = 1.8 years (2.0)		
Self-Reported Health		
Poor Health	1193	19.6
ADL Impairment		
ADL Hierarchy Scale		
0 - Independent	4367	71.9
1 - Supervision Required	421	6.9
2 - Limited Impairment	804	13.2
3 - Extensive Assistance Required (I)	299	4.9
4 - Extensive Assistance Required (II)	104	1.7
5 - Dependent	51	0.8
6 - Total Dependence	25	0.4
Mean (SD) = 0.6 (1.1)		
ADL Decline in Past 90 Days	1983	32.7
IADL Impairment: IADL Capacity Scale		
0 - No difficulty in any of 3 IADLs	117	1.9
1 - Some difficulty in 1	666	11.0
2 - Some difficulty in 2	651	10.7
3 - Some difficulty in all 3	46	0.8
4 - Great difficulty in 1	2311	38.1
5 - Great difficulty in 2	1835	30.2
6 - Great difficulty in all 3	445	7.3
Mean (SD) = 3.8 (1.5)		
Continence		
Bladder Incontinent	1513	24.9
Bowel Incontinent	616	10.2
Cognitive Impairment (Cognitive Performance Scale)		
0 - Intact	3468	57.1
1 - Borderline intact	918	15.1
2 - Mild impairment	592	9.7
3 - Moderate impairment	899	14.8
4 - Moderate/severe impairment	49	0.8
5 - Severe impairment	124	2.0

Need Characteristics	Client Number (N=6071)	Percent
6 - Very severe impairment	21	0.4
Mean (SD) = 0.9 (1.3)		
Worsening of Decision-Making in Past 90 Days	527	8.7
Behaviour		
Behaviour Problems Present	261	4.3
Changes/Worsening in Behaviour Symptoms in past 90 Days	137	2.3
Mood		
Depression Rating Scale Depressive Symptoms (score = 3+)	480	7.9
Mood Indicators are worse than 90 days ago	511	8.4
Mean (SD) = 0.6 (1.3)		
Unstable/Frail Health		
CHESS Score: 0 (No Instability)	2117	34.9
1	2206	36.3
2	1279	21.1
3	410	6.7
4/5 (Highest level of instability)	59	1.0
Mean = 1.0 (1.0)		
Presence of conditions that make health unstable	1399	23.0
Pain (MDS Pain Scale)		
0 - No pain	1947	32.1
1 - Less than daily pain	878	14.5
2 - Daily pain but not severe	2383	39.3
3 - Severe daily pain	863	14.2
Mean (SD) = 1.4 (1.1)		
Skin Condition		
Presence of Skin Ulcer	277	4.6
Falls	1517	25.0
Fell in last 90 days		
Medications		
Number of Medications Used: 0	158	2.6
1	181	3.0
2	312	5.1
3	386	6.4
4	500	8.2
5	663	10.9
6	627	10.3
7	654	10.8
8	558	9.2
9+	2032	33.5
Receipt of Psychotropic Medication	1966	32.4

Need Characteristics	Client Number (N=6071)	Percent
Special Treatments or Therapies Received/Scheduled	495	8.2
Any special treatments in last 7 days		
Any therapies in last 7 days	425	7.0
Service Utilization in Past 90 Days		
Overnight Hospital Stay	1544	25.4
Emergency Room Visit	492	8.1
Emergent Care	113	1.9
Disease Diagnosis		
Arthritis	3716	61.2
Hypertension	3420	56.3
Diabetes	1271	20.9
Coronary Artery Disease	1245	20.5
Cataract	1240	20.4
CVA (Stroke)	1151	19.0
Osteoporosis	1142	18.8
Heart Failure	1067	17.6
Emphysema/COPD/Asthma	1041	17.2
Thyroid Disease	969	16.0
Alzheimer's or Other Dementia	950	15.6
Cancer	712	11.7
Psychiatric Diagnosis	689	11.3
Glaucoma	643	10.6
Fracture (Other than Hip Fracture)	638	10.5
Irregular Pulse	486	8.0
Hip Fracture	378	6.2
Peripheral Vascular Disease	335	5.5
Renal Failure	239	3.9
Parkinsonism	218	3.6
Urinary Tract Infection	204	3.4
Pneumonia	145	2.4
Hemiplegia/Hemiparesis	105	1.7
Head Trauma	47	0.8
Multiple Sclerosis	44	0.7
Tuberculosis	10	0.2
Comorbidity Index: Number of Disease Diagnoses		
0	68	1.1
1	484	8.0
2	1122	18.5
3	1463	24.1
4	1226	20.2

Need Characteristics	Client Number (N=6071)	Percent
5	834	13.7
6	458	7.5
7	251	4.1
8	102	1.7
9	46	0.8
10	10	0.2
11-13	7	0.1
Mean (SD) = 3.6 (1.8)		
Priority Level of Care (MAPLe)		
1 - Low Need	1514	24.9
2 - Mild Need	1163	19.2
3 - Moderate Need	1604	26.4
4 - High Need	1388	22.9
5 - Very High Need	402	6.6
Mean (SD) = 2.7 (1.2)		

5.2.2.2 Caregiver Need Characteristics

The three caregiver need characteristics examined in this study population are outlined in Table 5.5. Nearly all of the clients in this study had a primary caregiver (discussed in the following section). Similarly small proportions of clients had a caregiver who was unable to continue care (7.3%) or had a primary caregiver who expressed distress (6.4%). It was very rare that a primary caregiver was unsatisfied with the support received from family or friends (1.6%).

Table 5.5: Population Characteristics Component - Caregiver Need Characteristics

Caregiver Need Characteristic	Client Number (N=6071)	Percent
Caregiver Unable to Continue Care	444	7.3
Primary Caregiver Unsatisfied with Support from Family/Friends	100	1.6
Primary Caregiver Expresses Distress	391	6.4

5.2.2.3 Client Enabling Characteristics

Eight items from the RAI-HC assessment were examined as client enabling characteristics (Table 5.6). Nearly all of the clients (97.2%) in the study lived independently in their own home or apartment at their time of referral to the WRHA Home Care program. Over 60.0% lived alone and 27.0% lived with their spouse.

Just over one-third of the clients (35.9%) lived with their primary caregiver, while nearly all of the remaining clients had a primary caregiver who did not live with them (62.9%). Only 1.2% of clients did not have a primary caregiver. The majority of the primary caregivers to these clients were a child or a child-in-law (60.3%). Less than 20.0% of primary caregivers were spouses, with the remainder being another type of relative (13.4%) or a friend or neighbour (6.6%).

Almost all caregivers provided emotional support (98.0%) and IADL care (89.6%) to clients. Not surprisingly, a much lower proportion of caregivers provided ADL care (28.7%) since it was shown previously in Table 5.4 that over 70.0% of the clients were independent in ADL functioning. Over half of the clients (53.4%) received seven hours or less of informal care in the week preceding their assessment and over 20.0% received 8 to 14 hours of informal care in that timeframe. One-quarter of the

clients received the equivalent of more than two hours per day of informal care (15+ hours).

Table 5.6: Population Characteristics Component - Client Enabling Characteristics

Client Enabling Characteristic	Client Number (N=6071)	Percent
Where Client Lived at Referral		
Private home/apartment	5900	97.2
Board and care/assisted living/group home	145	2.4
Other	26	0.4
Living Arrangement at Referral		
Lived alone	3748	61.7
Lived with spouse only	1484	24.4
Lived with spouse and other(s)	151	2.5
Lived with child (not spouse)	524	8.6
Lived with other(s) (not spouse or children)	126	2.1
Lived in group setting with non-relative(s)	38	0.6
Primary Caregiver Lives with Client		
Yes	2179	35.9
No	3820	62.9
No such helper	72	1.2
Primary Caregiver's Relationship to Client		
Child or child-in-law	3611	60.3
Spouse	1179	19.7
Other Relative	800	13.4
Friend/neighbour	398	6.6
Support from Primary Caregiver		
Emotional Support	5875	98.0
IADL Care	5369	89.6
ADL Care	1722	28.7
Amount of Informal Care (Last 7 Days)		
0-7 hours	3243	53.4
8-14 hours	1287	21.2
15+ hours	1541	25.4
Mean (SD) = 13.1 (18.4)		

5.2.2.4 Client Predisposing Characteristics

Four characteristics from the RAI-HC assessment were regarded as client predisposing characteristics – age, gender, marital status, and education (Table 5.7). This study population of older adults was old in age overall. The largest proportion of clients was age 80-84 (27.5%), followed by those aged 85-89 (22.7%). Few clients were in the youngest age group of 65-69 (5.5%) while a larger number were 90 years of age or older (15.6%).

Nearly three-quarters of the clients were female (73.0%) and over half of the clients were widowed (59.1%). Still, over one-quarter of this population was married (27.7%). The majority of the clients did not have a high school level of education (55.4% with grade 11 or less) but only a few had no formal schooling (1.2%) or their education was unknown (8.4%). The remainder of the population had a high school level of education or some form of post-secondary education.

Table 5.7: Population Characteristics Component - Client Predisposing Characteristics

Client Predisposing Characteristic	Client Number (N=6071)	Percent
Age: 65-69	335	5.5
70-74	649	10.7
75-79	1096	18.0
80-84	1669	27.5
85-89	1377	22.7
90+	945	15.6
Mean (SD) = 82.08 (7.19)		
Gender:		
Male	1637	27.0
Female	4434	73.0
Marital Status:		
Never married	388	6.4
Married	1680	27.7
Widowed	3591	59.1
Separated	94	1.5
Divorced	278	4.6
Other	40	0.7
Education:		
No schooling	76	1.2
8th grade or less	1633	26.9
9-11 grades	1732	28.5
High school	978	16.1
Technical or trade school	583	9.6
Some college/university	210	3.5
Diploma/Bachelor's degree	223	3.7
Graduate degree	125	2.1
Unknown	511	8.4

5.2.3 Summary

Among older adults receiving long-term home care, most are over the age of 80, are female, and are not married. The majority of the older clients was not new to the Home Care program and had been receiving care for greater than six months. The range of need among this population is evident. Functional impairment is more in the area of

IADLs rather than ADLs and cognitive impairment is an issue for less than half of the clients in this population. Pain is a common experience for these clients, they have multiple disease diagnoses, and the majority is taking five or more medications. However, few clients are receiving special treatments or therapies and only a minority are utilizing acute care resources. Overall, this population's level of care need, based on MAPLe scores, is moderate.

Informal care figures prominently in this population. Even though most clients lived alone independently in the community when they came into the program, nearly all clients have a primary caregiver to provide both emotional and some form of functional support. It was rare for caregivers to identify distress or inability to continue caring.

Several variables examined in the preceding tables were shown to occur in very few clients. Characteristics that occurred in less than 4% of the study population were not considered for further examination in any analyses because they offered little inherent variability in the study population. This criterion mostly affected specific disease diagnoses. Twelve characteristics occurred in less than 4% of the population, or conversely, over 96% of the population:

- Where client lived at referral: private home/apartment – 97.2%;
- Caregiver unsatisfied with support from family/friends – 1.7%;
- Changes/worsening of behaviour in past 90 days – 2.3%;
- Use of emergent care in last 90 days – 1.9%;
- 8 disease diagnoses all less than 4%: renal failure, Parkinsonism, urinary tract infection, pneumonia, hemiplegia/hemiparesis, head trauma, multiple sclerosis, tuberculosis.

5.3 Study Population's Utilization of Home Care Services

5.3.1 Length of Service Episodes

In accordance with study criteria, the lengths of service episode available to study service utilization among the study population varied from a minimum of two weeks (14 days) to 14 weeks (99 days) (Table 5.8). More than half of the clients (58.7%) had service episodes of 12 to 14 weeks available to examine service allocation (Table 5.9).

Table 5.8: Univariate Statistics – Study Population's Service Episode Lengths

Service Variable	Mean	Standard Deviation	Median	Range
Number of Days in Service Episode	75.7	25.6	85.0	14-99 days
Number of Weeks in Service Episode	10.5	3.7	12.0	2-14 weeks

To adjust for the varying lengths of service episodes in this study population, a grouped service episode variable was created that was entered in all logistic regression models to identify and account for any potential influence length of service episode may have on high use of home care service. The service episode lengths were regrouped to reflect an approximate monthly configuration of one month or less (14-30 days), one to two months (31-60 days), and two to three months (61-99 days). Nearly three-quarters of the study population (73.3%) fell into the latter category of having service episodes of two to three months in length (Table 5.9).

Table 5.9 Study Population's Service Episode Lengths, by Week and Monthly Grouping

Length of Service Episode	Number (N=6071)	Percent
Weeks:		
2	226	3.7
3	215	3.5
4	247	4.1
5	224	3.7
6	257	4.2
7	202	3.3
8	293	4.8
9	205	3.4
10	358	5.9
11	285	4.7
12	787	12.7
13	1292	21.3
14	1480	24.4
Service Episode Grouping:		
14-30 days	608	10.0
31-60 days	1014	16.7
61-99 days	4449	73.3

5.3.2 Home Care Visits

The final Procura dataset used in this study for service provision information contained nearly 2.5 million records for the study population. This was equivalent to service information for half a million (525,745) home care visits for the 6071 clients (Appendix A). The vast majority of the visits were for home support service (87.1%) as opposed to home nursing, and the provider for most of the visits was a home care attendant (Table 5.10). Only a minority of the long-term community-coordinated clients in this study received both home support and nursing services in their service episode (30.5%). The more common service scenario was receipt of home support service only (Table 5.11).

Table 5.10: Number of Home Care Visits by Type of Service Provider

Provider	Number Visits (N=525,745)	Percent
Home Care Attendant (HCA)	371,875	70.7
Home Support Worker (HSW)	85,821	16.3
Registered Nurse (RN)	38,728	7.4
Licensed Practical Nurse (LPN)	29,321	5.6

Table 5.11: Composition of Services Provided to Study Population

Service Composition	Number (N=6071)	Percent
Home Support Only	4217	69.5
Home Support and Nursing	1854	30.5

There was quite a range in the service profiles for this population, but on average, clients received nearly 8 home care visits and an accumulation of 37 home care tasks per week. They averaged 6.5 hours of service per week, which were mostly home support service hours (6.0 hours) rather than nursing hours (0.5 hours) (Table 5.12). The number of days in the client's service episode with a home care visit provided an indication of the intensity of service provision for this population. On average, there was a home care visit on more than half of the days in the clients' service episodes (54.5%). In other words, the

average client was receiving a home care visit approximately every second day (Table 5.12).

Table 5.12 Univariate Statistics – Description of Population’s Home Care Visits

Service Utilization	Mean	Standard Deviation	Median	Range
Average Number of Home Care Visits per Week	7.8	8.9	4.3	0.2-77.9
Average Number of Tasks Provided per Week	36.7	46.9	15.6	0.3-559.4
Average Total Home Care Hours per Week	6.5	8.8	3.3	0.1-116.9
Average Home Support Hours per Week	6.0	8.6	2.9	0.0-112.4
Average Nursing Hours per Week	0.5	1.4	0.0	0.0-18.9
Proportion of Service Episode with a Home Care Visit	54.5	36.8	49.5	2.3-100.0

5.3.3 Service Category and Task Allocation

5.3.3.1 Home Support

Older long-term clients received services from all eight home support service categories during their service episodes. The category of service received by most clients was the HX category – Assist Client with Hygiene (Table 5.13). A total of 70.0% of the clients received some form of service within this category. With this category of service, the home support provider gives assistance to the client, such as with set up, or some performance, but does not do the entire task for the client. The other home support service categories received by more than half of the clients were: Assist Client with Dressing (CX), Cleaning of Living Area (MX), and Laundry (WX). The category of

service least received was PX – Provide Personal Care. Tasks in this category are performed entirely by the service provider since the client cannot do the care. This finding is in keeping with the characteristics of the study population overall, since few clients were found to be very functionally impaired, particularly with ADL care needs.

Table 5.13 Number of Clients Receiving Home Support Service, by Category

Support Service Task Categories - Code	Client Number (N=6071)	Percent
Assist Client: Hygiene – HX	4249	70.0
Assist Client: Dressing – CX	3581	59.0
Cleaning of Living Area – MX	3457	56.9
Laundry – WX	3415	56.2
Nutrition – FX	2475	40.8
Supervision – DX	2169	35.7
Assist Client: Move Around Home – AX	1089	17.9
Provide Personal Care – PX	845	13.9

The home support tasks received by clients in each of these categories are outlined in Table 5.14. Tasks received too infrequently to provide meaningful reporting and study (i.e., were received by less than 6 clients) are not included in Table 5.14. The only home support task excluded due to this criteria is PG – gastrostomy feeding.

In the HX category, the tasks most frequently received, by more than half of the clients, were assistance with hair care, skin care, and bathing. Nearly half of the clients received assistance with hand/foot care. Nearly 60.0% of clients received assistance with dressing/undressing (category CX, task C01).

The seven tasks in the Cleaning (MX) category were fairly uniformly received by approximately half of the clients. The same pattern was found in the Laundry (WX) category, with all three laundry tasks received by about half of the clients.

Washing dishes after meal preparation was the Nutrition (FX) category task received by the largest proportion of clients (33.9%), followed by cooking meals (27.5%) and heating and serving meals (21.2%).

The dominant task received in the Supervision (DX) category was the oral medication reminder (24.0%). Assisting with getting clients in/out of bed/chair (14.2%) and assisting the client with walking (13.6%) were nearly equally received in the AX category for assisting with movement around the house. The PX category task received by the largest proportion of clients was full performance of dressing/undressing the client (6.7%).

Table 5.14: Number of Clients Receiving Home Support Service, by Task

Category - Code	Home Support Task - Code	Number (N=6071)	Percent	Top 20 Tasks ⁸
Assist Client: Hygiene - HX	Tub bath, stool, bath board - H01	3269	53.8	4
	Sponge bath - H02	1805	29.7	19
	Shaving - H03	927	15.3	
	Hair care - H04	3492	57.5	2
	Care of hands and feet - H05	2866	47.2	11
	Mouth and denture care - H06	1938	31.9	18
	Skin care - H07	3488	57.4	3
	Assist with toileting - H08	1350	22.2	
	Assist with perineal care - H09	2177	35.9	16
Assist Client: Dressing - CX	Assist client to dress-undress - C01	3581	59.0	1
Cleaning of Living Area - MX	Sponge mop floors-Kitchen-Bath - M01	3015	49.7	8
	Disposing of garbage - M02	3056	50.3	7
	Clean bathroom sink, toilet, tub - M03	3126	51.5	6
	Vacuuming - M04	2984	49.1	9
	Dusting - M05	2789	45.9	14
	Cleaning of kitchen - M06	2889	47.6	10
	Clean oven - defrost fridge - M07	2735	45.0	15
Laundry - WX	Making bed - W01	3239	53.3	5
	Washing laundry by machine - W02	2853	47.0	12
	Hanging-drying laundry - W03	2826	46.5	13
Nutrition - FX	Special Diet - F00	398	6.6	
	Cooking meal - F01	1672	27.5	20
	Heat and serve - F02	1289	21.2	
	Storing of food - F03	1439	23.7	
	Washing dishes after meal prep - F04	2059	33.9	17
	Meal planning - F05	453	7.5	
	Leaving prepared meals - F06	777	12.8	
	Bulk meal preparation - F07	425	7.0	
	Escort to/from congregate meal - F08	307	5.1	

⁸ Top 20 tasks based on proportion of clients scheduled the task in their service episode.

Category - Code	Home Support Task - Code	Number (N=6071)	Percent	Top 20 Tasks ⁸
Supervision - DX	Assist Client with eating - D01	280	4.6	
	Assist Client with moving - D02	410	6.7	
	Supervision of toileting - D03	308	5.1	
	Social interaction & activity - D04	703	11.6	
	Taking Client for a walk - D05	556	9.2	
	Oral medication reminder - D06	1460	24.0	
	Stand-by bath assistance - D07	203	3.3	
Assist Client Move Around Home - AX	Assisting to walk - A01	825	14.0	
	Assisting in-out of bed-chair - A02	863	14.2	
	Assist with positioning - A03	529	8.7	
Provide Personal Care - PX	Complete tub & sponge bath - P01	204	3.4	
	Perineal care - P02	196	3.2	
	Shaving - P03	64	1.0	
	Hair Care - P04	153	2.5	
	Care of hands and feet - P05	141	2.3	
	Mouth and denture care - P06	134	2.2	
	Skin care - P07	201	3.3	
	Dressing – Undressing - P08	406	6.7	
	Transfer - P09	129	2.1	
	Transfer-mechanical lift - PA	83	1.4	
	Positioning - PB	110	1.8	
	Passive exercises - PC	97	1.6	
	Apply topical cream-ointment - PD	68	1.1	
	Administer eye or ear drops - PE	43	0.7	
	Feeding client - PF	45	0.7	
	Clean respiratory equipment - PH	8	0.1	
	Turn on-off oxygen gauge - PJ	6	0.1	
	Provide bladder-bowel routine - PK	49	0.8	
	Provide bedpan-urinal-commode - PL	130	2.1	
	Indwelling catheter care - PM	55	0.9	
	Condom catheter care - PN	25	0.4	
	Ostomy care - PO	29	0.5	
	Bowel routines e.g. disimpaction - PP	6	0.1	

5.3.3.2 Home Nursing

While all clients received home support service, less than one-third of the clients received nursing services. As a result, only 10 of the 12 nursing service categories in the WRHA Home Care program were scheduled for more than 5 clients. Tasks in the categories of Hygiene & ADL (HN), and Nutrition (NN) were rarely scheduled and those categories are not presented in Table 5.15 as a result.

The nursing category received by the largest number of clients was the Medications (QN) category (17.8%). Services within Therapeutic Measures (TN) were nearly similarly scheduled (16.8% of clients). Each of the remaining nursing categories were scheduled for less than 8.0% of clients.

Table 5.15: Number of Clients Receiving Home Nursing Service, by Category

Nursing Task Categories - Code	Number (N=6071)	Percent
Medications – QN	1082	17.8
Therapeutic Measures – TN	1022	16.8
Wound Care – YN	449	7.4
Assessment – AS	428	7.0
Diabetes – DN	223	3.7
Airway Maintenance/Respiratory – RN	173	2.8
Elimination – EN	155	2.5
Palliative Care – PN	55	0.9
Intravenous Therapy – IN	16	0.3
Other – ON	303	5.0

With nursing service being a rare occurrence for this population, 24 tasks, which is nearly half of the 55 nursing tasks in the 10 categories, were not received by more than five clients and were excluded from fuller examination in Table 5.16. Most of the 24 excluded tasks were from the Intravenous Therapy and Palliative Care categories. These tasks included:

Intravenous Therapy (IN):

- IVAD - IV Admission
- IVLC - IV Limited Care
- IVMC - IV Medication Change
- IVPC - IV Peripheral Change
- IVPP - IV Program Pump
- IVPR - IV Picc Removal
- IVSC - IV Self Care
- LCSP - Central Line Or Port

Palliative Care (PN):

- PCBC - Bowel Care
- PCFB - Fasting Blood Sugar
- PCHT - Health Teaching
- PCMI - Medication Injection
- PCMO - Medication Oral
- PCMS - Medication Set up
- PCMT - Medication Topical
- PCOA - Other Activities
- PCRB - Random Blood Sugar
- PCRE - Resume
- PCUC - Urinary Care

Therapeutic Measures

- PT - Physiotherapy

Airway Maintenance/Respiratory (RN):

- TRC - Tracheostomy Care

Wound Care (YN):

- WCF - Wound Care Follow Up

Other (ON):

- TH - Telehealth Services
- CMRA - Case Management Reassessment

In the Medication (QN) category the nursing task received by the largest proportion of clients was medication monitoring (8.1%). Medication set-up (4.3%) and medication injection (4.2%) were second and third in this category (Table 5.16).

Health supervision (i.e., monitoring vital signs) was the task scheduled the most (16.0%) in the Therapeutic Measures (TN) category. The wound care task in the Wound Care (YN) category and the nursing assessment task in the Assessment (AS) category were scheduled similarly for about 7.0% of clients. Just under 3.0% of clients were scheduled the nursing tasks of random blood sugar testing in the Diabetes category (2.9%) and respiratory assessment in the Airway Maintenance/Respiratory category (2.8%). None of the tasks in the Elimination, Palliative Care, or Intravenous Therapy categories were scheduled for more than 1.0% of clients. Nearly 5.0% of clients were scheduled tasks that did not fit into one of the task descriptions and therefore were tasks considered as 'Other Activity'.

5.3.4 Summary

The services allocated to older long-term clients in the Home Care program are mainly home support services. A minority of clients requires nursing service. This population is averaging six and a half hours of service per week, of which 6 hours is home support service, with visit frequencies equivalent to about every second day. Largely, older clients are receiving assistance with hygiene and dressing. Household cleaning support and meal-related tasks also figure prominently in their services. Among the older clients receiving nursing services, tasks center mainly around medications and therapeutic measures, such as monitoring vital signs.

Table 5.16: Number of Clients Receiving Nursing Service, by Task

Category	Nursing Task	Number (N=6071)	Percent	Top 10 Tasks
Medications – QN	Medication Monitoring – MM	492	8.1	2
	Medication Set Up – MS	262	4.3	5
	Medication Injection – MI	258	4.2	6
	Eye Care – ECEC	227	3.7	7
	Medication Topical – MT	135	2.2	
	Medication Oral Essential – MO	115	1.9	
Therapeutic Measures –TN	Health Supervision – HS	974	16.0	1
	Health Teaching – HT	179	2.9	8
	Supportive Care – SC	37	0.6	
Wound Care –YN	Wound Care – WCWC	449	7.4	3
	Consult – WCC	14	0.2	
Assessment – AS	Assessment – AS	428	7.0	4
Diabetes – DN	Random Blood Sugar – RBS	176	2.9	9
	Fasting Blood Sugar – FBS	142	2.3	
Airway Maintenance/ Respiratory – RN	Respiratory Assessment – RAS	169	2.8	10
	Oxygen Therapy – OX	14	0.2	
Elimination – EN	Ostomy Care – OC	69	1.1	
	Urinary Care –UC	63	1.0	
	Bowel Care –BC	28	0.5	
Palliative Care – PN	Health Supervision – PCHS	46	0.8	
	Medication Monitoring –PCMM	20	0.3	
	Admission – PCAD	11	0.2	
	Supportive Care – PCSC	10	0.2	
	Wound Care – PCWC	10	0.2	
	Bereavement – BV	8	0.1	
Intravenous Therapy – IN	Health Teaching IVHT–	11	0.2	
	Medication Administration – IVMA	7	0.1	
	Non Self Nurse Care – IVNC	7	0.1	
	Blood Work – IVBW–	6	0.1	
	Picc Dressing – IVPD	6	0.1	
Other – ON	Other Activity – OA	299	4.9	

5.4 High Users of Total Home Care Service

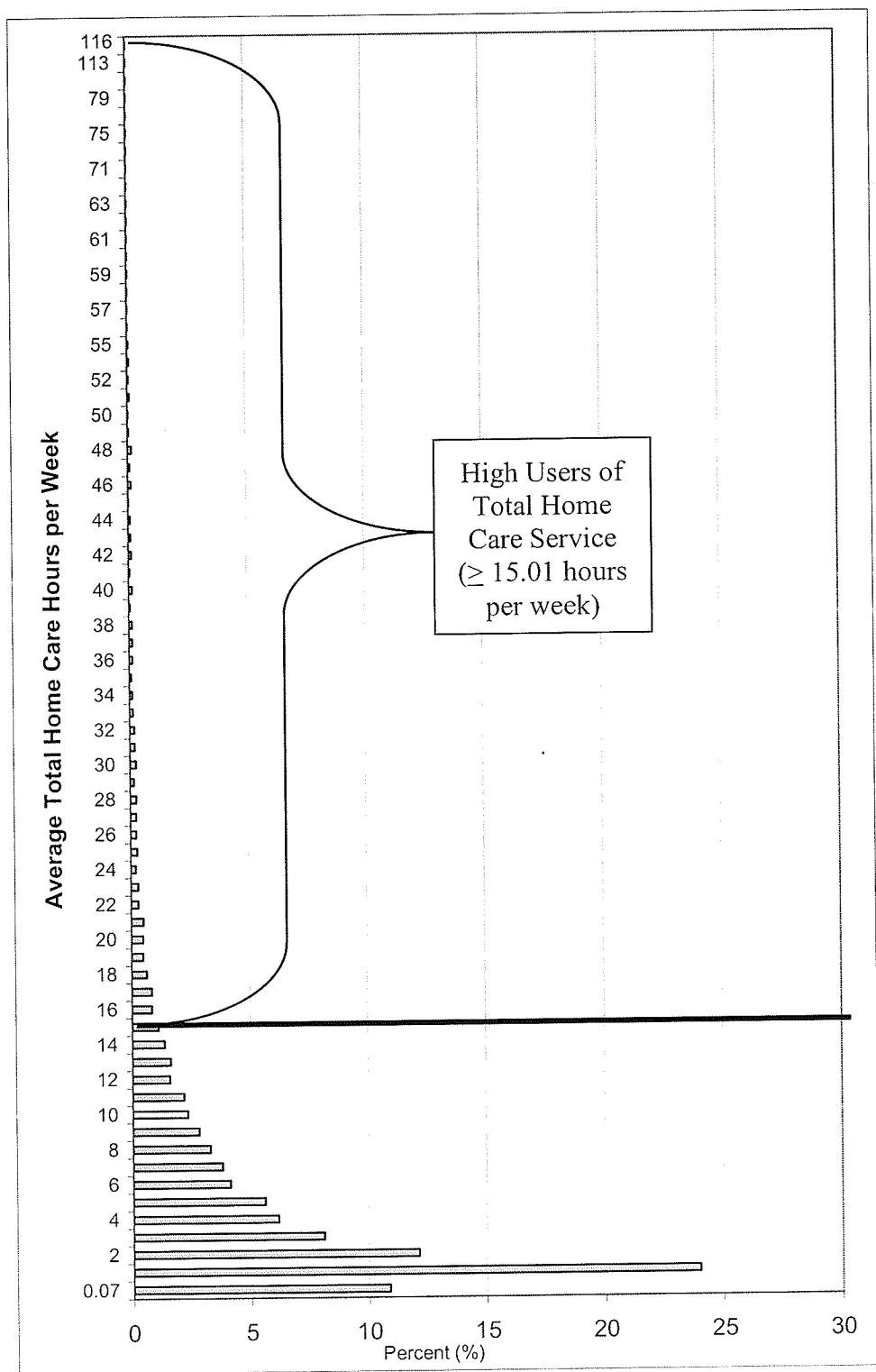
Total home care service use refers to the combined overall use of both home support and home nursing services in a service episode. On average, the clients received 6.5 hours of total home care per week in their service episodes, but there was a wide range among the population. Average total home care hours per week ranged from 0.1 hours (4.2 minutes) to 116.9 hours per week (Table 5.17).

High users of total home care were identified by their average hours of total home care per week. They were defined as the top 10% of clients with the highest average total home care hours per week and are referred to as the high total users in this study. Univariate statistics for the average home care hours per week variable revealed that the 90th percentile (top 10%) were clients with 15.01 hours of total home care per week or greater (Table 5.17). Using this cut point defined 608 clients as high total users and 5463 clients as other users. The wide range of weekly hours among the high total users is illustrated in Figure 5.1, since high users ranged from an average of 15.01 hours to 116.9 hours per week of combined home support and home nursing service.

Table 5.17: Average Total Home Care Hours per Week: Statistics and High Users

Average Total Home Care Hours per Week	
Mean (Standard Deviation)	6.5 (8.8)
Median	3.3
Range	0.1-116.9
Top 10% cut point	15.01
Number of High Total Users	n=608
Average Hours per Week	Number of Clients (%)
0.07-0.99	660 (10.9)
1.0-1.99	1457 (24.0)
2.0-2.99	735 (12.1)
3.0-3.99	491 (8.1)
4.0-4.99	374 (6.2)
5.0-5.99	340 (5.1)
6.0-6.99	251 (4.1)
7.0-7.99	230 (3.8)
8.0-8.99	199 (3.3)
9.0-9.99	171 (2.8)
10.0-10.99	142 (2.3)
11.0-15.0	412 (6.8)
15.01-30.99	438 (7.2)
31.0-60.99	156 (2.6)
61.0-116.86	14 (0.2)

Figure 5.1: High Users of Total Home Care Service



5.4.1 Characteristics of High Total Users and Other Users

High total users versus other users were compared and examined for significant differences in characteristics based on chi-square tests. This examination identified variables for inclusion in a logistic model to predict high total users. Only characteristics significant at $p \leq .20$ were retained for inclusion in a multivariate model and only those variables are further described in the following tables. The variables are presented in the form they were operationalized for multivariate modeling. Often categories within a variable needed to be collapsed due to small cell size or to reflect a more appropriate distribution pattern among the two user groups.

5.4.1.1 Environment Component – Health Care System

Only the home care office variable was included in the health care system component of the conceptual model, and it was found to be a significant variable when comparing high users of total home care against other users (Table 5.18).

Table 5.18: Home Care Office Coordinating Care – High Total Users and Other Users

Home Care Office Coordinating Care	High Total User - % (N=608)	Other Total User - % (N=5463)	p value
Office 1	9.5	12.4	<.0001
Office 2	5.9	5.9	
Office 3	7.1	6.5	
Office 4	5.1	5.1	
Office 5	10.5	10.8	
Office 6	6.1	4.0	
Office 7	6.4	8.4	
Office 8	13.5	16.5	
Office 9	5.3	5.8	
Office 10	10.9	12.7	
Office 11	12.0	7.0	
Office 12	2.6	1.6	
Other Office	5.1	3.4	

5.4.1.2 Need Component – Client and Caregiver

A total of 31 client need characteristics and two caregiver need characteristics met the significance criteria of $p \leq 0.20$ when high total users and other users were compared. The comparisons are outlined in Table 5.19. Large proportional differences were notable in several client characteristics. For example, only 22.4% of high total users were independent in ADL functioning while 77.4% of other users were independent in this area. Similarly for IADLs, only 13.6% of high total users were independent while 40.8% of other users were independent. Less than one-third (32.4%) of high total users were cognitively intact, but the proportion of cognitively intact clients was nearly twice as high (59.9%) among other users. The priority level of care indicated by the MAPLe algorithm identified that nearly half of the other users (48.4%) were low or mild need for care compared to only 5.4% of the high total users. By contrast, over half (56.1%) of high total users were found to be high or very high need for care on the MAPLe algorithm and only 26.5% of other users fell into those categories. Larger proportions of high total users were found in all the client need variables in Table 5.19, the only exceptions being some of the disease diagnoses and the new client status.

A larger proportion of high users had caregivers with need indicated as well. The same proportion of high total users had a caregiver that was unable to continue in caring activities (12.5%) or had a primary caregiver expressing distress (12.5%). The proportion of clients with caregiver need among other users was half that found in the high users, at about 6.0% for both caregivers unable to continue caring, and primary caregiver distress (Table 5.19).

Table 5.19: Client and Caregiver Need Characteristics – High Total Users & Other Users

Need Characteristic	High Total User - % (n=608)	Other Total User - % (n=5463)	p value
Client Status			
New Client	14.1	27.1	<.0001
Self-Reported Health			
Poor Health	27.5	18.8	<.0001
Continence			
Bladder Incontinent	46.7	22.5	<.0001
Bowel Incontinent	28.3	8.1	<.0001
Presence of Skin Ulcer	8.4	4.1	<.0001
Fall(s) in last 90 days	31.4	24.3	<.0001
ADL Impairment			
ADL Hierarchy Scale			<.0001
Independent	22.4	77.4	
Supervision Required	11.3	6.4	
Limited Impairment	27.5	11.7	
Extensive Assistance Required (I)	19.4	3.3	
Extensive Assistance Required (II)	10.5	0.7	
Dependent	5.8	0.3	
Total Dependence	3.1	0.1	
ADL Decline in Past 90 Days	40.5	31.8	<.0001
IADL Impairment: IADL Capacity Scale			<.0001
No difficulty to great difficulty in 1	13.6	40.8	
Great difficulty in 2	53.8	27.6	
Great difficulty in all 3	29.6	4.8	
Cognitive Impairment			<.0001
Cognitive Performance Scale			
Intact	32.4	59.9	
Borderline intact	13.3	15.3	
Mild impairment	7.9	10.0	
Moderate impairment	31.9	12.9	
Moderate/severe impairment	3.1	0.5	
Severe impairment	8.9	1.3	
Very severe impairment	2.5	0.1	
Worsening of Decision-Making in Past 90 Days	14.1	8.1	<.0001
Behaviour Problems Present	8.9	3.8	<.0001
Mood			
Depression (Depression Rating Scale)			<.0001
0 – No depression	62.0	70.7	
1,2	27.0	21.8	
3+ – Potential Depression	11.0	7.6	
Mood Indicators are worse than 90 days ago	12.2	8.0	0.0004

Need Characteristic	High Total User - % (n=608)	Other Total User - % (n=5463)	p value
Unstable/Frail Health			
CHESS Scale			0.01
0-1	66.8	71.7	
2-5	33.2	28.3	
Presence of conditions that make health unstable	33.7	21.9	<.0001
Pain (MDS Pain Scale)			
No pain	36.8	31.5	.02
Less than daily pain	12.7	14.7	
Daily pain but not severe	35.2	39.7	
Severe daily pain	15.3	14.1	
# of Medications Used			
0-4	23.2	25.5	.0004
5-8	36.2	41.8	
9+	40.6	32.7	
Uses Psychotropic Medication	38.0	31.8	0.002
Receives Special Treatments	10.5	7.9	0.02
Receives Therapies	10.7	6.6	0.0002
Disease Diagnosis			
Coronary Artery Disease	17.8	20.8	.08
Alzheimer's or Other Dementia	21.7	9.7	<.0001
Arthritis	58.5	61.5	0.16
Cataract	18.1	20.7	0.13
Psychiatric Diagnosis	13.8	11.1	0.04
Cancer	9.7	11.9	0.10
Diabetes	28.6	20.1	<.0001
Emphysema/COPD/Asthma	15.1	17.4	0.16
Comorbidity Index: # Disease Diagnoses			
0-1	6.7	9.3	<.0001
2-5	72.7	76.9	
6+	20.6	13.7	
Priority Level of Care (MAPLe)			
Low Need	2.3	27.5	<.0001
Mild Need	3.1	20.9	
Moderate Need	38.5	25.1	
High Need	40.3	20.9	
Very High Need	15.8	5.6	
Caregiver Need			
Caregiver Unable to Continue Care	12.5	6.7	<.0001
Primary Caregiver Expresses Distress	12.5	5.8	<.0001

5.4.1.3 Client Enabling Characteristics

Six client enabling characteristics differed between high total users and other users and are outlined in Table 5.20. A larger proportion of other users lived alone (64.1%) than high total users (40.3%), and as a result a larger proportion of high users had their primary caregiver living with them than other users (53.6% versus 33.9% respectively). A much larger proportion of the high total users' caregivers were providing ADL care than the other users' caregivers (52.5% versus 25.7%), which is in keeping with the different level of ADL dependence between these two groups identified in Table 5.19. The overall amount of informal care the two groups received was vastly different as well. The average amount of informal care provided to the total study population was just over 13 hours per week. Fifteen or more hours per week was considered above average. More than half (54.9%) of the high total users received above average amounts of informal care in a week while less than one-quarter of other users (22.1%) received that amount of informal care.

Table 5.20: Client Enabling Characteristics – High Total Users and Other Users

Enabling Characteristic	High Total User - % (n=608)	Other Total User - % (n=5463)	p value
Living Arrangement at Referral Lived alone	40.3	64.1	<.0001
Primary Caregiver Lives with Client	53.6	33.9	<.0001
Primary Caregiver's Relationship to Client Spouse	25.5	18.7	<.0001
Support from Primary Caregiver IADL Care	92.1	88.0	0.003
ADL Care	52.5	25.7	<.0001
Amount of Informal Care 15+ hours per week	54.9	22.1	<.0001

5.4.1.4 Client Predisposing Characteristics

Three client predisposing characteristics met the significance inclusion criteria for multivariate modeling and are displayed in Table 5.21. The age variable did not meet the criteria but is still included in the table since it was utilized in models as an adjusting factor. Slightly more males are among the high total users (31.2%) than the other users (26.5%). More clients are married among the high users (35.7%) than the other users (26.8%) as well. The largest difference found between the two user groups' education was that education level was unknown for a larger proportion of high total users (12.2%) than other users (8.0%).

Table 5.21: Client Predisposing Characteristics – High Total Users and Other Users

Predisposing Characteristic	High Total User - % (n=608)	Other Total User - % (n=5463)	p value
Age: 65-74	16.8	16.1	0.9
75-84	45.4	45.6	
85+	37.8	38.3	
Gender:			.01
Male	31.2	26.5	
Female	68.7	73.5	
Marital Status:			<.0001
Married	35.7	26.8	
Widowed	54.9	59.6	
Other	9.4	13.6	
Education:			0.01
8th grade or less	27.1	28.3	
9-11 grades	26.5	28.8	
High school	15.0	16.2	
> High school	19.2	18.7	
Unknown	12.2	8.0	

5.4.2 Home Care Service Utilization

Available service episode lengths for the high total users and other users varied from a minimum of two weeks (14 days) to 14 weeks (99 days) for both user groups (Table 5.22). The service episodes were on average slightly longer among the high total users, but overall the average service episode length in both groups was in the 10-week period. Table 5.23 also shows the similarity in proportions between the two user groups for the different service episode length groupings. Nonetheless, this variable was still retained for multivariate modeling to adjust for potential differences in service episode length between high total users and other users.

Table 5.22: Univariate Statistics – Study Population’s Service Episode Lengths

Service Variable	User Group	Mean (Standard Deviation)	Median	Range
Number of Days in Service Episode	High Total User	78.5 (26.6)	97.0	14-99 days
	Other User	75.3 (25.5)	85.0	14-99 days
Number of Weeks in Service Episode	High Total User	11.0 (3.9)	13.0	2-14 weeks
	Other User	10.5 (3.7)	12.0	2-14 weeks

Table 5.23: Service Episode Length Groups, High Total Users and Other Users

Service Episode Length	High Total Users Number (%)	Other Users Number (%)
14 days – 30 days	56 (9.2%)	552 (10.1%)
31 days – 60 days	111 (18.3%)	903 (16.5%)
61 days – 99 days	441 (72.5%)	4008 (73.4%)

Noted previously, there were a total of 525,745 unique home care visits available in the final Procura service dataset used in this study. Table 5.24 provides a frequency breakdown of visits by the four different service provider for total high users and other

users. The proportion of RN and LPN visits, while infrequent, is similar between the two user groups. Home care attendant visits dominate the visits in both groups but are slightly higher among high total users, with home support worker visits slightly higher among other users as a result. HCAs are higher skilled home support workers that can attend to a greater range of care needs. The high total users comprise 10% of the study population but were scheduled nearly 24% of the home care visits examined.

Table 5.24: Number of Home Care Visits by Provider Type for High Total Users and Other Users

Provider	# Visits to Total High User (%)	# Visits to Other User (%)	# Visits in Total Population (%)
Home Care Attendant	93146 (74.2)	278729 (69.6)	371875 (70.7)
Home Support Worker	15296 (12.2)	70525 (17.6)	85821 (16.3)
RN	9422 (7.5)	29306 (7.3)	38728 (7.4)
LPN	7658 (6.1)	21663 (5.4)	29321 (5.6)
Total # Visits % of Visits in Total Population	125522 (23.9)	400223 (76.1)	525745 (100.0)

Less than 30.0% of the other users were scheduled any nursing visits while nearly half (47.9%) of the high total users were scheduled for this service provision (Table 5.25). The majority of other users required only home support care.

Table 5.25: Composition of Services Provided to High Total Users and Other Users

Service Composition	High Total Users (N=608)	Other Users (N=5463)
# Clients with Home Support Only (%)	317 (52.1%)	3900 (71.4%)
# Clients with Home Support and Nursing (%)	291 (47.9%)	1563 (28.6%)

Table 5.26 highlights the difference in service intensity between the high total users and the other users. The high total users were scheduled for over 18 home care visits per week on average compared to an average of less than seven visits for the other user group. The high users averaged 120 tasks per week while other users averaged 27 tasks. High total users were scheduled for an average of 27 hours of home care service per week (26 hours for home support service, 1 hour for nursing service), nearly seven times greater than the four hours per week scheduled for other users (nearly all home support service). Almost 88.0% of the days in the high total users' service episodes had a home care visit, compared to just over 50.0% of the days in the other users' episodes. In other words, while other users were scheduled a home care visit the equivalent of every second day, the high users were scheduled visits on nearly a daily basis.

Table 5.26: Univariate Statistics – Description of Population’s Home Care Visits

Service Utilization	User Group	Mean (Standard Deviation)	Median	Range
Average Number of Home Care Visits per Week	High Total User	18.4 (11.7)	17.3	2.2-77.9
	Other User	6.6 (7.6)	3.1	0.2-64.1
Average Number of Tasks Provided per Week	High Total User	120.0 (72.2)	108.8	8.6-559.4
	Other User	27.4 (31.8)	13.0	1.1-208.2
Average Total Home Care Hours per Week	High Total User	27.3 (13.5)	22.3	15.0-116.9
	Other User	4.2 (3.6)	2.8	0.1-15.0
Average Home Support Hours per Week	High Total User	26.0 (13.9)	21.4	3.9-112.4
	Other User	3.8 (3.4)	2.4	0.02-15.0
Average Nursing Hours per Week	High Total User	1.3 (2.6)	0.0	0.0-19.0
	Other User	0.4 (1.2)	0.0	0.0-13.6
Proportion of Service Episode with a Home Care Visit	High Total User	87.4% (17.7)	98.0	31.1-100.0
	Other User	50.8% (36.6)	37.3	2.3-100.0

5.4.2.1 Support Service Allocation – Categories and Tasks

Both the high total users and the other users were scheduled services from all eight home support service categories. A significantly greater proportion of high use clients were scheduled home support service in all categories except two. The same proportion of high users and other users were scheduled laundry (WX) and home cleaning (MX) service (Table 5.27). However, among clients with the service, the high total users were scheduled service at a greater frequency than the other users, even for laundry and home cleaning service, as can be seen from the mean and median statistics in Table 5.27. Therefore a greater proportion of the high user group are allocated home support service in most categories, but also receive service at a greater frequency as well, compared to the other user group. Over 80.0% of high total users were scheduled

services in the hygiene assistance, dressing assistance, and nutrition categories. Hygiene assistance and dressing assistance were among the top three service categories for the other users as well, though at lower proportions (67.8% and 56.4% respectively), but home cleaning ranked second for allocation to this group (56.9%). Personal care provision (category PX) was scheduled for the fewest clients in both user groups, although a significantly greater proportion of high total users were scheduled this category of service. This category is assigned to clients who cannot perform any part of the care and staff must provide all the care instead. The greater proportion of clients with this service among high total users speaks to the level of need in that group.

The specific tasks scheduled in each home support service category are presented in Table C1 in Appendix C but key findings are presented here. Table C1 indicates the proportion of clients who were scheduled for each task for high total users and other users, and then among the users in both groups, the average and median number of times per week the task was scheduled. The pattern that emerged was one where greater proportions of high total users than other users were scheduled each unique task in most instances. Moreover, the high total users were scheduled to receive the task at a greater frequency per week than the other users. The two categories that differed in this pattern were Laundry (WX) and Cleaning of Living Area (MX). A larger proportion of other users tended to be scheduled tasks in these categories than the high total users. However, if a high user was receiving tasks in these categories, they tended to be provided more frequently than for other users.

Table 5.27: Use of Support Services Categories by High Total Users/Other Users

Support Services Category - Code	High Total User (n=608) / Other User (n=5463) / p value	Percent who used this task category	Clients who used this task category: Average times per week scheduled	
			Mean	Median
Assist Client: Hygiene – HX⁹	High User	89.5	10.2	7.7
	Other	67.8	3.6	1.6
	p value ¹⁰	<0.0001	<0.0001	
Nutrition – FX	High User	85.0	9.9	8.7
	Other	35.8	6.6	5.6
	p value	<0.0001	<0.0001	
Assist Client: Dressing – CX	High User	82.2	9.1	7.8
	Other	56.4	4.6	2.7
	p value	<0.0001	<0.0001	
Supervision – DX¹¹	High User	80.3	8.7	6.0
	Other	30.8	6.4	5.0
	p value	<0.0001	<0.0001	
Cleaning of Living Area – MX	High User	57.1	3.8	1.6
	Other	56.9	1.2	0.5
	p value	--	<0.0001	
Laundry – WX	High User	56.4	3.8	2.1
	Other	56.2	1.3	0.6
	p value	--	<0.0001	
Assist Client: Move Around Home – AX	High User	56.4	8.8	6.9
	Other	13.7	4.3	2.5
	p value	<0.0001	<0.0001	
Provide Personal Care – PX¹²	High User	41.6	11.8	9.8
	Other	10.8	5.3	4.1
	p value	<0.0001	<0.0001	

⁹ This category of service provides assistance to the client, such as set-up, or performance of some of the task, but does not do the entire task for the client.

¹⁰ For the % who used this task category, the p value results are for a chi squared test. For the number of times per week a task category was scheduled, the p value results are for a Mann Whitney U test. If the results are nonsignificant, no p value is shown (--).

¹¹ This category of service provides only monitoring and/or direction – there should be no hands on performance of the task.

¹² This category of service performs the task for the client; the client cannot do the care, it is done for him/her.

Table 5.28 outlines which task in each of the eight home support service categories was scheduled to the greatest proportion of high total users and other users. With the exception of the tasks in the HX and MX categories, all of the other tasks are the same between the two user groups, except provided to a larger proportion of high users. In the HX category skin care was the dominant task among high total users while hair care was the dominant task among other users. Disposing of garbage was the dominant task in the cleaning (MX) category for just under half (47.5%) of high total users. Cleaning the bathroom was the dominant task for other users in the MX category, scheduled for just over half (51.9%) of other users.

Table 5.28: Dominant Support Service Task in Each Category for High Total Users and Other Users

Home Support Category	High Total User		Other User	
	Support Task – Code	Percent	Support Task - Code	Percent
Assist Client: Hygiene – HX	Skin care – H7	75.0	Hair care – H4	55.9
Assist Client: Dressing – CX	Assist client to dress-undress – C1	82.2	Assist client to dress-undress – C1	56.4
Cleaning of Living Area – MX	Disposing of garbage – M2	47.5	Clean bathroom sink, toilet, tub – M3	51.9
Laundry – WX	Making bed – W1	54.3	Making bed – W1	53.2
Nutrition – FX	Washing dishes after meal prep – F4	78.5	Washing dishes after meal prep – F4	29.0
Supervision – DX	Oral medication reminder – D6	55.3	Oral medication reminder – D6	20.6
Assist Client Move Around Home – AX	Assist in/out of bed/ chair – A2	47.2	Assist in/out of bed/chair – A2	10.5
Provide Personal Care – PX	Dressing-undressing – P8	21.7	Dressing-undressing – P8	5.0

Table 5.29 provides the top 20 tasks scheduled for the two user groups, regardless of category, based on the proportion of clients scheduled the task in their service episode. The tasks for high total users are dominated by client assistance (CX, HX, AX) tasks and meal-related tasks (FX) while 10 of the 20 tasks for other users were laundry and housekeeping tasks (MX, WX). This task comparison illustrates the more hands-on care and basic needs high total users required than other users.

Table 5.29: Top 20 Home Support Tasks Provided to High Total Users and Other Users

High Total User		Other User	
Support Task – Category Code	Percent	Support Task – Category Code	Percent
Assist client to dress-undress – CX	82.2	Assist client to dress-undress – CX	56.4
Washing dishes after meal prep – FX	78.5	Hair care – HX	55.9
Skin care – HX	75.0	Skin care – HX	55.5
Hair care – HX	71.7	Tub bath, stool, bath board – HX	53.9
Assist with perineal care – HX	68.3	Making bed – WX	53.2
Cooking meal – FX	66.9	Clean bathroom sink,toilet,tub–MX	51.9
Heat and serve food – FX	62.0	Disposing of garbage – MX	50.6
Assist with toileting – HX	62.0	Mop floors, kitchen, bath – MX	50.5
Sponge bath – HX	61.7	Vacuuming – MX	50.5
Mouth and denture care – HX	60.4	Cleaning of kitchen – MX	48.5
Care of hands and feet – HX	59.5	Wash laundry by machine – WX	47.6
Storing of food – FX	59.0	Hanging-drying laundry – WX	47.1
Oral medication reminder – DX	55.3	Dusting – MX	47.0
Making bed – WX	54.3	Clean oven – defrost fridge – MX	46.1
Tub bath, stool, bath board – HX	53.6	Care of hands and feet – HX	45.8
Mop floors, kitchen, bath – MX	50.5	Taking client for a walk – DX	34.7
Disposing of garbage – MX	47.5	Wash dishes after meal prep – FX	29.0
Clean bathroom sink, toilet, tub – MX	47.4	Mouth and denture care – HX	28.8
Assist in/out of bed/chair – AX	47.2	Sponge bath – HX	26.2
Social interaction and activity – DX	45.1	Cooking meal – FX	23.2

When frequency of task scheduling was examined, different tasks emerge as significant. The frequency of scheduling on a weekly average is presented for all support service tasks in Table C1 in Appendix C, but the top 5 most frequently scheduled tasks are summarized in Table 5.30. Much smaller proportions of clients were scheduled these tasks, but when needed, they required the service more frequently. However, some of these tasks take very little provider time, such as the meal escort (or reminder) or medication reminder tasks.

Table 5.30: Five Most Frequently Scheduled Support Service Tasks for High Total Users and Other Users

High Total Users			Other Users		
Home Support Task - Category	Weekly Average	Proportion of Clients	Home Support Task - Category	Weekly Average	Proportion of Clients
Transfer – Mechanical Lift - PX	17.0 times	10.2%	Escort to/from Congregate Meal - FX	11.1 times	5.3%
Positioning - PX	14.1 times	12.7%	Oral Medication Reminder - DX	8.2 times	20.6%
Indwelling Catheter Care - PX	12.7 times	3.3%	Indwelling Catheter Care - PX	7.5 times	0.6%
Escort to/from Congregate Meal - FX	12.6 times	3.3%	Condom Catheter Care - PX	7.1 times	0.2%
Perineal Care - PX	11.1 times	17.1%	Transfer – Mechanical Lift - PX	6.5 times	0.4%

5.4.2.2 Nursing Service Categories and Tasks

It was revealed in section 5.3.2 that less than one-third of the study population received nursing services. In that previous section ten categories of nursing service could be examined. However, only nine nursing categories were scheduled to enough clients to support comparison by the two total home care user groups. Intravenous therapies were scheduled for too few clients, particularly clients in the other user group, and neither the category nor its tasks are examined in this section.

Table 5.31 displays the proportion of clients scheduled each type of nursing service category and the frequency of scheduled need for the high total users and the other users. Service categories for nursing assessment (AS) and respiratory services (RN) were scheduled for similar small proportions of high total users and other users. The remaining nursing categories were scheduled for significantly greater proportions of high total users than other users. However, once nursing service category was scheduled, there was more similarity between the two users groups in their frequency of receipt than was seen among the home support categories. Five nursing categories were scheduled more frequently for high total users – Diabetes, Medications, Palliative Care, Wound Care, & Other nursing activities. Medications and Therapeutic Measures were scheduled for the greatest proportion of clients in both groups, but it was Diabetes services that were scheduled most frequently among clients assessed as needing that nursing service in both user groups.

Table 5.31: Proportion of High Total Users and Other Users and Frequency of Scheduled Nursing Service, by Category

Nursing Category - Code	High Total User (n=608) / Other User (n=546)	Percent who used this task category	Clients scheduled this task category: Average times per week scheduled	
			Mean	Median
Assessment - AS	High User	5.9	0.1	0.1
	Other	7.2	0.1	0.1
	p value ¹³	--	--	
Elimination - EN	High User	6.6	2.5	1.3
	Other	2.1	1.7	1.4
	p value	<0.0001	--	
Diabetes - DN	High User	8.9	6.4	4.8
	Other	3.1	3.8	1.5
	p value	<0.0001	<0.05	
Medications - QN	High User	30.9	5.9	2.7
	Other	16.4	3.4	1.0
	p value	<0.0001	<0.0001	
Airway Maintenance/Respiratory - RN	High User	3.0	1.1	0.8
	Other	2.8	0.9	0.6
	p value	--	--	
Palliative Care - PN	High User	2.1	2.0	2.1
	Other	0.8	1.2	0.6
	p value	<0.001	<0.05	
Therapeutic Measures - TN	High User	25.7	1.7	0.8
	Other	15.9	1.2	0.7
	p value	<0.0001	--	
Wound Care - YN	High User	12.3	3.5	2.6
	Other	6.8	2.3	1.6
	p value	<0.0001	<0.001	
Other - ON	High User	10.2	5.2	2.4
	Other	4.4	2.8	1.0
	p value	<0.0001	<0.01	

¹³ For the % who received this task category, the p value results are for a chi squared test. For the number of times per week a task category is received, the p value results are for a Mann Whitney U test. If the results are nonsignificant, no p value is shown (--).

Very few specific nursing tasks could be examined by the high total user/other user dichotomy due to the infrequent occurrence of nursing service being scheduled for the long-term community-coordinated home care client. Only 18 of the 49 tasks from the nine categories were scheduled for enough clients to permit examination. The complete details for client proportions and frequency of scheduling are in Table C2 in Appendix C. The dominant (or only available) task for each nursing category, based on the proportion of clients who were scheduled the task, is identified for total high users and other users in Table 5.32. Health supervision (i.e., health status monitoring; monitoring vital signs) was the task scheduled to most clients in both groups out of all the categories (24.5% of high total users and 15.1% of other users).

Table 5.32: Dominant Nursing Task in Each Category for High Total Users and Other Users

Nursing Category	High Total User		Other User	
	Nursing Task - Code	Percent	Nursing Task - Code	Percent
Assessment - AS	Assessment – AS	5.9	Assessment – AS	7.2
Elimination - EN	Urinary Care – UC	3.1	Ostomy Care - OC	1.1
Diabetes - DN	Random Blood Sugar – RBS	6.6	Random Blood Sugar – RBS	2.5
Medications - QN	Medication Monitoring – MM	11.0	Medication Monitoring – MM	7.8
Airway Maintenance/Respiratory - RN	Respiratory Assessment – AS	2.8	Respiratory Assessment – AS	2.8
Palliative Care - PN	PC Health Supervision - PCHS	2.0	PC Health Supervision - PCHS	0.6
Therapeutic Measures - TN	Health Supervision – HS	24.5	Health Supervision – HS	15.1
Wound Care - YN	Wound Care – WCWC	12.3	Wound Care – WCWC	6.8
Other -ON	Other Activity – OA	10.2	Other Activity – OA	4.3

The top 10 tasks provided to the most clients in the two user groups, regardless of category, are outlined in table 5.33. After health supervision, many clients in both groups were scheduled medication-related tasks, with medication monitoring being the medication nursing service scheduled for most clients. ‘Other activity’ is identified in the task list for both user groups, which is unfortunate, since details on the type of service provided is lost. The two diabetes-related tasks are both in the list for high total users as well.

Table 5.33 Top 10 Nursing Tasks Provided to High Total Users and Other Users

High Total User		Other User	
Nursing Task – Category Code	Percent	Nursing Task – Category Code	Percent
Health Supervision – TN	24.5	Health Supervision – TN	15.1
Wound Care – YN	12.3	Medication Monitoring – QN	7.8
Medication Monitoring – QN	11.0	Assessment – AS	7.2
Medication Injection – QN	10.4	Wound Care – YN	6.8
Other Activity – ON	10.2	Other Activity – ON	4.3
Eye Care – QN	8.4	Medication Set Up – QN	4.0
Medication Set Up – QN	7.2	Medication Injection – QN	3.6
Random Blood Sugar – DN	6.6	Eye Care – QN	3.2
Fasting Blood Sugar – DN	6.6	Health Teaching – TN	2.9
Medication, Topical – QN	6.3	Respiratory Assessment – RN	2.8

The five most frequently scheduled nursing tasks for the high total users and other users are presented in Table 5.34. Based on the average number of times the task was scheduled among the clients needing the task, the same five tasks emerged for both groups with only differences in ordering in the bottom three tasks. All of the tasks, with the exception of fasting blood sugar, belong to the medication category.

Table 5.34: Five Most Frequently Scheduled Nursing Tasks for High Total Users and Other Users

High Total Users			Other Users		
Nursing Task	Weekly Average	Proportion of Clients	Nursing Task	Weekly Average	Proportion of Clients
Eye Care	10.0	8.5%	Eye Care	8.0	3.2%
Medication, Oral	8.5	4.9%	Medication, Oral	6.3	1.6%
Medication, Injection	5.4	10.4%	Medication, Topical	4.0	1.8%
Fasting Blood Sugar	4.5	6.6%	Medication, Injection	3.0	3.6%
Medication, Topical	4.3	6.3%	Fasting Blood Sugar	2.8	1.9%

5.4.3 Logistic Regression Model for Predicting High Users of Total Home Care

The preceding sections provide some insight into the characteristics of high users of overall home care and their service allocation. The tables in section 5.4.1 identified 41 client characteristics and two caregiver need characteristics eligible for inclusion in a logistic model to predict high users of total home care based on a chi-square p value of $\leq .20$. As noted in the Methods section, the variables were entered into the logistic model based on their conceptual groupings in the Andersen-Newman Service Utilization model.

In Step 1 of building the logistic model, home care office, the only health care system variable, was entered in the model. In Step 2, 31 client need variables were added to the model. In Step 3, two caregiver need characteristics were added to the model. In Step 4, six client enabling characteristics were added to the model. In the final Step, three client predisposing characteristics were added to the model. Table 5.35 identifies the characteristics that were significant at each step as well as the overall model statistics and the significant contribution of each conceptual grouping as it was added to the model. The detailed results of the full model with all 43 variables and the two adjustment variables (age and length of service episode, both insignificant in the model) are presented in Table D1 in Appendix D.

As indicated in Table 5.35, the home care office variable, seven client need variables, and two client enabling variables were significant by the end of Step 5. No significant caregiver need or client predisposing variables emerged at this point. The non-significant variables were removed from this full model one at a time until only variables significant at the $p=.05$ level remained. Many interaction terms were then tested individually within this main effects model. The interaction examinations focused mainly on living arrangement (whether client lived alone or not) or informal care variables, such as amount of informal care provided, caregiver distress, caregiver unable to continue care, type of care caregiver was providing (ADL or IADL), caregiver relationship and how these variables interacted with client need variables, namely ADL, IADL, and cognition indicators, and the MAPLe algorithm. Two quadratic terms were examined as well to test for a curvilinear relationship between the characteristic and being a high user – the ADL Hierarchy scale and the total amount of informal hours.

Neither quadratic term was significant and they were removed from the model.

Moreover, informal hours performed better as a variable dichotomized into above average hours (15 hours or more per week) versus lesser hours rather than a continuous variable or 3-category ordinal variable.

Four interaction terms were found to be significant or near significant:

- Non-spouse caregiver by above average informal care (15+ hours): $p=0.003$;
- Living alone by MAPLe score: $p=0.047$;
- Living alone by ADL Hierarchy scale score: $p=0.052$;
- Cognitive Performance Scale score by caregiver unable to continue caring:
 $p=0.055$

The four interaction terms were entered into the main model simultaneously and any that remained insignificant were removed one at a time.

Table 5.35: Preliminary Significant Variables in Building a Logistic Model to Predict High Users of Total Home Care

Step 1: Health Care System		Step 2: Client Need		Step 3: Caregiver Need		Step 4: Client Enabling		Step 5: Client Predisposing	
Variable	p value	Variable	p value	Variable	p value	Variable	p value	Variable	p value
Home care office	< .0001	Home care office	0.008	Home care office	0.008	Home care office	0.04	Home care office	0.02
		New client	<.0001	New client	<.0001	New client	<.0001	New client	<.0001
		Self-reported poor health	0.02	Self-reported poor health	0.02	Self-reported poor health	0.02	Self-reported poor health	0.01
		ADL Hierarchy	<.0001	ADL Hierarchy	<.0001	ADL Hierarchy	<.0001	ADL Hierarchy	<.0001
		IADL Capacity	<.0001	IADL Capacity	<.0001	IADL Capacity	<.0001	IADL Capacity	<.0001
		Medications	0.0009	Medications	0.0009	Medications	0.0002	Medications	0.0002
		MAPLe	<.0001	MAPLe	<.0001	Decline in decision-making	0.05	Decline in decision-making	0.05
				No significant Caregiver Need variables	--	MAPLe	<.0001	MAPLe	<.0001
						Non-spouse caregiver	<.0001	Non-spouse caregiver	<.0001
						15+ informal care hours per week	0.002	15+ informal care hours per week	0.002
								No significant Client Predisposing variables	--
Model χ^2	40.2	Model χ^2	1190.2	Model χ^2	1190.6	Model χ^2	1232.2	Model χ^2	1243.2
df	12	df	45	df	47	df	54	df	61
p value	<.0001	p value	<.0001	p value	<.0001	p value	<.0001	p value	<.0001
c statistic	0.57	c statistic	0.87	c statistic	0.87	c statistic	0.88	c statistic	0.88
		Model difference		Model difference		Model difference		Model difference	
		χ^2	1150.0	χ^2	0.37	χ^2	41.57	χ^2	11.05
		df	33	df	2	df	7	df	7
		p value	<.0001	p value	0.82	p value	<.0001	p value	0.14

5.4.3.1 Results of the Final Fitted Model

The significant main effects and interaction terms in the final model are summarized in Table 5.36. Seven variables and two two-way interactions were significant predictors in the final fitted model predicting high users of total home care. The health care system variable, represented by home care office, was a significant predictor of high total users. Most offices were not distinct from the reference office, but clients coordinated in three offices, Offices 5, 6, and 11 were more likely to be high users than clients in the reference office (Office 8). New clients were 56.0% less likely to be high users than existing clients while clients who self-reported being in poor health were 26.0% more likely to be high total users.

ADL impairment as measured by the ADL Hierarchy Scale was highly significant in the final model. For every one unit increase in the ADL score, the odds of being a high total user increased by a factor of 1.90. IADL impairment as measured by the IADL Capacity Scale also figured prominently in the results. Compared to clients with lesser degrees of IADL difficulty, clients with an IADL Capacity score of 5 (great difficulty with 2 IADLs) were three times more likely to be high total users, and clients with an IADL Capacity score of 6 (great dependency with 3 IADLs) were 4.6 times more likely to be high total users.

Cognitive impairment as indicated by the Cognitive Performance Scale, was not significant in the final model. However, cognitive decline was significant. Interestingly, clients who had experienced cognitive decline over the last 90 days were 37.0% less likely to be high total users.

The number of medications the client took in the week before their assessment was associated with being a high total user. Low medication use (0-4 medications) served as the reference category for this variable. Clients taking an average number of medications (5-8 medications) were no more likely to be high total users, but clients taking an above average number of medications (9 or more) were at significantly greater odds of being a high total user (OR=1.50).

The four remaining characteristics found to be predictive of clients who were high total users were involved in significant interactions. The indicator for priority level of care, the MAPLe score, is interacting with living arrangement, and caregiver relationship is interacting with amount of informal care. Since these variable pairs interact odds ratios for the single variables are not calculated. With the MAPLe algorithm for example, you cannot consider the odds of being a high user without specifying whether the client is living alone or living with others (Stokes et al., 2000). To get the odds ratios for the two variables interacting requires the use of all coefficients in the model involved with the pair and their interaction.

Table 5.36: Final Fitted Logistic Regression Model (Adjusted¹⁴)– Predicting High Users of Total Home Care Services

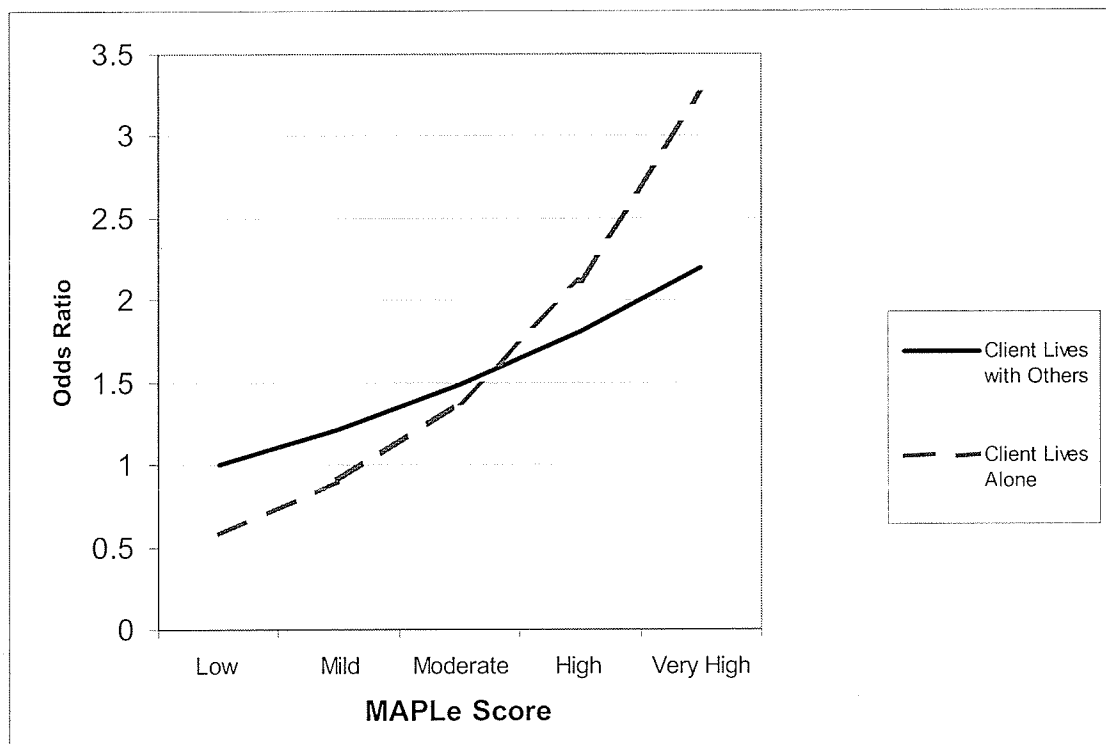
Characteristic (*** indicates reference group)	P-value for Group	Estimate	Standard Error	Wald Chi-Square	p-value	Odds Ratio (95% confidence interval)
Home Care Office:	0.02					
Office Other		0.30	0.26	1.34	0.25	1.35 (0.81-2.26)
Office 1		-0.15	0.21	0.49	0.48	0.86 (0.58-1.30)
Office 2		0.24	0.24	0.97	0.32	1.27 (0.79-2.03)
Office 3		0.14	0.24	0.34	0.56	1.15 (0.72-1.84)
Office 4		0.18	0.26	0.48	0.49	1.20 (0.71-2.02)
Office 5		0.42	0.20	4.20	0.04	1.52 (1.02-2.27)
Office 6		0.50	0.25	3.96	0.05	1.65 (1.01-2.71)
Office 7		-0.32	0.24	1.81	0.18	0.73 (0.45-1.16)
Office 8		***				
Office 9		-0.05	0.25	0.04	0.85	0.95 (0.58-1.56)
Office 10		0.11	0.20	0.29	0.59	1.11 (0.75-1.65)
Office 11		0.54	0.21	6.79	0.009	1.71 (1.14-2.56)
Office 12		0.23	0.36	0.41	0.52	1.26 (0.62-2.56)
Client Assessment Status:	<.0001					
New Client		-0.84	0.14	36.47	<.0001	0.43 (0.33-0.57)
Existing Client		***				
Self Reported Health:	0.05					
Reports Poor Status		0.23	0.12	3.92	0.05	1.26 (1.00-1.59)
Does Not Report Poor Status		***				
ADL Hierarchy Scale	<.0001	0.64	0.04	235.02	<.0001	1.90 (1.75-2.06)
IADL Capacity Scale	<.0001					
Score=0-4		***				
Score=5		1.11	0.14	65.86	<.0001	3.05 (2.33-3.99)
Score=6		1.53	0.20	60.47	<.0001	4.60 (3.13-6.79)

¹⁴ Adjusted for Age, gender, and service episode length – none of the adjusters were significant in the model.

Characteristic (*** indicates reference group)	P-value for Group	Estimate	Standard Error	Wald Chi-Square	p-value	Odds Ratio (95% confidence interval)
Decline in decision-making:	0.004					
Decline from 90 days ago		-0.46	0.16	8.08	0.005	0.63 (0.46-0.87)
No Decline		***				
Number of Medications:	0.0001					
0-4		***				
5-8		-0.07	0.14	0.25	0.62	0.93 (0.71-1.22)
9+		0.41	0.14	8.51	0.004	1.50 (1.14-1.97)
MAPLe Priority Level	0.03	0.20	0.09	4.88	0.03	
Living Arrangement:	0.06					
Lives with others		***				
Lives alone		-0.76	0.40	3.64	0.06	
Caregiver Relationship:	0.24					
Spouse		***				
Non-spouse		0.26	0.22	1.37	0.24	
Amount of Informal Care per Week:	0.62					
Less than 15 hours		***				
15 hours or more		-0.11	0.22	0.24	0.62	
MAPLe*Live Alone	0.03	0.23	0.11	4.43	0.03	
Non-Spouse*Informal Hours	0.004	0.73	0.25	8.19	0.004	
	Likelihood Ratio chi-square test = 1213.50 (31 DF); p < .0001 c statistic = 0.88 Hosmer & Lemeshow Goodness-of-Fit chi-square test = 9.59 (8 DF); p = 0.30					

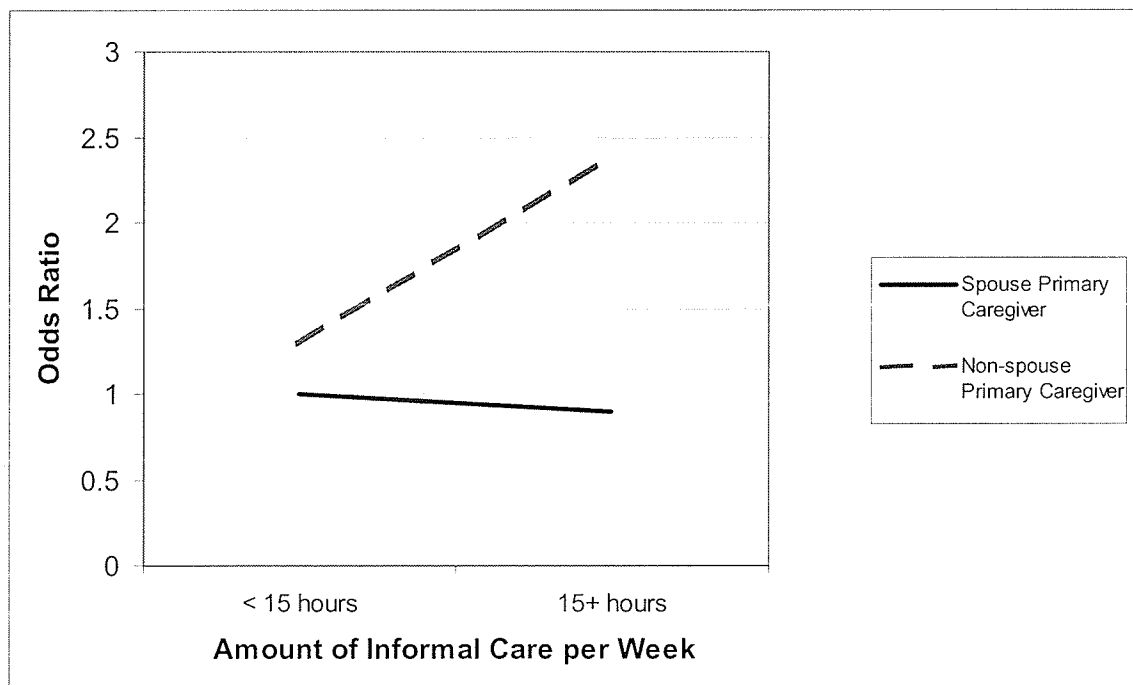
The significant interaction between client level of need (the MAPLe algorithm) and living arrangement is illustrated in Figure 5.2. In general, as a client's level of need increased, as indicated by their MAPLe score, the odds of being a high total user increased. However, if the client was living alone, the increase in odds was more dramatic. Compared to a client with a low MAPLe score that lived with others (the reference group), a client in very high need living with others had twice the odds of being a high total user. However, for a client living alone with very high needs, the odds of being a high total user were nearly 3.5 times that of the reference group.

Figure 5.2: MAPLe Score by Living Arrangement Interaction to Predict High Total Users



The significant interaction between caregiver relationship and amount of informal care is illustrated in Figure 5.3. Fifteen or more hours of informal care per week was an above average amount of informal care for this study population. Being a high total user is not predicted by amount of informal care if the primary caregiver is a spouse. Among clients with a spouse caregiver, those receiving above average amounts of informal care are no more likely to be high total users than those receiving average or less amounts of informal care. This relationship differs for clients whose primary caregiver is not a spouse. Overall, clients with non-spouse caregivers are more likely to be high total users than clients with a spouse caregiver. The odds of being a high total user significantly increased by a factor of 2.4 for clients with non-spouse caregivers and who are receiving above average amounts of informal care, when compared to the reference group.

Figure 5.3: Caregiver Relationship by Informal Care Interaction to Predict High Total Users



5.4.4. Summary

Among older long-term home care clients, high total users are characterized by greater functional and cognitive impairment, and greater level of need overall than other users. The informal support system is providing more care among high total users but also experiencing more caregiver distress.

The proportion of home support versus home nursing is similar between high total users and other users, where home support dominates the type of care the groups are receiving. However, the pattern of service allocation to high total users is one of greater frequency of visits, at greater durations, over a greater range of tasks, for both home support and home nursing.

Client need figures prominently in predicting high total users of home care. ADL dependence produced the greatest odds of being a high total user followed by IADL dependence. Overall level of need was also a strong predictor, particularly when living arrangement was considered. Surprisingly, cognitive impairment (based on the Cognitive Performance Scale scores) was not a factor in predicting high total users, and a noted decline in decision-making abilities had a negative relationship with being a high total user.

Even though the non-significant and contradictory relationship between cognitive status indicators and home care use was highlighted in the literature section, these clients were examined further (n=527). Their level of ADL impairment was lower than that of the high total users (their mean ADL Hierarchy scale score was 1.1 versus 2.1 for high total users) which could explain why they were not high users overall. However, their cognitive impairment was higher than that found among the high total users (their mean

CPS score was 2.8 versus 2.0 for the high total users). This group of older clients with decline in decision-making has characteristics similar to those found in supportive housing clients (Mitchell et al., 2008). If this group were in supportive housing, it would explain why these individuals with greater cognitive impairment were less likely to be high users of public home care since many of their support needs would be addressed in the home.

The higher number of medications being a predictor of high total users is in line with the prevalence of medication-related nursing tasks scheduled for high total users. The caregiver relationship and informal hours interaction speaks to the complex relationship the informal support system has with a formal care program. Home care office, while one of the least significant variables that remained in the model, does indicate some unmeasured factor related to office, if only for a few offices, is predictive of high total users.

5.5 High Users of Home Support Service

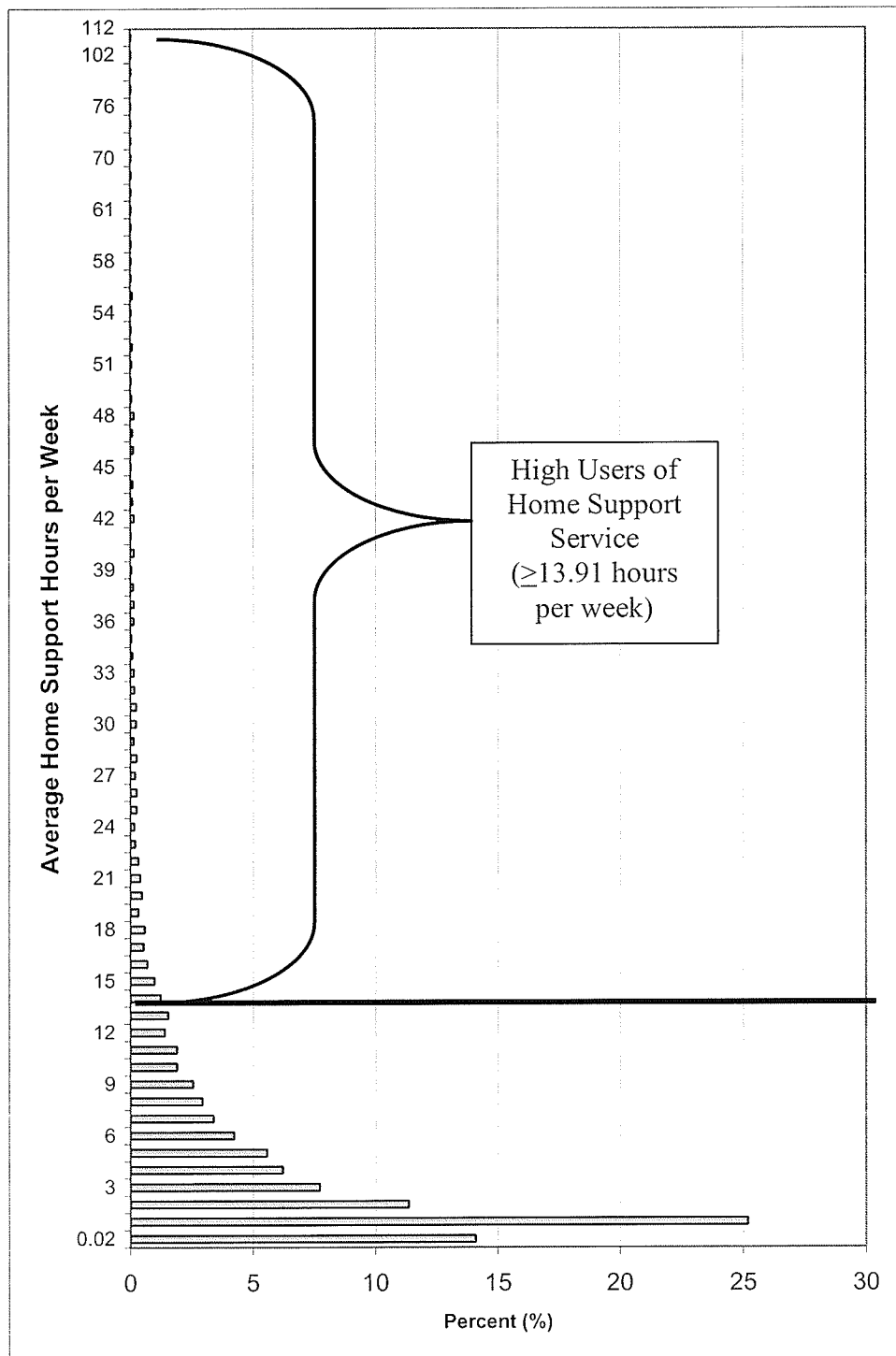
On average, older long-term clients received six hours of home support service per week. The hours ranged from 0.02 to 112.4 hours per week. High users of home support were identified from the frequencies of clients' average hours of home support service. Univariate statistics revealed the top 10% cut point for high use was 13.91 hours per week – the equivalent to just under 2 hours per day (Table 5.18). This cut created 608 high users of support services, referred to as high home support users in this study, and 5463 clients who were other home support users (other support users). There was considerable overlap between high use of home care overall and high user of support

services. A large proportion of clients who were high total users were also high home support users. Of the 608 clients who were high total users, 550 clients (90.5%) were identified in the high home support user group as well. Figure 5.4 illustrates the range of home support hours provided to older long-term clients and the range of weekly hours that exists among the high home support users (13.91 – 112.4 hours).

Table 5.37: Average Home Support Hours per Week: Statistics and High Users

Average Home Support Hours per Week	
Mean (Standard Deviation)	6.0 (8.6)
Median	2.9
Range	0.02-112.4
Top 10% cut point	13.91 hours
Number of High Users	608
Average Hours per Week	Number of Clients (Percent)
0.02-0.99	855 (14.1)
1.0-1.99	1529 (25.2)
2.0-2.99	689 (11.3)
3.0-3.99	469 (7.7)
4.0-4.99	378 (6.2)
5.0-5.99	339 (5.6)
6.0-6.99	257 (4.2)
7.0-7.99	206 (3.4)
8.0-8.99	178 (2.9)
9.0-9.99	155 (2.5)
10.0-10.99	116 (1.9)
11.0-11.99	116 (1.9)
12.0-12.99	86 (1.4)
13.0-13.90	90 (1.5)
13.91-14.99	79 (1.3)
15.0-30.99	367 (6.0)
31.0-60.99	149 (2.5)
61.0-112.43	13 (0.2)

Figure 5.4: High Users of Home Support Service



5.5.1 Characteristics of High Home Support Users

The comparison between high home support users versus other users of support services provides results very similar to results reported in Section 5.4.1 on the characteristics of high total users. This is as expected, given the significant overlap in clients who are in both the high total user group as well as the high home support user group. Similar to section 5.6.1 for high total users, only characteristics found to be significant in chi-square tests at $p \leq .20$ are presented in the following characteristics tables of high home support users/other support users.

5.5.1.1 Environment Component – Health Care System

There is a preliminary indication that a relationship exists between the home care office coordinating care and high home support service use (Table 5.38).

Table 5.38: Home Care Office Coordinating Care – High Home Support Users and Other Users

Home Care Office Coordinating Care	High Support User - % (N=608)	Other Support User - % (N=5463)	p value
Office 1	10.2	12.3	<.0001
Office 2	6.4	5.9	
Office 3	6.9	6.5	
Office 4	4.4	5.2	
Office 5	10.7	10.7	
Office 6	5.9	4.0	
Office 7	5.9	8.4	
Office 8	14.1	16.4	
Office 9	4.4	5.9	
Office 10	10.9	12.7	
Office 11	12.3	7.0	
Office 12	2.8	1.5	
Other Office	4.9	3.4	

5.5.1.2 Need Component – Client and Caregiver

Thirty-two client need characteristics and two caregiver need characteristics met the chi-square significance criteria of $p \leq .20$ when high home support users were compared to other support users. All the variables are the same ones reported at this level of comparison for total high users with the exception of one additional variable identified here for home support – overnight hospital stay(s) – and a difference in two disease diagnoses (Table 5.39).

Once again, as with high total users, the high home support users emerge in greater proportions with higher functional and cognitive impairment, poor health status, and overall level of care. Caregiver need is also an issue for larger proportions of high home support users than other support users. Double the proportion of high home support users have a caregiver unable to continue in caring activities or a primary caregiver expressing distress (12.8% of clients for both indicators) compared to other support users (6.7% and 5.7% respectively).

Table 5.39: Client and Caregiver Need Characteristics – High Home Support Users and Other Users

Need Characteristic	High Support User - % (N=608)	Other Support User - % (N=5463)	P value
Client Status			
New Client	13.3	27.2	< .0001
Self-Reported Health			
Poor Health	25.8	19.0	< .0001
ADL Impairment			
ADL Hierarchy Scale:	20.7	77.6	< .0001
0 - Independent			
1 - Supervision Required	12.2	6.3	
2 - Limited Impairment	27.5	11.7	
3 - Extensive Assistance (I)	19.9	3.3	
4 - Extensive Assistance (II)	10.9	0.7	
5 - Dependent	5.8	0.3	
6 - Total Dependence	3.1	0.1	
ADL Decline in Past 90 Days	39.6	31.9	< .0001
IADL Impairment - IADL Capacity Scale			
No difficulty to great difficulty in 1 (Score = 0-4)	15.0	67.7	< .0001
Great difficulty in 2 (Score = 5)	54.9	27.48	
Great difficulty in all 3 (Score = 6)	30.1	4.8	
Continence			
Bladder Incontinent	47.5	22.4	< .0001
Bowel Incontinent	27.6	8.2	< .0001
Cognitive Impairment			
Cognitive Performance Scale			< .0001
0 - Intact	31.1	60.0	
1 - Borderline intact	12.8	15.4	
2 - Mild impairment	9.5	9.8	
3 - Moderate impairment	32.2	12.9	
4 - Moderate/severe impairment	2.6	0.6	
5 - Severe impairment	9.2	1.2	
6 - Very severe impairment	2.5	0.1	
Worsening of Decision-Making in Past 90 Days	14.6	8.0	< .0001
Behaviour			
Behaviour Problems Present	8.7	3.8	< .0001
Changes in Behaviour Symptoms	4.6	2.0	< .0001
Mood			
Depression			< .0001
0 – No Depression	62.8	70.6	
1,2	26.0	21.9	
3+ – Potential Depression	11.2	7.5	
Mood Indicators are worse than 90 days ago	11.8	8.0	0.001

Need Characteristic	High Support User - % (N=608)	Other Support User - % (N=5463)	P value
Unstable/Frail Health			
CHESS Score 0, 1	71.6	67.4	0.03
2-5	28.4	32.6	
Presence of conditions that make health unstable	34.5	21.8	<.0001
Pain (MDS Pain Scale)			
No pain (score = 0)	38.6	31.3	0.0002
Less than daily pain to severe daily pain	61.3	68.7	
Skin Condition			
Presence of Skin Ulcer	7.4	4.2	0.0004
Falls			
Fell in last 90 days	31.6	24.2	< .0001
# of Medications Used			
0 - 4	24.8	25.4	0.0009
5 - 8	37.7	41.6	
9+	37.5	33.0	
Uses Psychotropic Medication	37.2	31.8	0.008
Received Special Treatments	11.3	6.5	<.0001
Service Utilization in Past 90 Days			
Overnight Hospital Stay	22.7	25.7	0.10
Disease Diagnosis			
CVA (Stroke)	34.5	17.2	<.0001
Coronary Artery Disease	17.8	20.8	0.08
Alzheimer's or Other Dementia	32.7	13.6	<.0001
Arthritis	58.2	61.5	0.11
Hip Fracture	7.7	6.1	0.11
Psychiatric Diagnosis	13.3	11.1	0.11
Diabetes	24.7	20.5	0.02
Emphysema/COPD/Asthma	13.8	17.5	0.02
Comorbidity Index: # Disease Diagnoses			
0-1	7.4	9.3	0.0001
2-5	72.7	76.9	
6+	19.9	13.8	
Priority Level of Care (MAPLe)			
Low Need	1.8	27.5	<.0001
Mild Need	3.1	20.9	
Moderate Need	38.8	25.0	
High Need	41.3	20.8	
Very High Need	15.0	5.7	
Caregiver Need			
Caregiver Unable to Continue Care	12.8	6.7	<.0001
Primary Caregiver Expresses Distress	12.8	5.7	<.0001

5.5.1.3 Client Enabling Characteristics

Six client enabling characteristics emerged at the preliminary level of comparison for consideration in multivariate analysis of high home support users – living arrangement, primary caregiver living arrangement, relationship of primary caregiver, IADL support from primary caregiver, ADL support from primary caregiver, and amount of informal care (Table 5.40). These are the same six variables that emerged for high total users as well.

Table 5.40: Client Enabling Characteristics – High Home Support Users and Other Users

Enabling Characteristic	High Support User - % (N=608)	Other Support User - % (N=5463)	P value
Living Arrangement at Referral Lived alone	38.0	64.4	<.0001
Primary Caregiver Lives with Client	56.1	33.6	<.0001
Primary Caregiver's Relationship to Client Spouse	27.1	18.6	<.0001
Support from Primary Caregiver IADL Care	92.4	88.0	0.0012
ADL Care	54.8	25.4	<.0001
Amount of Informal Care 15+ hours per week	56.6	21.9	<.0001

5.5.1.4 Client Predisposing Characteristics

The three client enabling characteristics eligible with the appropriate p value for inclusion in multivariate analysis are gender, marital status, and education. Age is presented in Table 5.41 because of its status as an adjustor in any multivariate analyses. A larger proportion of high home support users are married and male. Education distributions are similar between the two groups although education level is unknown for a larger number of high home support users.

Table 5.41: Client Predisposing Characteristics – High Home Support Users and Other Users

Predisposing Characteristic	High Support User - % (N=608)	Other Support User - % (N=5463)	P value
Age: 65-74	16.9	16.1	.73
75-84	44.1	45.7	
85+	39.0	38.2	
Gender: Male	31.2	26.5	.01
Female	68.7	73.5	
Marital Status: Married	37.3	26.6	<.0001
Widowed	54.4	59.7	
Other	8.2	13.7	
Education: 8th grade or less	27.1	28.3	<.0001
9–11 grades	25.3	28.9	
High school	15.0	16.2	
> High school	19.2	18.7	
Unknown	13.3	7.9	

5.5.2 Home Support Service Utilization

Available service episode lengths for the high home support users and other users varied from a minimum of two weeks (14 days) to 14 weeks (99 days) for both groups (Table 5.42). The average number of days available in service episodes was only slightly higher for high home support users, and both user groups had over ten weeks of service information in their service episodes, on average. The similarity in the service episodes between high home support users and other home support users is further confirmed in Table 5.43. The proportion of clients in the three groupings for service episode length are strikingly similar in both groups, which reassures that different lengths of service observation are not influencing high home support use in this research. Nonetheless, this

3-category variable is still entered into multivariate analysis predicting high home support users to identify if length of service episode is having any influence on the outcome.

Table 5.42: Univariate Statistics –Service Episode Lengths

Service Variable	User Group	Mean (Standard Deviation)	Median	Range
Number of Days in Service Episode	High Home Support User	78.4 (26.9)	97.0	14-99 days
	Other Support User	75.4 (25.5)	85.0	14-99 days
Number of Weeks in Service Episode	High Home Support User	11.0 (4.0)	13.0	2-14 weeks
	Other Support User	10.5 (3.7)	12.0	2-14 weeks

Table 5.43: Length of Service Episode Groups, High Total Users and Other Users

Service Episode Length	High Home Support Users # (%)	Other Support Users # (%)
14 days – 30 days	57 (9.4%)	551 (10.1%)
31 days – 60 days	111 (18.3%)	903 (16.5%)
61 days – 99 days	440 (72.4%)	4009 (73.4%)

It was noted in Section 5.3.2 that over 86.0% of the 525,745 service visits available in this study were home support visits. Table 5.44 provides a breakdown of the 457,696 home support visits to the study population and the type of provider scheduled for the visits. The majority of home support visits were scheduled with home care attendants for both groups (80-85%), although a slightly higher proportion of visits to the high home support users were scheduled with attendants than home support workers.

Nearly 24% of the visits were scheduled for high home support users, who only comprise 10% of the population.

Table 5.44: Number of Home Support Visits by Provider Type to High Home Support Users and Other Support Users

Provider	# Visits to Total High User (%)	# Visits to Other User (%)	# Visits in Total Population (%)
Home Care Attendant	92618 (85.5)	279257 (79.9)	371875 (81.3)
Home Support Worker	15677 (14.5)	70144 (20.1)	85821 (18.7)
Total # Visits (% of Home Support Visits in Total Population)	108,295 (23.7)	349,401 (76.3)	457,696 (100.0)

High home support users were scheduled visits at an average weekly rate nearly three times greater than that for other home support users (Table 5.45). The average number of support service visits per week to high home support users was nearly 16 visits compared to fewer than 6 visits for other support users. High home support users accumulated 116 tasks per week, on average, while other home support users accumulated just under 26 tasks. The visits to high home support users averaged 26 hours of support service per week compared to less than four hours per week for other support users. Over 86.0% of the days in the service episodes for high home support users contained a home support visit; only 50.9% of service episode for other home support users contained a home support visit. Therefore, high home support users

received support service close to daily while other support users received home support service the equivalent of every second day.

Table 5.45: Description of Home Support Visits to High Home Support Users and Other Support Users

Service Utilization	User Group	Mean (Standard Deviation)	Median	Range
Average Number of Support Service Visits per Week	High Support User	15.9 (10.1)	14.7	1.9-62.7
	Other Support User	5.7 (6.9)	2.2	0.1-53.0
Average Number of Support Service Tasks Provided per Week	High Support User	116.1 (71.4)	104.1	6.8-559.4
	Other Support User	25.9 (30.7)	11.8	0.1-205.5
Average Home Support Hours per Week	High Support User	26.3 (13.6)	21.4	13.9-112.4
	Other Support User	3.8 (3.3)	2.4	0.02-13.9
Proportion of Service Episode with a Home Support Visit	High Support User	86.5 (18.3)	97.7	26.9-100.0
	Other Support User	50.9 (36.7)	37.4	2.3-100.0

5.5.2.1 Support Service Allocation – Categories and Tasks

The home support service allocation pattern that emerges for high home support users is identical to the home support service allocation pattern described for high total users in Section 5.4.2.1. A greater proportion of high home support users are assessed for need for service in each home support category, except for laundry and cleaning, and the frequency of scheduled visits was at a higher rate for high home support users in all categories (Table 5.46). A range of 80.0% to 90.0% of high home support users required support service in the hygiene assistance, dressing assistance, nutrition categories. By

comparison, the categories required by the largest proportions of other support users were hygiene assistance, cleaning, and laundry, ranging from 56.0% to 68.0% of clients.

Table 5.46: Use of Support Services Categories by High Home Support Users/Other Users

Support Services Category - Code	High Home Support User (N=608) / Other User (N=5463) / p value	Percent scheduled the task category	For clients scheduled this task category: Average times per week scheduled	
			Mean	Median
Assist Client: Hygiene – HX ¹⁵	High Home Support User	89.8	10.3	7.9
	Other Support User	67.8	3.6	1.6
	p value ¹⁶	<0.0001	<0.0001	
Nutrition – FX	High Home Support User	84.7	10.0	9.0
	Other Support User	35.9	6.6	5.6
	p value	<0.0001	<0.0001	
Assist Client Dressing – CX	High Home Support User	82.7	9.1	7.8
	Other Support User	56.3	4.6	2.7
	p value	<0.0001	<0.0001	
Supervision – DX ¹⁷	High Home Support User	80.8	8.6	6.0
	Other Support User	30.7	6.4	5.0
	p value	<0.0001	<0.0001	
Assist Client Move Around Home – AX	High Home Support User	56.6	8.9	7.0
	Other Support User	13.6	4.3	2.5
	p value	<0.0001	<0.0001	
Cleaning of Living Area – MX	High Home Support User	54.6	4.0	1.6
	Other Support User	57.2	1.2	0.5
	p value	--	<0.0001	
Laundry – WX	High Home Support User	54.4	3.9	2.8
	Other Support User	56.5	1.3	0.6
	p value	--	<0.0001	
Provide Personal Care – PX ¹⁸	High Home Support User	41.6	11.7	9.8
	Other Support User	10.8	5.3	4.4
	p value	<0.0001	<0.0001	

¹⁵ This category of service provides assistance to client, such as set-up, or performance of some of the task, but does not do the entire task for the client.

¹⁶ For the % who received this task category, the p value results are for a chi squared test. For the number of times per week a task category is received, the p value results are for a Mann Whitney U test. If the results are nonsignificant, no p value is shown (--).

¹⁷ This category of service provides only monitoring and/or direction – there should be no hands on performance of the task.

¹⁸ This category of service performs the task for the client; the client cannot do the care, it is done for him/her.

The specific tasks scheduled in each home support service category for high and other home support users are presented in full detail in Appendix C (Table C3) with key details presented here. Table C1 indicates the proportion of clients scheduled for each task, by high/other support user groups, and then among the users in both groups, the average and median number of times per week the task was scheduled. As was found for high total users, the pattern that emerges is one of more high home support users requiring each task, and at a greater frequency, than the other group. The exception to this pattern was again tasks within laundry and cleaning, where often more clients in the other group were scheduled these types of services than high home support users.

Table 5.47 outlines which task in each support service category was scheduled for the greatest proportion of high and other home support users. Table 5.48 outlines the 20 tasks that were scheduled for the largest proportion of high and other home support users, regardless of category. While the tasks identified in Table 5.47 are very similar for the two groups, the tasks identified in Table 5.48 illustrate the different level of need between the two groups. The high home support users require assistance with basis needs around hygiene, dressing, nutrition, while the needs of the other home support users are split between hygiene assistance and cleaning.

A full reporting of scheduled frequency for each task is provided in Table C3 in Appendix C but the five home support tasks most frequently scheduled for high and other support users are presented in Table 5.49. These tasks are not provided to large proportions of clients, but when needed, clients require them more frequently.

Table 5.47: Dominant Support Service Task in Each Category for High Home Support Users and Other Home Support Users

Home Support Category	High Home Support User		Other Home Support User	
	Support Task – Code	Percent	Support Task - Code	Percent
Assist Client: Hygiene – HX	Skin care – H7	75.0	Hair care – H4	55.9
Assist Client: Dressing – CX	Assist client to dress-undress – C1	82.7	Assist client to dress-undress – C1	56.3
Cleaning of Living Area – MX	Disposing of garbage – M2	45.9	Clean bathroom sink, toilet, tub – M3	52.2
Laundry – WX	Making bed – W1	52.6	Making bed – W1	53.4
Nutrition – FX	Washing dishes after meal prep – F4	78.5	Washing dishes after meal prep – F4	29.0
Supervision – DX	Oral medication reminder – D6	55.8	Oral medication reminder – D6	20.5
Assist Move Around Home - AX	Assist in/out of bed/ chair – A2	47.4	Assist in/out of bed/chair – A2	10.5
Provide Personal Care – PX	Dressing-undressing – P8	21.2	Dressing-undressing – P8	5.1

Table 5.48: Top 20 Home Support Tasks Provided to High Home Support Users and Other Home Support Users

High Home Support User		Other Home Support User	
Support Task – Category Code	Percent	Support Task – Category Code	Percent
Assist client to dress-undress – CX	82.7	Assist client to dress-undress – CX	56.3
Washing dishes after meal prep – FX	78.5	Hair care – HX	55.9
Skin care – HX	75.0	Skin care – HX	55.5
Hair care – HX	71.7	Tub bath, stool, bath board – HX	53.9
Assist with perineal care – HX	69.1	Making bed – WX	53.4
Cooking meal – FX	66.3	Clean bathroom sink, toilet, tub – MX	52.2
Heat and serve food – FX	63.2	Disposing of garbage – MX	50.8
Assist with toileting – HX	63.2	Mop floors, kitchen, bath – MX	50.7
Sponge bath – HX	62.3	Vacuuming – MX	50.3
Mouth and denture care – HX	62.2	Cleaning of kitchen – MX	48.7
Care of hands and feet – HX	60.0	Wash laundry by machine – WX	47.9
Storing of food – FX	58.4	Hanging-drying laundry – WX	47.4
Oral medication reminder – DX	55.8	Dusting – MX	47.2
Tub bath, stool, bath board – HX	53.8	Clean oven – defrost fridge – MX	46.1
Making bed – WX	52.6	Care of hands and feet – HX	45.8
Assist in/out of bed/chair – AX	47.4	Assist with perineal care – HX	32.3
Social interaction and activity – DX	46.7	Wash dishes after meal prep – FX	29.0
Disposing of garbage – MX	45.9	Mouth and denture care – HX	28.6
Clean bathroom sink, toilet, tub – MX	45.1	Sponge bath – HX	26.1
Assisting to walk – AX	41.3	Cooking meal – FX	23.2

Table 5.49: Five Most Frequently Scheduled Support Service Tasks for High Home Support Users and Other Home Support Users

High Home Support Users			Other Home Support Users		
Home Support Task - Category	Weekly Average	Proportion of Clients	Home Support Task - Category	Weekly Average	Proportion of Clients
Transfer – Mechanical Lift - PX	17.3 times	10.2%	Escort to/from Congregate Meal - FX	11.2 times	5.3%
Positioning - PX	14.1 times	12.7%	Oral Medication Reminder - DX	8.2 times	20.5%
Indwelling Catheter Care - PX	12.7 times	3.3%	Indwelling Catheter Care - PX	7.4 times	0.6%
Escort to/from Congregate Meal - FX	11.7 times	2.8%	Condom Catheter Care - PX	7.1 times	0.2%
Provide Perineal Care - PX	11.3 times	16.8%	Apply topical cream/ointment - PX	5.8 times	0.7%

5.5.3 Logistic Regression Model for Predicting High Users of Home Support Service

The tables in Section 5.5.1 identified 42 client characteristics and two client need characteristics eligible for inclusion in multivariate analyses to predict high home support users. Variables significant at $p \leq .20$ were entered into a logistic regression model according to their conceptual groupings in the Andersen-Newman Service Utilization model.

In Step 1 of building the logistic model, home care office, the only health care system variable, was entered in the model. In Step 2, 32 client need variables were added to the model. In Step 3, two caregiver need characteristics were added to the model. In Step 4, six client enabling characteristics were added to the model. In the final Step, three client predisposing characteristics were added to the model. Table 5.50 identifies the characteristics that were significant at each Step as well as the overall model statistics

and the significant contribution of each conceptual grouping as it was added to the model. The detailed results of the full model with all 43 variables and the two adjustment variables (age and length of service episode, both insignificant in the model) are presented in Table D2 in Appendix D.

As indicated in Table 5.50, the home care office variable, six client need variables, and two client enabling variables were significant by the end of Step 5. No significant caregiver need or client predisposing variables emerged at this point. The non-significant variables were removed from this full model one at a time until only variables significant at the .05 level remained. Many interaction terms were then tested individually within this main effects model. The interaction examinations focused mainly on living arrangement (whether client lived alone or not) or informal care variables, such as amount of informal care provided, caregiver distress, caregiver unable to continue care, type of care caregiver was providing (ADL or IADL), caregiver relationship and how these variables interacted with client need variables, namely ADL, IADL, and cognition indicators, and the MAPLe algorithm.

Two quadratic terms were examined as well to test for a curvilinear relationship between the characteristic and being a high user – the ADL Hierarchy scale and the total amount of informal hours. Neither quadratic term was significant and they were removed from the model. As with the high total user model, informal hours performed better as a variable dichotomized into above average hours (15 hours or more per week) versus lesser hours rather than a continuous variable or 3-category ordinal variable.

Table 5.50: Preliminary Significant Variables in Building a Logistic Model to Predict High Users of Home Support Service

Step 1: Health Care System		Step 2: Client Need		Step 3: Caregiver Need		Step 4: Client Enabling		Step 5: Client Predisposing	
Variable	p value	Variable	p value	Variable	p value	Variable	p value	Variable	p value
Home care office	< .0001	Home care office	0.001	Home care office	0.001	Home care office	0.004	Home care office	0.002
		New client	<.0001	New client	<.0001	New client	<.0001	New client	<.0001
		Overnight hospital stay	0.04	Overnight hospital stay	0.04	Overnight hospital stay	0.03	Overnight hospital stay	0.04
		ADL Hierarchy	<.0001	ADL Hierarchy	<.0001	ADL Hierarchy	<.0001	ADL Hierarchy	<.0001
		IADL Capacity	<.0001	IADL Capacity	<.0001	IADL Capacity	<.0001	IADL Capacity	<.0001
		Stroke	0.04	Stroke	0.04	Stroke	0.02	Stroke	0.02
		MAPLe	<.0001	MAPLe	<.0001	MAPLe	<.0001		
				No significant Caregiver Need variables	--	Non-spouse caregiver	0.0005	MAPLe	<.0001
						15+ informal care hours per week	0.001	Non-spouse caregiver	0.002
								15+ informal care hours per week	0.0006
								No significant Client Predisposing variables	--
Model χ^2	43.2	Model χ^2	1244.7	Model χ^2	1245.2	Model χ^2	1283.9	Model χ^2	1299.3
df	12	df	46	df	48	df	55	df	67
p value	<.0001	p value	<.0001	p value	<.0001	p value	<.0001	p value	<.0001
c statistic	0.57	c statistic	0.88	c statistic	0.88	c statistic	0.89	c statistic	0.89
		Model difference		Model difference		Model difference		Model difference	
		χ^2	1201.5	χ^2	0.5	χ^2	38.7	χ^2	15.4
		df	34	df	2	df	7	df	12
		p value	<.0001	p value	0.78	p value	<.0001	p value	0.22

Five interaction terms were found to be significant or near significant and were entered simultaneously in the full model:

- Living alone by MAPLe score: $p=.042$;
- Caregiver's ability to care by ADL Hierarchy Scale score: $p=.011$;
- Caregiver's ability to care by Cognitive Performance Scale score: $p=0.016$;
- Caregiver's ability to care by MAPLe score: $p=.094$;
- Caregiver relationship by informal care hours: $p=0.004$.

Interaction terms that were insignificant at this point were removed one at a time.

5.5.3.1 Results of the Final Fitted Model

The significant main effects and interaction terms in the final model are summarized in Table 5.51. Eight variables and two two-way interactions were significant predictors in the final fitted model predicting high users of home support service. Not surprisingly, many of the significant variables in this model were also significant in the model predicting high users of total home care. Again, home care office coordinating care is a significant predictor, although with different results. Only two offices are identified as significantly different from the reference office, but in opposite directions. Clients in Office 7 are 44.0% less likely to be high home support users while clients in Office 11 are 1.64 times more likely to be high home support users. This result for Office 11 is consistent with the finding for high total users.

New clients are significantly less likely to be high home support users ($OR=0.41$) as are clients with an overnight hospital stay prior to assessment ($OR=0.74$), and clients

who experienced a decline in their decision-making ($OR=0.69$) as well. The results for new clients and clients with a decline in decision-making are of the same magnitude as was seen in the logistic model for high total users. The hospital variable is a new variable that emerged with high home support users.

Another new variable that emerged is gender. Females have 1.28 times higher odds of being high home support users than males. Stroke diagnosis is also a new predictive variable. Clients with a stroke diagnosis are 1.4 times more likely to be high home support users.

Functional dependence as measured through IADL limitations was highly significant. Compared to clients with lower levels of IADL difficulty, clients with great difficulty with two IADLs (IADL Capacity = 5) had 3.63 times greater odds of being high home support users and clients with great difficulty in three IADLs (IADL Capacity = 6) had 4.39 times greater odds of being high users. Similarly, the indicator for priority level of care need was a significant predictor. For every one unit increase in the MAPLe score, the odds of being a high home support user increased by a factor of 1.30.

The remaining four characteristics found to be predictive of high home support users are involved in significant interactions. Once again, the interaction between caregiver relationship and informal support hours is found for high home support users, as it was found for high total users. Figure 5.5 illustrates the relationship where clients with non-spouse caregivers providing higher amounts of informal care have increased odds of being high home support users. The magnitude of the interaction is the same as was reported for high total users in Figure 5.3 in Section 5.4.3.1.

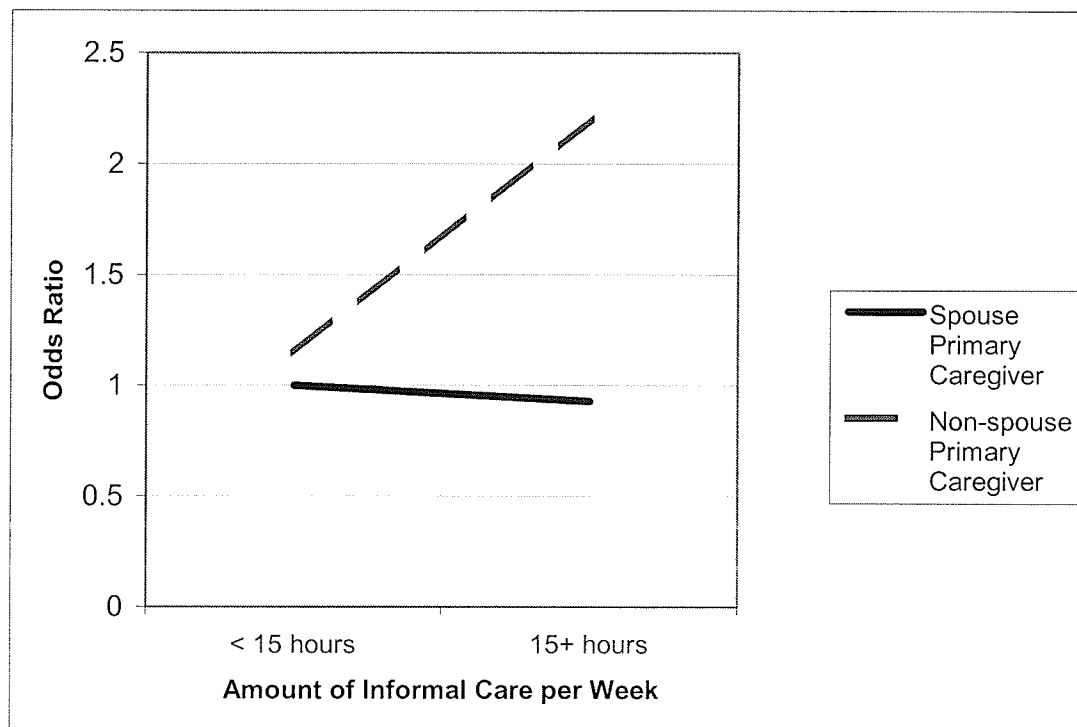
Table 5.51: Final Fitted Logistic Regression Model (Adjusted)¹⁹ – Predicting High Users of Home Support Services

Characteristic (*** indicates reference group)	P-value for Group	Estimate	Standard Error	Wald Chi-Square	p-value	Odds Ratio (95% confidence interval)
Gender:	0.04					
Female		0.25	0.12	4.42	0.036	1.28 (1.02-1.62)
Male		***				
Home Care Office:	0.002					
Office Other		0.24	0.27	0.79	0.38	1.27 (0.75-2.13)
Office 1		-0.12	0.20	0.33	0.57	0.89 (0.60-1.33)
Office 2		0.27	0.23	1.31	0.25	1.31 (0.82-2.08)
Office 3		0.08	0.24	0.12	0.73	1.09 (0.68-1.74)
Office 4		-0.18	0.28	0.41	0.52	0.84 (0.48-1.45)
Office 5		0.37	0.20	3.30	0.07	1.45 (0.97-2.17)
Office 6		0.38	0.25	2.27	0.13	1.48 (0.89-2.42)
Office 7		-0.58	0.24	5.61	0.02	0.56 (0.34-0.90)
Office 8		***				
Office 9		-0.41	0.26	2.36	0.12	0.67 (0.40-1.12)
Office 10		0.02	0.20	0.01	0.91	1.02 (0.69-1.51)
Office 11		0.49	0.20	5.80	0.02	1.64 (1.10-2.46)
Office 12		0.16	0.36	0.20	0.65	1.17 (0.58-2.38)
Client Assessment Status:	<.0001					
New Client		-0.89	0.14	36.95	<.0001	0.41 (0.31-0.55)
Existing Client		***				
Hospital Use Last 90 Days:	0.02					
No use		***				
1+ Overnight stay		-0.29	0.12	5.65	0.02	0.74 (0.58-0.95)
IADL Capacity Scale	<.0001					
Score=0-4		***				
Score=5		1.29	0.14	82.08	<.0001	3.63 (2.74-4.79)
Score=6		1.48	0.20	56.0	<.0001	4.39 (2.98-6.47)

¹⁹ Adjusted for age and service episode length – both nonsignificant in the final fitted model.

Characteristic (*** indicates reference group)	P-value for Group	Estimate	Standard Error	Wald Chi-Square	p-value	Odds Ratio (95% confidence interval)
Decline in decision-making: Decline from 90 days ago	0.02	-0.37	0.16	5.14	0.02	0.69 (0.51-0.95)
No Decline		***				
Stroke Diagnosis: No Stroke	0.003	***				
Stroke Diagnosis		0.34	0.11	8.56	0.003	1.40 (1.12-1.76)
MAPLe Priority Level	<.0001	0.26	0.06	17.55	<.0001	1.30 (1.15-1.47)
ADL Hierarchy Scale	<.0001	0.68	0.04	231.64	<.0001	
Caregiver's Ability to Care: Can Continue Care	0.02	***				
Cannot Continue Care		0.58	0.24	5.91	0.02	
Caregiver Relationship: Spouse	0.50	***				
Non-spouse		0.13	0.20	0.45	0.50	
Amount of Informal Care per Week: Less than 15 hours	0.73	***				
15 hours or more		-0.07	0.21	0.12	0.73	
ADL Scale*Caregiver Ability	0.03	-0.23	0.11	4.91	0.03	
Non-spouse*Informal Hours	0.003	0.73	0.24	8.68	0.003	
	Likelihood Ratio chi-square test = 1266.59 (30 DF); p <.0001 c statistic = 0.89 Hosmer & Lemeshow Goodness-of-Fit chi-square test = 9.39 (8 DF); p = 0.31					

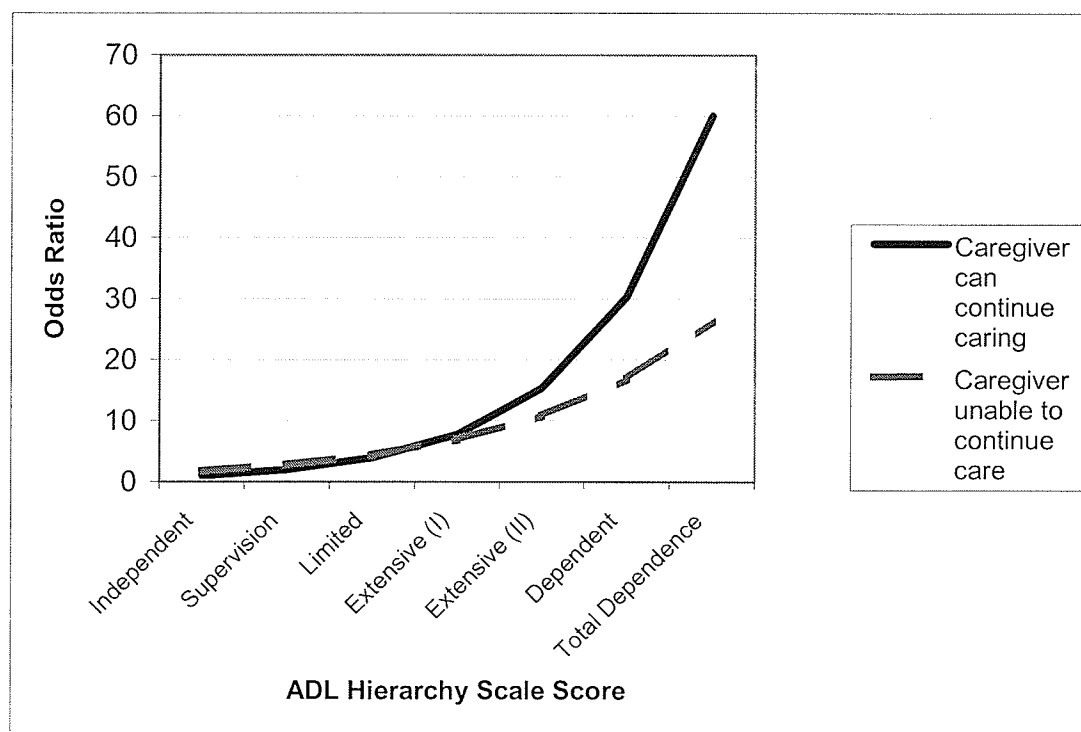
Figure 5.5: Caregiver Relationship by Informal Care Interaction to Predict High Home Support Users



The other interaction discovered was between ADL functioning and caregiver's ability to care. In general, as a client's ADL functional dependence increased, as indicated by their ADL Hierarchy Scale score, the odds of being a high home support user increased (Figure 5.6). However, if one of the client's caregivers indicated an inability to continue in caring activities, the odds of being a high home support user were not as high as were among clients whose caregivers could continue in their caring activities. Clients with caregivers able to continue caring experienced very similar odds of being high home support users as clients with caregivers unable to continue at the lower levels of ADL dependence, but once clients' ADL scores were 4 or greater

(Extensive – II level), the caregiver groups diverged. The odds of being a high home support user increased even more dramatically at the highest levels of ADL dependency among clients with caregivers able to continue caring. While the odds continued to rise at the highest ADL dependency levels for clients with caregivers unable to continue caring, the increases were more tempered.

Figure 5.6: ADL Functioning by Caregiver Ability Interaction to Predict High Home Support Users



5.5.4 Summary

Among older long-term home care clients, high users of home support service are for the most part the same individuals who are high users of total home care service. As a result, their characteristics are extremely similar. The high users of home support service are characterized by greater functional and cognitive impairment, and greater level of need overall than other home support users. The informal support system is providing more care and more caregivers are experiencing distress as a result.

Home support visits to both high and other home support users were serviced mainly by home care attendants as opposed to home support workers. Again, the pattern of home support service provision to high home support users mimicked the findings found for high total users. With their greater needs, greater proportions of high home support users were assessed as needing all categories of home support service than other home support users, with the exception of cleaning and laundry. However, regardless of the task and its category, high home support users were scheduled support tasks more frequently than other home support users and visit durations were longer overall.

By focusing solely on home support service, slight differences emerged in the predictors of high home support users compared to the predictors of high total users. Client need still figured prominently in predicting high home support users. A total of seven of the 12 characteristics identified as predictors were client need characteristics. However, at least one variable from each Andersen-Newman conceptual groupings examined in this study were predictors of high home support use. One health care system variable (home care office), one caregiver need variable (inability to continue care), two client enabling characteristics (caregiver relationship and informal care hours), and one

client predisposing variable (gender) completed the predictor variables. New predictor variables that emerged for high users of home support service were overnight hospital stay, stroke diagnosis, and gender. A new interaction emerged as well, that between ADL dependence and caregiver's ability to continue caring. Once again, this interaction speaks to the complex relationship between the informal support system and formal care. The formal system is able to respond to clients with greatest support needs in general, and even more so to clients with an informal system that can complement the formal needs.

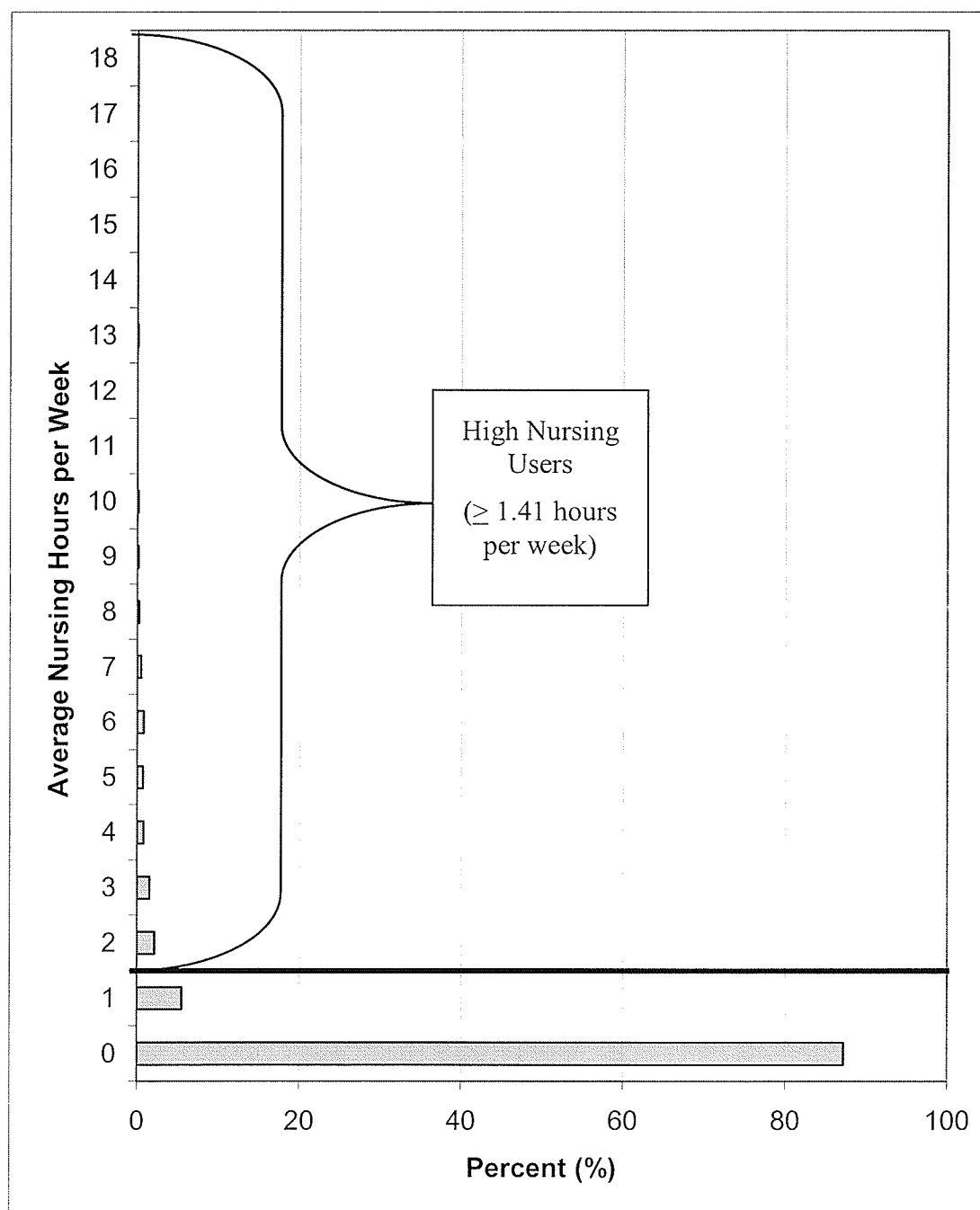
5.6 High Users of Home Nursing Service

Home support dominated the services used by older long-term clients while nursing service was provided at much lower rates. On average, older long-term clients received 30 minutes of nursing service per week, although as noted previously, most of these clients did not receive any nursing service (69.5%) (Table 5.52). The greatest amount that a client received was an average of 19.0 hours of nursing per week. Univariate statistics identified high users of nursing service as those clients that received 1.41 nursing hours or more per week. This cut-point created 608 high users of nursing service (referred to as high nursing users) and 5463 other nursing users. There was considerably less overlap between clients who were high nursing users and the other two high user categories. Only 149 clients who were high nursing users were also high users of total home care (24.5%). Fewer of these clients were high home support users. Only 91 clients (14.9%) who were high nursing users were also identified as high users of home support service. Figure 5.7 illustrates the range of nursing hours allocated to the study population in general and to the clients identified as high nursing users.

Table 5.52: Average Home Nursing Hours per Week: Statistics and High Users

Average Home Nursing Hours per Week	
Mean (Standard Deviation)	0.5 (1.4)
Median	0.0
Range	0.0-19.0
Top 10% cut point	1.41
Number of High Users	608
Average Hours per Week	Number of Clients (Percent)
0	4217 (69.5)
0.02-1.40	1246 (20.5)
1.41-2.99	296 (4.9)
3.0-3.99	95 (1.6)
4.0-4.99	49 (0.8)
5.0-5.99	45 (0.7)
6.0-6.99	49 (0.8)
7.0-7.99	31 (0.5)
8.0-8.99	15 (0.2)
9.0-9.99	8 (0.1)
10.0-10.99	9 (0.1)
11.0-18.95	11 (0.2)

Figure 5.7: High Users of Home Nursing Service



5.6.1 Characteristics of High Nursing Users

Even though most of the older long-term clients who comprise the high nursing user group were not in the high total user or the high home support user groups, similar characteristics presented themselves in chi-square tests as significantly different between high nursing users and other nursing users as was found for the other user groups. The variables significant at $p \leq .20$ and eligible for entry in a multivariate analysis are summarized in the following tables according to conceptual grouping.

5.6.1.1 Environment Component – Health Care System

Home care office is preliminarily identified in a relationship with high use of nursing service (Table 5.53), as was the case with overall home care use and home support use.

Table 5.53: Home Care Office Coordinating Care – High Nursing Users and Other Users

Home Care Office Coordinating Care	High Nursing User - % (N=608)	Other Nursing User - % (N=5463)	p value
Office 1	10.4	12.3	0.01
Office 2	7.1	5.8	
Office 3	7.4	6.5	
Office 4	4.1	5.2	
Office 5	9.2	10.9	
Office 6	3.6	2.5	
Office 7	3.8	4.2	
Office 8	10.0	8.0	
Office 9	17.3	16.1	
Office 10	6.4	5.7	
Office 11	9.9	12.8	
Office 12	7.4	7.5	
Other*	2.3	0.8	

*Other includes Hospitals, Long Term Care Access Centre, & Specialty Programs

5.6.1.2 Need Component – Client and Caregiver

Slightly fewer need characteristics were identified for high nursing users compared to the other high user groups. Twenty-eight client need variables and one caregiver need variable emerged from the chi-square comparisons (Table 5.54). All of the client need characteristics identified in the high nursing examination were identified in the other user groups with the exception of three different disease diagnoses not seen previously – heart failure, glaucoma, and peripheral vascular disease. These three diagnoses were present in a larger proportion of high nursing users than among other nursing users.

Just as with the other user groups, greater proportions of high nursing users exhibit higher functional dependence than other nursing users, but more with ADL dependence than IADL dependence. Nearly 73.0% of other nursing users are totally independent in ADLs compared to 63.0% of high nursing users. Close to 24.0% of high nursing users exhibited moderate to severe cognitive impairment while less than 18.0% of other nursing users exhibited the same level of impairment.

Skin ulcers are far more prevalent among high nursing users than other nursing users (17.6% versus 3.1%). Larger proportions of high nursing users have 6 or greater disease diagnoses than other nursing users (21.5% versus 13.6% respectively) and a larger proportion are also taking 9 or more medications (46.4% versus 32.0%).

The level of care need is greater among high nursing users, with 70.9% classified as moderate to very high need on the MAPLe algorithm compared to 54.2% of other nursing users. Caregiver distress is only slightly higher among high nursing users (8.4%) but still significantly different from other nursing users (6.2%).

Table 5.54: Client and Caregiver Need Characteristics – High Nursing Users and Other Nursing Users

Need Characteristic	High Nursing User - % (N=608)	Other Nursing User - % (N=5463)	p value
Self-Reported Health			
Poor Health	28.1	18.7	<.0001
ADL Impairment (ADL Hierarchy Scale)			
Independent	63.0	72.9	<.0001
1-3 (Supervision Required- Extensive Assistance Required (I))	31.7	24.4	
4-6 (Extensive Assistance Required (II)- Total Dependence)	5.3	2.7	
ADL Decline in Past 90 Days	39.1	31.9	0.0003
IADL Impairment: IADL Capacity Scale			
No difficulty in any of 3 IADLs	1.6	1.9	0.001
Some difficulty in 1-3 IADLs	16.6	23.1	
Great difficulty in 1-3 IADLs	81.7	74.9	
Continence			
Bowel Incontinent	14.3	9.7	0.0003
Cognitive Impairment (Cognitive Performance Scale)			
Intact	49.8	57.9	<.0001
Borderline intact/Mild Impairment	26.6	24.7	
Moderate to Very Severe Impairment	23.5	17.4	
Worsening of Decision-Making in Past 90 Days	11.8	8.3	0.004
Mood			
Depression (Depression Rating Scale)			
0	64.8	70.3	0.02
1,2	26.1	21.9	
3+	9.0	7.8	
Mood Indicators are worse than 90 days ago	12.0	8.0	0.0008
Unstable/Frail Health			
CHESS Score:			
0 (No instability)	28.4	35.6	<.0001
1	35.2	36.5	
2	24.0	20.7	
3	9.0	6.5	
4	3.0	0.7	
5 (Highest level of instability)	0.3	0.0	
Presence of conditions that make health unstable	27.3	22.6	0.009

Need Characteristic	High Nursing User - % (N=608)	Other Nursing User - % (N=5463)	p value
Disease Diagnosis			
Heart Failure	23.8	16.9	<.0001
Coronary Artery Disease	24.3	20.1	0.01
Peripheral Vascular Disease	11.5	4.8	<.0001
Alzheimer's or Other Dementia	17.6	15.2	0.13
Arthritis	54.9	61.9	0.0008
Glaucoma	20.4	9.5	<.0001
Cancer	15.5	11.3	0.003
Diabetes	33.7	19.5	<.0001
Emphysema/COPD/Asthma	19.2	16.9	0.15
Comorbidity Index: # Disease Diagnoses			
0-1	5.6	9.5	<.0001
2-5	72.9	76.9	
6-13	21.5	13.6	
# of Medications Used			
0-4	16.9	26.2	<.0001
5-8	36.7	41.7	
9+	46.4	32.0	
Skin Condition			
Presence of Skin Ulcer	17.6	3.1	<.0001
Falls			
Fell in last 90 days	28.3	24.6	.05
Receives Special Treatments	14.6	7.4	<.0001
Service Utilization in Past 90 Days			
Overnight Hospital Stay	34.5	24.4	<.0001
Emergency Room Visit	9.7	7.9	0.13
Priority Level of Care (MAPLe)			
Low/Mild Need	29.1	45.8	<.0001
Moderate to Very High Need	70.9	54.2	
Caregiver Need			
Primary Caregiver Expresses Distress	8.4	6.2	0.04

5.6.1.3 Client Enabling Characteristics

Three client enabling characteristics emerged at the appropriate significance level for consideration and are outlined in Table 5.55. Slightly more high nursing users lived alone than other nursing users (66.9% versus 61.2% respectively). Conversely, a slightly lower proportion of high nursing users received ADL care from their primary caregiver than other nursing users (25.5% versus 28.7%). The largest difference in amount of informal care the two groups are using occurs in the lower amount of care categories. Both groups are proportional in the clients receiving above average amounts of informal care (15 or more hours per week), but a larger proportion of high home nursing users received informal care amounts in the 8-14 hours range (24.8% versus 20.8%). As a result, a smaller proportion of high nursing users received informal care amounts in the 0-7 hours range than other nursing users (50.7% versus 53.7%).

Table 5.55: Client Enabling Characteristics – High Nursing Users and Other Nursing Users

Enabling Characteristic	High Nursing User - % (n=608)	Other Nursing User - % (n=5463)	P value
Living Arrangement at Referral			
Lived alone	66.9	61.2	0.005
Support from Primary Caregiver			
ADL Care	25.5	28.7	0.10
Amount of Informal Care per Week			
0-7 hours	50.7	53.7	0.07
8-14 hours	24.8	20.8	
15+ hours	24.5	25.5	

5.6.1.4 Client Predisposing Characteristics

Only age and marital status emerged as client predisposing characteristics to consider in examination of nursing high users (Table 5.56). Gender is included in Table 5.56 because of its status as an adjustor variable in any multivariate analyses. The largest proportion of high nursing users are age 85 and older (44.1%) while among other nursing users, the largest proportion of clients are in the age range of 75 to 84. The gender distribution is strikingly similar between the two groups, with just over 70.0% of clients being female in both groups. Marital status isn't greatly dissimilar between the two groups, but a slightly high proportion of high nursing users are not married (76.0%) than other nursing users (71.9%).

Table 5.56: Client Predisposing Characteristics – High Nursing Users & Other Nursing Users

Predisposing Characteristic	High Nursing User - % (n=608)	Other Nursing User - % (n=5463)	P value
Age: 65-74	16.6	16.2	0.003
75-84	39.3	46.2	
85+	44.1	37.6	
Gender:			0.29
Male	28.8	26.8	
Female	71.2	73.2	
Marital Status:			0.08
Married	24.0	28.1	
Widowed	61.2	58.9	
Other	14.8	13.0	

5.6.2 Home Nursing Service Utilization

Available service episode lengths for the high nursing users and other nursing users varied from a minimum of two weeks (14 days) to 14 weeks (99 days) for both groups (Table 5.57). The average number of days available in service episodes was slightly higher for high home support users (79 days) than other nursing users (75 days), and as a result, high nursing users had an average of 11 weeks for their service episode lengths compared to about 10.5 weeks for other nursing users. The slight dissimilarity in service episodes lengths is further examined in Table 5.58 where it can be seen that a slightly larger proportion of high nursing users than other nursing users are in the 61-99 days category for service episode length while there is a slightly larger proportion of other nursing users than high nursing users in the 14-30 days category. This 3-category variable is entered into multivariate analysis predicting high home support users to identify if the slight discrepancies in length of service episode are having any influence on the outcome.

Table 5.57: Univariate Statistics –Service Episode Lengths

Service Variable	User Group	Mean (Standard Deviation)	Median	Range
Number of Days in Service Episode	High Nursing User	79.2 (25.7)	96.0	14-99 days
	Other Nursing User	75.3 (25.6)	85.0	14-99 days
Number of Weeks in Service Episode	High Nursing User	11.1 (3.8)	13.0	2-14 weeks
	Other Nursing User	10.5 (3.7)	12.0	2-14 weeks

Table 5.58: Service Episode Length Groups, High Nursing Users and Other Nursing Users

Service Episode Length	High Nursing Users # (%)	Other Nursing Users # (%)
14 days – 30 days	51 (8.4%)	557 (10.2%)
31 days – 60 days	101 (16.6%)	913 (16.7%)
61 days – 99 days	456 (75.0%)	3993 (73.1%)

Of the 525,745 service visits available in this study, only 68,049 were nursing visits. Table 5.59 provides a breakdown of the nursing visits to the study population by the type of provider scheduled for the visits. Different service distributions for RNs and LPNs emerges for the high nursing and other nursing user groups. Roughly half of the nursing visits to high nursing users were scheduled for RNs whereas 70.0% of the nursing visits to other nursing users were scheduled for RNs. The proportion of LPN visits was much smaller for other nursing users compared to high nursing users.

High nursing users comprise 10% of this study population, yet they received 80% of the available nursing visits. The majority of the clients in the other nursing user group did not receive any nursing visits. As indicated previously in Table 5.52, 4217 clients did not have a single nursing visit in their service episode. This is equivalent to 77% of the other nursing user group. Another way to look at nursing service allocation is to consider only those clients with a nursing visit. Therefore, with 1854 clients receiving any nursing service, the 608 high nursing users would comprise 32.8% of that population. Regardless of whether the high nursing users are considered as the 10% of the total study population, or as the 32.8% of the nursing service population, by receiving 80% of nursing visits, they are still being scheduled a disproportionately high amount of the nursing service.

Table 5.59: Number of Nursing Visits by Provider Type to High Nursing Users and Other Nursing Users

Provider	# Visits to High Nursing Users (%)	# Visits to Other Nursing User (%)	# Visits in Total Population (%)
LPN	25364 (46.3)	3957 (30.0)	29321 (43.1)
RN	29471 (53.7)	9257 (70.0)	38728 (56.9)
Total # Visits (% of Nursing Visits in Total Population)	54835 (80.6)	13214 (19.4)	68049 (100.0)

Table 5.60 reports on nursing service statistics for the high nursing users and the other nursing users. For the purpose of that table, examination was restricted to clients who received a nursing visit. Therefore, for the other nursing user group, only 1246 of the 5463 clients were considered.

High nursing users were scheduled visits at an average weekly rate eight times greater than that for other nursing users who were scheduled any nursing service (Table 5.60). The average number of nursing visits per week to high home support users was 8 visits compared to just less than one visit for other nursing users scheduled the service.

High nursing users accumulated almost 15 tasks per week, while other nursing users accumulated less than two tasks. The nursing visits to high nursing users averaged almost four hours of nursing service per week compared to a half an hour per week for other nursing users. About 70.0% of the days in the service episodes for high nursing

users contained a nursing visit while about 13.0% of the service episode for other nursing users scheduled nursing service contained a nursing visit. Therefore, high nursing users received a nursing visit the equivalent to 5 days per week, and the other nursing users received a nursing visit equivalent to less than once per week.

Table 5.60: Description of Nursing Visits to High Nursing Users (N=608) and Other Nursing Users Scheduled Service (N=1246)

Nursing Service Utilization	User Group	Mean (Standard Deviation)	Median	Range
Average Number of Nursing Visits per Week	High Nursing User	8.0 (5.4)	6.5	1.1 – 28.7
	Other Nursing User	0.9 (0.7)	0.8	0.1 – 7.0
Average Number of Nursing Tasks Provided per Week	High Nursing User	14.9 (13.2)	9.9	1.1 – 70.5
	Other Nursing User	1.6 (1.5)	1.2	0.1 – 17.6
Average Nursing Hours per Week	High Nursing User	3.9 (2.6)	3.1	1.4 – 18.9
	Other Nursing User	0.5 (0.3)	0.5	0.02 – 1.4
Proportion of Service Episode with a Nursing Visit	High Nursing User	70.5 (26.4)	78.1	16.0 – 100.0
	Other Nursing User	13.0 (9.8)	11.4	1.0 – 100.0

5.6.2.1 Nursing Service Allocation – Categories and Tasks

Table 5.61 presents the results of scheduled nursing service by the nine nursing categories examined in this study. High nursing users were compared to other nursing users to determine the proportion in both groups that were scheduled the nursing categories, and then among the clients scheduled the service category, the weekly frequency it was scheduled.

The results in the table reiterate the difference in nursing need between the two groups. While 70.6% of high nursing users were scheduled medication-related service (category QN) only 12.0% of other nursing users were scheduled such service. Thirty-eight percent of high nursing users required therapeutic nursing measures (category TN) compared to 14.0% of other nursing users. Almost 20.0% of high nursing users required diabetes care compared to less than 2.0% of other nursing users. This disproportionate allocation of service is evident in all of the nursing categories.

Among the clients scheduled the categories of service, frequency of receipt was still higher among high nursing users. Only nursing assessment (category AS) was scheduled at similar weekly rates for both groups. In all of the other categories, frequency of service was scheduled at a higher weekly visit rate for high nursing users than other nursing users.

It was noted previously that few specific nursing tasks could be examined at the level of the user group dichotomy due to the infrequent occurrence of scheduled nursing service among older long-term community-coordinated home care clients. Complete details on the 18 nursing tasks that could be examined for proportional allocation and frequency of scheduling to high and other nursing users are in Table C4 in Appendix C. In this section, only key features of that table are presented. Table 5.62 outlines the dominant (or only available) task scheduled in each nursing category, based on proportion of clients scheduled the task. The same task is dominant for both high and other nursing users in all the nursing categories. Therefore, the same type of need is being identified in each category for both groups, but larger proportions of high nursing users are identified with the need.

Table 5.61: Proportion of High Nursing Users and Other Nursing Users and Frequency of Scheduled Nursing Service, by Nursing Category

Nursing Category - Code	High Nursing User (N=608) / Other Nursing User (N=5463) / p value	Percent who used this task category	Clients scheduled this category: Average times scheduled per week	
			Mean	Median
Medications - QN	High Nursing User	70.6	8.4	6.9
	Other Nursing User	12.0	0.8	0.7
	p value	<0.0001	<0.0001	
Therapeutic Measures - TN	High Nursing User	38.3	3.2	2.0
	Other Nursing User	14.4	0.7	0.6
	p value	<0.0001	<0.0001	
Wound Care - YN	High Nursing User	35.4	4.2	3.8
	Other Nursing User	4.3	1.0	0.9
	p value	<0.0001	<0.0001	
Assessment - AS	High Nursing User	21.4	0.1	0.1
	Other Nursing User	5.5	0.1	0.1
	p value ²⁰	<0.0001	--	
Diabetes - DN	High Nursing User	19.6	7.5	6.0
	Other Nursing User	1.9	1.0	0.9
	p value	<0.0001	<0.0001	
Elimination - EN	High Nursing User	8.6	3.5	2.1
	Other Nursing User	1.9	1.1	1.1
	p value	<0.0001	<0.0001	
Airway Maintenance/Respiratory - RN	High Nursing User	5.1	1.9	2.0
	Other Nursing User	2.6	0.7	0.6
	p value	<0.001	<0.0001	
Palliative Care - PN	High Nursing User	4.6	2.2	2.1
	Other Nursing User	0.5	0.5	0.3
	p value	<0.0001	<0.0001	
Other - ON	High Nursing User	25.8	5.5	4.5
	Other Nursing User	2.7	0.8	0.6
	p value	<0.0001	<0.0001	

²⁰ For the % who received this task category, the p value results are for a chi squared test. For the number of times per week a task category is received, the p value results are for a Mann Whitney U test. If the results are nonsignificant, no p value is shown (--).

Table 5.62: Nursing Task in Each Category With Largest Proportion of Clients

Nursing Category	High Total User		Other User	
	Nursing Task - Code	Percent	Nursing Task - Code	Percent
Medications - QN	Medication Monitoring – MM	24.0	Medication Monitoring – MM	6.3
Therapeutic Measures - TN	Health Supervision – HS	35.2	Health Supervision – HS	13.9
Wound Care - YN	Wound Care – WCWC	35.5	Wound Care – WCWC	4.3
Assessment - AS	Assessment – AS	21.4	Assessment – AS	5.5
Diabetes - DN	Random Blood Sugar – RBS	16.0	Random Blood Sugar – RBS	1.4
Elimination - EN	Ostomy Care – OC	3.8	Ostomy Care - OC	0.8
Airway Maintenance/ Respiratory - RN	Respiratory Assessment – AS	4.6	Respiratory Assessment – AS	2.6
Palliative Care - PN	PC Health Supervision - PCHS	4.3	PC Health Supervision - PCHS	0.4
Other -ON	Other Activity – OA	25.7	Other Activity – OA	2.6

When the most prevalent nursing tasks are compared for high and other nursing users, regardless of nursing category, again similar tasks emerge (Table 5.63). Although ranked slightly differently, 8 of the 10 tasks are the same for nursing and other high users. Wound care is the most prevalent task among high nursing users (35.4%), just ahead of health supervision (35.2%). Health supervision is the most prevalent task among other nursing users (13.9%). Unfortunately ‘other activity’ was a task scheduled for one-quarter of high nursing users, and what type of nursing activity was involved is lost to examination. Other activity is in the top 10 tasks provided to other nursing users as well, but for only 2.6% of clients in this group. Medication-related tasks make up four of the top 10 tasks to high nursing users and three of the top 10 tasks to other nursing users. The oral medication task and fasting blood sugar task are among the 10 tasks for high

nursing users but not other nursing users. Respiratory assessment and health teaching are the two tasks that are instead on the list for other nursing users.

Table 5.63: Top 10 Nursing Tasks Provided to Largest Proportions of High Nursing Users and Other Nursing Users

High Total User		Other User	
Nursing Task – Category Code	Percent	Nursing Task – Category Code	Percent
Wound Care – YN	35.4	Health Supervision – TN	13.9
Health Supervision – TN	35.2	Medication Monitoring – QN	6.3
Other Activity – ON	25.7	Assessment – AS	5.5
Medication Monitoring – QN	24.7	Wound Care – YN	4.3
Assessment – AS	21.4	Medication Set Up – QN	3.0
Medication Injection – QN	16.6	Medication Injection – QN	2.9
Random Blood Sugar – DN	16.0	Respiratory Assessment – RN	2.6
Medication Set Up – QN	15.8	Health Teaching – TN	2.6
Medication Oral, Essential – QN	15.6	Other Activity – ON	2.6
Fasting Blood Sugar – DN	15.3	Random Blood Sugar – DN	1.4

The five tasks most frequently scheduled to clients are outlined in Table 5.64.

Only three tasks are among the top five tasks for both the high and other nursing users – eye care, oral medication and topical medication. Eye care was the task most frequently scheduled for both groups, although at much different frequencies of 10.1 times per week for high nursing users and 1.5 times a week for other nursing users. All of the tasks for the high nursing users are in the medication category. Only three tasks are medication-related for the other nursing users, with ostomy care and wound care completing their list of five tasks. Although the proportion of clients scheduled each of these five tasks is

small, it is evident how the frequency of requirement for some clients would culminate into high use of nursing service.

Table 5.64: Five Most Frequently Scheduled Nursing Tasks for High Nursing Users and Other Nursing Users Scheduled for Nursing Care

High Nursing Users			Other Nursing Users		
Nursing Task - Category	Weekly Average	Proportion of Clients	Nursing Task	Weekly Average	Proportion of Clients
Eye Care - QN	10.1	3.0%	Eye Care - QN	1.5	0.8%
Medication, Injection - QN	8.5	16.6%	Ostomy Care - EN	1.4	0.8%
Medication, Oral - QN	8.1	15.6%	Medication, Topical - QN	1.4	0.9%
Medication, Topical - QN	5.6	14.1%	Medication, Oral - QN	1.1	0.4%
Medication Monitoring - QN	5.4	6.6%	Wound Care - YN	1.0	4.3%

5.6.3 Logistic Regression Model for Predicting High Users of Home Nursing Service

Building a model to predict high nursing users was approached the same way as for high total users and high home support users. Variables identified as significant at $p \leq .20$ in chi-square tests (identified in Tables 5.53 to 5.56) were entered into a logistic regression model according to their conceptual groupings in the Andersen-Newman model.

In Step 1 of building the logistic model, home care office, the only health care system variable, was entered in the model. In Step 2, 28 client need variables were added to the model. In Step 3, one caregiver need characteristic was added to the model. In Step 4, three client enabling characteristics were added to the model. In the final Step, two client predisposing characteristics were added to the model. Table 5.50 identifies the

characteristics that were significant at each Step as well as the overall model statistics and the significant contribution of each conceptual grouping as it was added to the model. No significant caregiver need variables were identified at this point in the model building process. The detailed results of the full model with all 35 variables and the two adjustment variables (gender and length of service episode, both insignificant in the model) are presented in Table D3 in Appendix D.

As indicated in Table 5.65, 12 client need variables, two client enabling variables and one client predisposing characteristic were significant by the end of Step 5. The non-significant variables were removed from this full model one at a time until only variables significant at the .05 level remained. Many interaction terms were then tested individually within this main effects model. As with the other high user models, the interaction examinations focused mainly on living arrangement (whether client lived alone or not) or informal care variables, such as amount of informal care provided, caregiver distress, caregiver unable to continue care, type of care caregiver was providing (ADL or IADL), caregiver relationship and how these variables interacted with client need variables, namely ADL, IADL, and cognition indicators, and the MAPLe algorithm. Interactions with two additional variables more specific to nursing – receipt of special treatments, or receipt of special therapies – were examined for this model as well. Again, two quadratic terms were examined to test for a curvilinear relationship between the characteristic and being a high nursing user – the ADL Hierarchy scale and the total amount of informal hours. Neither quadratic term was significant and they were removed from the model. The informal care hours was operationalized as a 3-category ordinal variable instead of a continuous variable in the model.

Table 5.65: Preliminary Significant Variables in Building a Logistic Model to Predict High Users of Home Nursing Service

Step 1: Health Care System		Step 2: Client Need		Step 3: Caregiver Need		Step 4: Client Enabling		Step 5: Client Predisposing	
Variable	p value	Variable	p value	Variable	p value	Variable	p value	Variable	p value
Home care office	0.01	Poor self-rated health	0.02	Poor self-rated health	0.02	Poor self-rated health	0.03	Poor self-rated health	0.03
		Overnight hospital stay	0.0002	Overnight hospital stay	0.0002	Overnight hospital stay	0.0002	Overnight hospital stay	0.0002
		Skin ulcer	<.0001	Skin ulcer	<.0001	Skin ulcer	<.0001	Skin ulcer	<.0001
		Peripheral vascular disease	<.0001	Peripheral vascular disease	<.0001	Peripheral vascular disease	<.0001	Peripheral vascular disease	<.0001
		Glaucoma	<.0001	Glaucoma	<.0001	Glaucoma	<.0001	Glaucoma	<.0001
		Cancer	0.001	Cancer	0.001	Cancer	0.0003	Cancer	0.0002
		Diabetes	<.0001	Diabetes	<.0001	Diabetes	<.0001	Diabetes	<.0001
		Cataract	0.03	Cataract	0.03	Arthritis	0.05	Arthritis	0.03
		Comorbidity	0.004	Comorbidity	0.004	Comorbidity	0.004	Comorbidity	0.004
		# Medications	<.0001	# Medications	<.0001	# Medications	<.0001	# Medications	<.0001
		ADL Hierarchy Scale	0.02	ADL Hierarchy Scale	0.02	ADL Hierarchy Scale	0.007	ADL Hierarchy Scale	0.005
		Special Treatments	<.0001	Special Treatments	<.0001	Special Treatments	<.0001	Special Treatments	<.0001
		MAPLe	<.0001	MAPLe	<.0001	MAPLe	<.0001	MAPLe	<.0001
				No significant caregiver need variables	--	Living arrangement	0.001	Living arrangement	0.004
						Caregiver provides ADL care	0.003	Caregiver provides ADL care	0.003
								Age group	0.0004
Model χ^2	25.12	Model χ^2	458.93	Model χ^2	459.65	Model χ^2	520.91	Model χ^2	537.08
df	12	df	46	df	47	df	53	df	58
p value	0.01	p value	<.0001	p value	<.0001	p value	<.0001	p value	<.0001
c statistic	0.56	c statistic	0.75	c statistic	0.75	c statistic	0.76	c statistic	0.76
		Model difference		Model difference		Model difference		Model difference	
		χ^2	433.81	χ^2	0.72	χ^2	61.26	χ^2	19.77
		df	34	df	1	df	6	df	6
		p value	<.0001	p value	0.40	p value	<.0001	p value	0.003

Five interaction terms were found to be significant or near significant and were entered simultaneously in the full model:

- Living alone by ADL dependence: $p = .01$;
- Living alone by IADL dependence: $p = 0.02$;
- Living alone by cognitive impairment: $p = 0.003$;
- Living alone by MAPLe score: $p = .07$;
- Caregiver distress by cognitive impairment: $p = .06$.

Interaction terms still non-significant at this point were removed one at a time.

5.6.3.1 Results of the Final Fitted Model

The significant main effects and interaction terms in the final model are summarized in Table 5.66. Thirteen variables and two two-way interactions were significant predictors in the final fitted model predicting high users of home nursing. Quite different predictors emerged in the home nursing model compared to those found in the high total use or home support use models. Not surprisingly, many of the predictive variables are disease-specific, health conditions or treatment-related variables.

Clients with poor self-reported health were 1.28 times more likely to be high nursing users. Peripheral vascular disease, glaucoma, cancer or a diabetes diagnosis increased the odds of being a high nursing user, with odds ratios among these four diseases ranging from 1.49 to 2.41. Conversely, an arthritis diagnosis has a negative relationship with high nursing use. Clients with arthritis were significantly less likely to be high nursing users ($OR=0.72$). Presence of a skin ulcer produced the highest odds

ratio for high nursing. Clients with a skin ulcer were 6.43 times more likely to be high nursing users.

The risk of being a high nursing user was 1.75 times greater for clients receiving nine or more medications than clients using four or less medications. There was no increase in significant difference in odds among clients using 5 to 8 medications. The odds of being a high nursing user for clients receiving special treatments (e.g., respiratory treatments, dialysis, ostomy care) were 92.0% higher than the odds of being a high nursing user for clients without special treatments. Similarly, clients with one or more overnight hospital stays in the previous 90 days were 1.39 times more likely to be high nursing users.

A dichotomized version of the MAPLe algorithm also proved significant. Compared to clients with low or mild MAPLe scores, clients with a moderate or higher level of care were 1.65 times more likely to be high nursing users.

One client enabling characteristic stood on its own in the model. If the client was not receiving ADL care from the primary caregiver, they were 1.53 times more likely to be a high nursing user than a client who was receiving ADL care from their caregiver. One client predisposing characteristic also emerged on its own in this model. For the first time age was a factor in the high use of a home care service. The oldest clients in this elderly cohort, clients age 85 or greater, had 1.41 times higher odds of being a high nursing user compared to clients age 65 to 75. The odds for clients age 75 to 84 were not significantly different from the younger reference group.

Table 5.66: Final Fitted Logistic Regression Model (Adjusted)²¹ – Predicting High Users of Home Nursing Services

Characteristic (*** indicates reference group)	P-value for group	Estimate	Standard Error	Wald Chi-Square	p-value	Odds Ratio (95% confidence intervals)
Age Group:	0.0002	***				
Age 65-74		***				
Age 75-84		-0.07	0.14	0.29	0.59	0.93 (0.71-1.21)
Age 85+		0.34	0.14	5.91	0.015	1.41 (1.07-1.86)
Self Reported Health:	0.02	***				
Does Not Report Poor Status		***				
Reports Poor Status		0.24	0.11	5.12	0.02	1.28 (1.03-1.58)
Disease Diagnoses:						
Peripheral vascular disease	0.0006	0.55	0.16	11.66	0.0006	1.74 (1.27-2.39)
Arthritis	0.0005	-0.33	0.10	12.14	0.0005	0.72 (0.60-0.87)
Glaucoma	<.0001	0.88	0.12	53.17	<.0001	2.41 (1.90-3.05)
Cancer	0.002	0.40	0.13	9.34	0.0022	1.49 (1.15-1.93)
Diabetes	<.0001	0.64	0.10	37.85	<.0001	1.90 (1.55-2.33)
Skin Ulcer:	<.0001	***				
Not Present		***				
Present		1.86	0.15	158.35	<.0001	6.43 (4.81-8.60)
Number of Medications:	<.0001	***				
0-4		***				
5-8		0.21	0.13	2.59	0.11	1.24 (0.95-1.60)
9+		0.56	0.13	17.54	<.0001	1.75 (1.35-2.28)
Special Treatments:	<.0001	***				
No treatments received		***				
Received 1+ treatment(s)		0.65	0.14	21.88	<.0001	1.92 (1.46-2.51)
Hospital Use Last 90 Days:	0.0009	***				
No use		***				
1+ Overnight stay		0.33	0.10	11.02	0.0009	1.39 (1.14-1.69)
MAPLe Priority Level:	<.0001	***				
Low/Mild		***				
Moderate or greater		0.50	0.12	16.38	<.0001	1.65 (1.30-2.11)

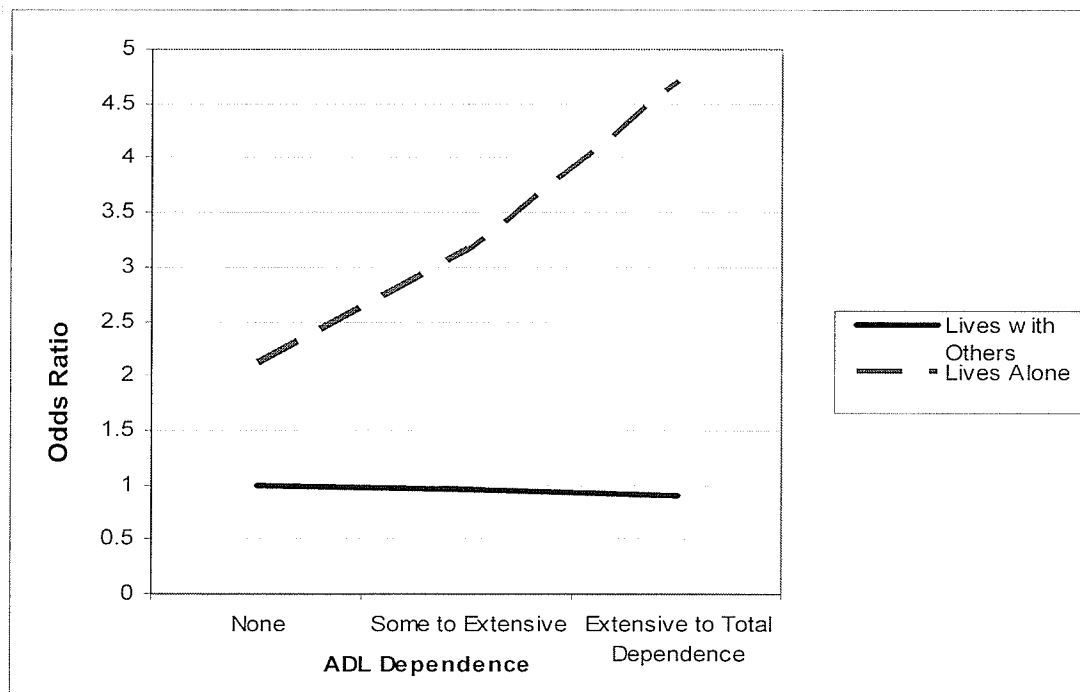
²¹ Adjusted for gender and length of service episode – neither variable was significant in the model

Characteristic (*** indicates reference group)	P-value for group	Estimate	Standard Error	Wald Chi-Square	p-value	Odds Ratio (95% confidence intervals)
Caregiver Area of Help ADL care provided	0.0007	***				
No ADL care		0.42	0.12	11.55	0.0007	1.53 (1.20-1.95)
ADL Hierarchy Scale (Regrouped)	0.69	-0.05	0.13	0.16	0.69	
Cognitive Performance Scale (Regrouped)	0.0001	0.27	0.07	14.64	0.0001	
Living Arrangement: Lives with others	0.03	***				
Lives alone		0.29	0.13	4.83	0.03	
Caregiver Distress: Does not express distress	0.0005	***				
Expresses distress		0.98	0.28	11.94	0.0005	
ADL Scale*Live Alone	0.01	0.45	0.17	6.73	0.01	
CPS*Caregiver Distress	0.0007	-0.72	0.21	11.42	0.0007	
	Likelihood Ratio chi-square test = 525.68 (24 DF); p <.0001 c statistic = 0.76 Hosmer & Lemeshow Goodness-of-Fit chi-square test = 6.54 (8 DF); p = 0.59					

The remaining four characteristics found to be predictive of high nursing users were involved in significant interactions. An interaction was discovered between ADL dependence and living arrangement, and another interaction was discovered between cognitive impairment and caregiver distress. Figure 5.8 illustrates the interaction between ADL dependence and living arrangement. ADL dependence was measured with the ADL Hierarchy Scale regrouped into a 3-category ordinal variable. For clients living with others, level of ADL dependency had no effect on the odds of being a high nursing user. Clients living with others with the highest level of ADL dependence were no more

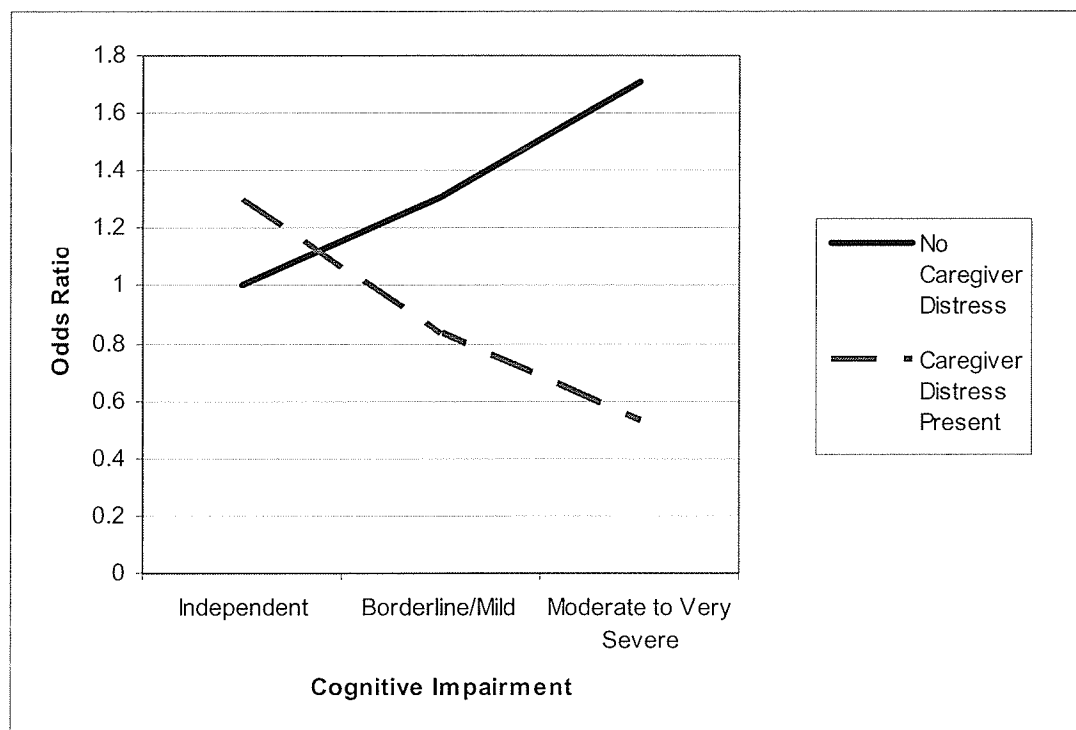
likely to be high nursing users than clients completely independent in ADLs and living with others. The results were different for clients living alone. At all levels of ADL dependence, clients living alone had higher odds of being high nursing users than the reference group. Clients living alone and independent in ADLs were twice as likely to be high nursing users, and the odds increased to the point that clients living alone with the highest level of ADL dependence were nearly five times as likely to be high nursing users.

Figure 5.8: ADL Functioning by Living Arrangement Interaction to Predict High Nursing Users



The interaction between cognitive impairment and caregiver distress is illustrated in Figure 5.9. In this model, cognitive impairment was measured with the Cognitive Performance Scale regrouped into a 3-category ordinal variable. The reference group in this interaction was clients with no caregiver distress and who were independent in cognitive performance. In this interaction, quite dissimilar results emerge based on caregiver distress. Among clients whose primary caregiver is not experiencing distress, odds of being a high nursing user increase as cognitive impairment increases. Clients in this group with the highest level of cognitive impairment are 70.0% more likely to be high nursing users than clients without any cognitive impairment. However, the opposite relationship is seen among clients whose caregiver is experiencing distress. Clients in this group who are cognitively intact were 1.30 times more likely to be high nursing users than the reference group. As cognitive impairment becomes an issue and increases, the odds of being a high nursing user decreased. Clients with borderline or mild cognitive impairment were 17.0% less likely to be high nursing users, and clients with moderate or greater impairment were half as likely to be high nursing users than the reference group. This complex interaction suggests that when caregiver distress is present among clients with cognitive impairment, the distress is due to demands on the caregiver that can less likely be addressed by nursing service, and may therefore be due to functioning or behavioural demands.

Figure 5.9: Cognitive Impairment by Caregiver Distress Interaction to Predict High Nursing Users



5.6.4 Summary

Nursing service is a rare service among older long-term community-coordinated home care clients. Seventy percent of the study population did not receive any nursing visits in their service episodes. They were largely assessed as requiring only home support services. When nursing services were required in this population, the high users of nursing service were mostly a different group of individuals from the total high users of overall home care or high users of home support service. As a result, the characteristics of the high nursing users were quite different compared to the characteristics of high total users or high home support users. The greater levels of functional and cognitive impairment seen in the latter two groups were not seen among the high nursing users. While larger proportions of the high nursing users rather than

other nursing users had functional and cognitive impairment, the differences between these two groups were not nearly as disproportionate as seen between the other two high user groups.

Even among the high nursing users, nursing service was required at much lower durations and frequencies than seen among home support visits. Nonetheless, the vast majority of nursing visits went to the high nursing users. Interestingly, nursing service visits were split between RN and LPN providers for high nursing users while RNs provided the majority of nursing visits to other nursing users. Medication- and health supervision-related service were the dominant nursing services provided to older long-term clients.

Client need variables were central in the final model predicting high nursing users but the variables were related to health conditions, diseases, and clinical services and treatments. Most variables that emerged as predictors of high nursing users were different from the variables that emerged as predictors for high total users or high home support users. The interactions discovered in predicting high nursing users were different as well. The considerable overlap between overall home care use and home support use, both for service patterns and characteristics, was not replicated again with home nursing use. The older long-term clients that required higher use of nursing services were unique in this population.

5.7 Summary of Key Results

This section summarizes the key findings related to the research questions: the profile of older, long-term home care clients; service provision patterns to the population; service allocation to high users of home care; and the significant relationships between client and contextual characteristics and high users of home care services.

5.7.1 Profile of Long-Term Clients

The older, long-term, community-coordinated home care clients in this study exhibited a wide range in their characteristics and needs. On average though, the clients presented with low levels of ADL dependency and cognitive impairment. Their functional dependence was related more to IADL needs. Most clients were diagnosed with multiple chronic diseases, averaging nearly four diseases. As a result, the medication examination indicated that the clients took multiple medications in a week. Overall, the study population's priority level for service need based on their MAPLe scores was moderate need.

Along with formal service, informal support was a prominent component of care for most clients. A primary caregiver was identified and providing support for nearly all of the clients in the study. Primary caregivers were largely addressing the clients' IADL and emotional needs. The average client in this study received just over 13 hours of informal care per week.

5.7.2 Service Provision to Long-Term Clients

Clients in this study truly were long-term clients since the majority had been receiving home care for over six months, with the average length of service being nearly two years. All of the study population received home support services but only 30.0% received nursing services. The assessed need of these clients rarely resulted in provision of professional medical care or treatment from home care nursing staff. As a result, the bulk of this population's home care hours per week came from home support visits. Home support visits were on average longer in duration and more frequently scheduled than nursing visits, culminating in an average of six hours of home support service per week and only half an hour of nursing service per week for the average older, long-term client.

The greatest proportion of clients received home support assistance with hygiene, dressing, and housekeeping needs such as cleaning and laundry. The largest proportions of clients received nursing service for medication-related tasks or therapeutic measures and monitoring.

5.7.3 Characteristics of High Users

The high users of home care generally presented with greater need than their 'other user' counterparts. The disparity in functional dependence, cognitive impairment, and indicators of health status was most apparent in the comparisons between high total users/other total users and the high home support users/other home support users. There was much similarity in the profiles for high total user and high home support user. This was due to the fact that the two high user groups were largely comprised of the same

individuals (Table 5.67). As a result, just over 90.0% of high total users (550 clients) were also high home support users. A much lower degree of overlap was found with high nursing users. Less than 25.0% of high nursing users (149 clients) were also high total users. Less than 15.0% of high nursing users (91 clients) were also high home support users.

Table 5.67: Overlap of High Users in the Study Population

High User Category	Number of Clients	Percent of Study Population (n=6071)
High Total User	608	10.0%
High Home Support User	608	10.0%
High Nursing User	608	10.0%
High Total User & High Home Support User	550	9.1%
High Total User & High Nursing User	149	2.5%
High Home Support User & High Nursing User	91	1.5%
High Total User and High Home Support User and High Nursing User	91	1.5%

5.7.4 Service Provision to High Users

High users required a greater range of service, their visits were typically longer in duration, and they required visits more frequently. High total users received 24.0% of all home care visits examined, high home support users received 24.0% of the home support visits examined, and high nursing users received 80.0% of the nursing visits examined in this study.

Over 80.0% of the clients in both high total user and high home support user groups required assistance with hygiene, dressing, nutrition-related tasks, and required

supervision. While the respective other user also required assistance with hygiene and dressing, laundry and cleaning tasks were a larger feature of the services allocated to other users than high users. Conversely, for nursing service the pattern was that medication-related tasks and therapeutic measures were the dominant types of nursing service categories needed by both high users and other users.

5.7.5 Predictors of High Users

Table 5.68 summarizes the significant results of the final multivariate logistic regression models built to predict high users of home care service. The table identifies the predictors with independent significant effects as well as the significant interactions that were found. Odds ratios and confidence intervals are presented for the independent predictors. The side-by-side comparison is useful for highlighting that different factors affect home care volume depending on the home care service category in question.

Table 5.68: Significant Predictors of High Users of Home Care Service

Characteristic	High Total User	High Home Support User	High Nursing User
	Odds Ratio (95% C.I.)	Odds Ratio (95% C.I.)	Odds Ratio (95% C.I.)
Health Care System			
Home Care Office 5	1.52* (1.02-2.27)		
Home Care Office 6	1.65* (1.01-2.71)		
Home Care Office 7		0.56* (0.34-0.90)	
Home Care Office 11	1.71** (1.14-2.56)	1.64* (1.10-2.46)	
Client Need			
New Client	0.43*** (0.33-0.57)	0.41*** (0.31-0.55)	
Self Reported Poor Health	1.26* (1.00-1.59)		1.28* (1.03-1.58)
1+ Overnight Hospital Stay		0.74* (0.58-0.95)	
ADL Hierarchy Scale	1.90*** (1.75-2.06)	Interaction* With caregiver ability to care	Interaction** With lives alone
IADL Capacity Scale Score=5	3.05*** (2.33-3.99)	3.63*** (2.74-4.79)	
Score=6	4.60*** (3.13-6.79)	4.39*** (2.98-6.47)	
Cognitive Performance Scale			Interaction*** With caregiver distress
Decline in decision-making in past 90 days	0.63** (0.46-0.87)	0.69** (0.51-0.95)	
Skin Ulcer			6.43*** (4.81-8.60)
Stroke Diagnosis		1.40** (1.12-1.76)	
Peripheral vascular disease			1.74*** (1.27-2.39)
Arthritis			0.72*** (0.60-0.87)
Glaucoma			2.41*** (1.90-3.05)
Cancer			1.49** (1.15-1.93)
Diabetes			1.90*** (1.55-2.33)
Use 9+ Medications	1.50** (1.14-1.97)		1.75*** (1.35-2.28)
Received Special Treatments			1.92*** (1.46-2.51)
MAPLe Priority Level ²²	Interaction* With lives alone	1.30*** (1.15-1.47)	1.65*** (1.30-2.11)

²² For high total user and high home support user, MAPLe score was left as a continuous variable; for high nursing users, MAPLe score was dichotomized into Low/Mild scores versus Moderate or higher.

Characteristic	High Total User	High Home Support User	High Nursing User
	Odds Ratio (95% C.I.)	Odds Ratio (95% C.I.)	Odds Ratio (95% C.I.)
Caregiver Need			
Caregiver Distress			Interaction*** With cognition (CPS)
Caregiver Unable to Continue Care		Interaction* With ADL dependence	
Client Enabling			
Lives alone	Interaction* With MAPLe score		Interaction** With ADL dependence
Non-spouse primary caregiver	Interaction** With informal care hours	Interaction** With informal care hours	
Caregiver Does not Provide ADL Care			1.53*** (1.20-1.95)
Receives 15+ hours of Informal Care/Week	Interaction** With non-spouse caregiver	Interaction** With non-spouse caregiver	
Client Predisposing			
Female		1.28* (1.02-1.62)	
Age 85+			1.41* (1.07-1.86)

Note: *p < 0.05; **p < 0.01; ***p < 0.001

5.7.5.1 Health Care System

The health care system, measured by the single variable of home care office, was a factor with high total users and high home support users, but not high nursing users. Overall, nearly all of the community home care offices were similar in their complement of high users once other client characteristics were taken into account. Only two or three offices emerged as significantly associated with high total or high home support users by comparison.

5.7.5.2 Client Need

Most of the significant predictors in all three high user groups were client need characteristics. Both ADL impairment and IADL impairment were highly associated with being a high total user or a high home support user. As impairment increased on these indicators so did the odds of being a high user. IADL functioning had no influence on nursing and level of ADL impairment was not associated with nursing volume if the client lived with others. It was only a significant predictor if the client lived alone.

Level of ADL dependence was only one of two characteristics that was a significant predictor in all three high user groups. The other predictor common to all high users was the client need characteristic of priority care level based on the MAPLe algorithm.

The remaining client need variables identified as predictors of high home care users were related to the functions addressed by home support and home nursing service. New client status significantly reduced the odds of being a high total user or high home support user. This relationship wasn't found for nursing use. Self-reported poor health was not a predictor of higher amounts of home support, but it was a predictor of higher amounts of total home care and nursing. Having at least one overnight hospital stay in the 90 days before assessment was not related to high nursing use but this variable had a significant negative relationship with high home support use.

Cognition indicators produced conflicting results with high users. Cognitive impairment on the CPS was a predictor for high nursing users but not the other user groups. Instead decline in decision making was associated with these latter home care categories, but in a negative direction. Clients who exhibited a decline in their decision-

making skills compared to their status 90 days previously were significantly less likely to be high total and high home support users. Further examination of these clients indicated they might be residents of assisted living or supportive housing

Several disease-related and clinical indicators were relevant predictors of high users but mostly for nursing service. Most were positively related to high users, except arthritis, which instead decreased the odds of being a high nursing user. The number of medications a client was taking did not register with higher home support use, but was significantly associated with high total users and high nursing users. Moreover, receipt of special treatments was only associated with high nursing use.

5.7.5.3 Caregiver Need

Two caregiver need variables emerged as predictors of high home support users and high nursing users, but not with high total users. Caregiver distress interacted with cognitive impairment to predict high nursing users. Clients with higher cognitive impairment but no caregiver distress were at greatest odds of being high nursing users. Caregiver ability to care interacted with ADL impairment to predict high home support users. Clients with higher levels of ADL dependence and a caregiver able to continue in caring activities were at greatest odds of being high home support users. Overall, the influence of caregiver need on home care volumes was minimal compared to client need.

5.7.5.4 Client Enabling

Client enabling indicators were significant predictors in each high user category but only one client enabling indicator had an independent effect. If the caregiver *was not*

providing ADL care to the client, the client was significantly more likely to be a high nursing user. The remaining client enabling indicators were all involved in interactions. The amount of informal support clients were receiving interacted with the relationship of the caregiver (spouse or non-spouse) to predict high total users and high home support users. For both high user categories, clients receiving greater amounts of informal care with a non-spouse primary caregiver were more likely to be high users of formal care. Living arrangement interacted with MAPLe level of care to predict high total users and also interacted with level of ADL dependency to predict high nursing users. In both interactions, clients living alone were at greater odds of being high users as MAPLe levels or ADL impairment increased.

5.7.5.5 Client Predisposing

Client predisposing characteristics were largely insignificant in predicting high home care use. Only age and gender emerged as significant predictors. Gender was a predictor of being a high home support user, with females more likely to be high users. Clients age 85 or older were more likely to be high users of nursing service.

5.7.5.6 Interaction Terms

Two significant interactions terms were found within each high user category. All of the interactions involved informal support variables and mainly were interacting with client need. Several of the caregiver need and the client enabling characteristics did not emerge as significant predictors of high users upon their initial entry into the

multivariate models. Only when interactions were examined did their significant contribution to high user status emerge.

5.7.6 Overall Significance of Multivariate Models

Overall performance of the final multivariate models to predict high users was assessed using measures of model significance, calibration, and discrimination. Calibration refers to whether predicted probabilities agree with the observed probabilities (Steyerberg et al., 2001). Discrimination refers to the ability to distinguish, in this case, between high users and other users (Hanley & McNeil, 1982). Model significance was assessed with the Likelihood Ratio Chi-Square test and calibration was assessed with the Hosmer and Lemeshow's goodness-of-fit test. Discrimination was reported using the c statistic, which is equivalent to the area under the receiver operating characteristic (ROC) curve. The ROC curve in a binary measure such as our high user status outcome plots the true positive rate as a function of the false positive rate (Cortes & Morhi, 2004) The c statistic ranges from 0.5 to 1, where 0.5 corresponds to the model randomly predicting the response, and a 1 corresponds to the model perfectly discriminating the response (Hanley & McNeil, 1982). Table 5.69 displays the model statistics for each of the final high user models.

The Likelihood Ratio chi-square statistics indicate that each final model explained a significant proportion of the variation in the probability of being in the high user group. The c statistic for each model demonstrates the good discrimination of the models. The greatest discrimination was achieved for the high home support users at 0.89, just slightly better than 0.88 for high total users. The c statistic was a bit lower for the high nursing

users at 0.76, although this magnitude still indicates there is very good discrimination in the model. The Homer and Lemeshow statistics indicate that all three models have an adequate fit of the data observed.

Stokes and colleagues (2000) caution that while goodness-of-fit statistics will tell you how well a model fits the data, they do not tell you about where the model fails to fit the data. To assess the lack of fit, the authors suggest using logistic regression diagnostics. The two diagnostic tools they point to in particular are examination of the Pearson residuals and the deviance residuals. These residuals are useful in identifying outliers, observations that are not explained well by the model. The residual values are considered to be indicative of lack of fit if they exceed 2 in size (Stokes et al., 2000). The INFLUENCE option in SAS requests these regression diagnostics in the logistic procedure. Examination of these diagnostics indicated that there were no influential outliers in any of the final three models, and therefore, it is concluded that the models fit the data well.

Table 5.69: Models Statistics for Final Multivariate Models Predicting High Users

Model Statistic	High Total Users	High Home Support Users	High Nursing Users
Likelihood Ratio chi-square test	1213.50 (31 DF); p < 0.0001	1266.59 (30 DF); p < 0.0001	526.68 (24 DF) p < 0.0001
c statistic	0.88	0.89	0.76
Hosmer & Lemeshow Goodness-of-Fit chi-square test	9.59 (8 DF); p = 0.30	9.39 (8 DF); p = 0.31	6.54 (8 DF); p = 0.59

CHAPTER 6: DISCUSSION

In this final chapter, the findings of the research questions are discussed. Both the research implications and the policy implications of the results are presented. The strengths and limitations of the study are noted so that the results can be considered within those parameters. In the latter section, areas for future research are discussed.

6.1 Characteristics of Older, Long-Term, Community-Coordinated Clients

The needs of older, long-term, community-coordinated home care clients were wide and varied but overall exhibited a moderate level of care needs. Most clients were receiving a combination of formal and informal care.

The characteristics revealed for this WRHA population are not largely different from other long-term home care clients in some regions of Canada. Previous research compared 30,000 Ontario long-term care clients to 4000 of the WRHA's long-term clients based on RAI-HC assessment data collected in both jurisdictions (Hirdes et al., 2005). The Ontario population was comprised of clients in 2003/04 and the WRHA population was comprised of clients in 2004. Examination of selected characteristics and outcomes found there was similarity between the WRHA and Ontario samples, with the WRHA's clients being somewhat older and more likely to live alone, and showing slightly lower levels of physical, cognitive, and health impairment than the Ontario clients. A comparison of those Ontario clients in the study by Hirdes and colleagues (2005) to the clients in this study continues to find similarity. For example, 25.5% of the Ontario population scored 2 or greater on the ADL Hierarchy scale compared to 21.2% of the WRHA population in this study. Just over 30% (31.4%) of the Ontario clients scored

2 or greater on the Cognitive Performance Scale compared to 27.8% of this study's clients. Lastly, the exact same proportion of clients in each study population scored 0 on the CHESS scale (no health instability) at 34.8%.

CIHI recently reported on characteristics of long-term home care clients in British Columbia (B.C.) and the Yukon Territory in Canada based on data from RAI-HC assessments as well (CIHI, 2008). Although CIHI reported on long-term clients of all ages for British Columbia and the Yukon, the majority of the clientele were elderly; 70.0% to 80.0% of clients were age 75 years or older in B.C.'s five health regions, and 50.0% of the clients from the Yukon were in that age group. The WRHA home care clients in this present study are similar in characteristic to home care clients in the Yukon in terms of level of cognitive impairment (30.0% in Yukon, 27.8% in WRHA with CPS score 2+), priority level of care need (34.0% in Yukon, 30.0% in WRHA high/very high MAPLe scores) and weekly informal care hours (approximately 13 hours in both regions).

There was variation among the five regions in B.C. but overall the characteristics of long-term clients in B.C. are much different from those of this WRHA sample. The B.C. long-term clients are characterized by much greater functional dependence (e.g., 45.0% in Fraser Health Authority versus 25.0% in WRHA with ADL Hierarchy scores of 2+), cognitive impairment (55.0% of clients on average in B.C.), and overall care need (nearly 60.0% with high/very high MAPLe scores) than exhibited by this WRHA population. Different jurisdictional home care policy for eligibility, entry criteria, and range of services provided affect the composition of clients serviced by programs (CHCA, 2008), which undoubtedly is a factor in differences between the B.C. and

WRHA home care clients. The profiles of the WRHA's older long-term clients generated by this study provide a baseline for ongoing evaluation of clients in the WRHA program and jurisdictional comparison when possible due to use of the RAI-HC for assessment in home care in other jurisdictions in Canada.

6.2 Service Allocation to Older, Long-Term Clients

All of the clients in this study received home support services but less than one-third received nursing services. The disproportional allocation of home support service and home nursing found in this older population are similar to the results of other Canadian studies. Among older adults in Canada, results from a national health survey found over half of the seniors who were receiving public home care service received housework service, and only 38.0% received nursing care (Carrière, 2006). Although the focus wasn't on long-term home care clients, both a British Columbia and an Alberta study similarly found home support services consumed more home care hours or claims than home nursing (Penning et al, 2006; Wilson et al., 2005). When the focus was on long-term clients, but not specifically older clients, Laporte and colleagues (2007) still discovered that long-term clients are more likely to receive personal support and/or home-making service (75.0%) than nursing service (56.0%). However, among their long-term clients in Ontario, a much larger proportion received nursing service than was seen in this study. This finding could be related to the eligibility criteria in Ontario to be able to receive homemaking and personal care. The person must exhibit a need for assistance with personal care and/or to support caregivers of a person with cognitive impairment needing 24-hour care and supervision (CHCA, 2008). The latter component

of the criteria may inflate the number of clients that would need nursing as a result of greater impairment, both physical and mental.

Even though this present study artificially reduced the number of clients receiving nursing service by excluding the long-term nursing only clients, their inclusion (186 clients) would have merely changed the proportion of clients receiving nursing service in this population from 30.0% to nearly 32.0%. If anything, the proportion of clients that receive home nursing among older long-term clients may be over-inflated in this study population. Over 2200 older clients with RAI-HC assessments were lost to this study since they did not have any services of any type scheduled in the Procura system after the date of their assessment. With home care offices still grappling with the complexities and workload of introducing home support service scheduling into Procura during the time period of this study, a proportion of the 2200 clients lost probably were only receiving home support service.

The results of this study differ from studies of the general adult population that found public nursing service was more dominant than public housework or personal care service (Wilkins, 2006) or at least as dominant as housework service (Forbes et al., 2003). This study adds further evidence that when examining public home care utilization, the population studied needs to be addressed. Older home care clients may be allocated home support and nursing service differently than younger home care clients, particularly older clients who are long-term users of home care service. Short-term clients would likely be in greater receipt of nursing service, according to the study by Laporte and colleagues (2007).

Use of task-level home support and nursing data in this study allowed for greater examination of what composed the broad categories of home support and nursing service allocated to the study population. This study found that the greatest proportion of clients received home support assistance with hygiene, dressing, and housekeeping needs such as cleaning and laundry, ranging from 56.0% to 70.0%. For nursing, the largest proportion of clients received medication-related tasks or therapeutic measures (17.0% and 18.0% respectively). While there is little in the way of comparative data, these results are similar to those from the Ontario study that found 75.0% of the long-term clients receiving public home care received service from the categories of personal support and/or home-making (Laporte et al., 2007), and the Alberta study (Wilson et al., 2005) that found personal care was the greatest service being utilized in home care.

Again, the results from this study differ from studies that examined home care service allocation at the national level to adults in general and even older adults in particular. For example, Forbes and colleagues (2003) had to focus their study of home support service to housework assistance only since too few adult Canadians received personal care to allow its examination. Even when specific to older adults receiving public home care, at the national level Carrière (2006) still found that personal care was provided to only 29.0% of older clients who had no informal support. Unfortunately, further comparison of this study's service allocation results with previous research is limited due to the inability of most studies to provide additional detail around the specific tasks included in the personal support, home-making, or any other home support service category. Moreover, none of the Canadian studies reviewed identified categories within home nursing service in their study to provide some comparison with this study.

6.3 High Users of Public Home Care

The high user methodology borrowed from other health services research and employed in this study proved to be an effective approach for identifying a service volume-related category of home care clients when no such category was innate to the home care program under study. The top 10% of clients, based on average weekly hours of service allocation, yielded 608 'high user' clients in each of the three home care service categories studied. While several other methods exist in the literature for examination of the association of factors related to home care volume, the high user method served as a unique approach in home care research. The high user category is a simply created, readily comprehended, and easily replicated home care user category that transcends non-comparable, regionally created client groups.

This study and approach to resource examination is distinct from previous research involving case-mix measures derived from RAI-HC assessment data. Case-mix is a system that explains resource use. The RAI-HC case-mix system, the Resource Utilization Groups for Home Care (RUG-III/HC), has been shown to be a valid system for classifying home care clients into similar groups of resource use and cost (Bjorkgren, Fries, and Shugarman, 2000; Poss, Hirdes, Fries, McKillop, & Chase, 2008). Only RAI-HC assessment information relating to the client is used for assigning the client to one of the seven hierarchical resource utilization groups in RUG-III/HC. Additional factors such as informal care characteristics are not considered in the client's resource classification. This classification methodology sought to limit withdrawal of caregiver involvement, gaming, and distrust of the case-mix system (Poss et al., 2008).

Therefore, while the RUG-III/HC case-mix system identifies home care clients that require greater resource, that classification system only takes into account client characteristics. This present study of high users uses an expanded framework (the Andersen-Newman model) of client and contextual characteristics to identify those home care clients with greatest resource use. It provides a greater understanding of the multitude of factors that are associated and interact with being a high user of home care so that the complexity of high resource use can be better understood.

In this study, the high users of home care, regardless of the home care category examined, generally presented with greater need than their 'other user' counterparts. As just discussed, the older long-term home care population is one that predominantly receives only home support service. Therefore, even when home support and home nursing hours were combined to identify high users of total home care, nursing service was not a great influence given such a large proportion of the population did not receive nursing service.

The high nursing users were unique individuals since less than one-quarter of high nursing users were also high total users and even fewer were among the high home support users. Older long-term clients' functional dependence and chronic health conditions are not drawing on large amounts of nursing resources. The Home Care program, therefore is matching service provision to need, since the study did not find evidence of great nursing need in the majority of the population. The types of factors found to be predictors of high users of nursing service were clinically oriented which gives the results validity. However, most clients did not possess these characteristics. For example, skin ulcers produced the greatest odds of being a high nursing user yet less

than 5.0% of the study population had such a condition. High nursing users were unique from high total users and high home support users because their services were targeted for specific conditions that were not present in the population at large.

These findings suggest that high use of one type of home care service does not necessarily equate with high use of another type of home care service. This is in contrast to high user results in other health care sectors. For example, high users of general practitioners were also high users of specialists and other physicians (McColl & Shortt, 2006). Individuals frequently visiting emergency rooms were also frequent visitors to general practitioners and specialists (Blank et al., 2005; Chan & Ovens, 2002). The fact that high use of one category of home care was not associated with high use of another category of home care again speaks to the Home Care program matching services to need.

In all three high user categories, high user status was the result of the same pattern of service delivery. Those clients assessed as requiring a greater range of service, for greater durations, at greater visit frequency understandably became the high users. The service allocation to high users was such that these clients who comprised 10% of the population received a disproportionate number of visits, particularly for nursing. The high nursing users consumed 80.0% of the available nursing visits. Previous research on high users of health care services found disproportionate consumption as well (Reid et al, 2003, Roos et al., 1989). This finding speaks to the importance of examining high users due to the great discrepancy in service utilization.

Generally, the types of services high users received were not very different from the types of services other users received. However, home support service did present

with a somewhat different allocation pattern between high total users/other total users, and high home support users/other home support users. Over 80.0% of the clients in both high users groups required assistance with hygiene, dressing, nutrition-related tasks, and required supervision. While the respective other users also required assistance with hygiene and dressing, laundry and cleaning tasks were a significant feature of the services allocated to them as well. The proportion of high users and other users receiving laundry or housecleaning was the same in both groups (57.0% each for cleaning and 56.0% each for laundry). These support services were similarly provided to clients regardless of high user status, but once required, high users received them more frequently. Nearly all clients in this study were receiving IADL support from their caregivers and perhaps these types of tasks were still manageable for caregivers of clients with higher needs. When formal support for these tasks was required, the greater needs of the high users were reflected in higher visit rates.

6.4 Predictors of High Users of Home Care

6.4.1 Health Care System

The health care system, measured by the single variable of home care office, was a factor not addressed in much of the previous home care research. This office variable was predictive of high total users and high home support users, but not high nursing users. Even then, only two or three offices were associated with high users. It is difficult to discern whether the home care office coordinating care actually is not a factor when it comes to the volume of nursing service allocated to clients or if the provision of nursing service was perhaps too limited in this study population to properly gauge a home care office influence. Nonetheless, this study does provide evidence that an office effect can influence the amount of home care scheduled for clients. What cannot be determined from these results is whether the effect is due to staffing characteristics, namely among the case coordinators allocating service or the direct service providers; differing approaches or attitudes among management in some offices; or if the office association is in fact a proxy for some underlying, unmeasured community characteristic, be it community resources or the population in the communities to which the offices are aligned. Hypotheses from WRHA staff and other health care professionals consulted regarding this particular result suggest that the home care offices identified with high users were likely responding to unmeasured characteristics of particular populations in their community areas when higher odds were found, or direction from management/staffing issues when lower odds were found. This home care office relationship result certainly merits closer attention in future research.

6.4.2 Client Need

Most of the significant predictors in all three high user groups were client need characteristics, which is consistent with previous research addressing home care volume (e.g., Kadushin, 2004; Meinow, et al., 2005). The dominance of functional dependence as the major predictor of home care volume in previous studies is replicated in this study for two of the high user categories – total users and home support users. Both ADL dependence and IADL dependence were highly associated with being a high total user or a high home support user. As dependency or need on these indicators increased so did the odds of being a high user. IADL functioning had no influence on nursing volume and the effect of ADL dependence was modified in the high nursing user group because of its interaction with living arrangement. Level of ADL impairment was not associated with nursing volume if the client lived with others, it was only a significant predictor if the client lived alone. Even then ADL impairment did not produce the highest odds of being a high nursing user. That distinction went to presence of skin ulcers (odds ratio = 6.43). This type of interaction with living alone was not evident in the other user groups since level of ADL impairment was a significant factor regardless of living arrangement.

A different interaction emerged with ADL impairment as a predictor of high home support users. As level of ADL impairment increased, so did the odds of being a high home support user, but the odds were highest among clients whose caregiver could continue in caring activities. For clients with caregivers that could not continue in caring activities, the odds of high home support use increased with an increase in ADL impairment as well, but at a lower magnitude. At first this interaction may seem counter-intuitive, but it seems to be suggesting that the Home Care program is responding to

caregivers who are willing and able to care for and keep clients in the community, particularly those with the greatest level of dependence. Those caregivers may also be more insistent in getting home support because they feel they can manage the care, particularly when their efforts are complemented by formal support. Conversely, if a caregiver is not able to continue in caring activities, at higher ADL dependency levels the client would likely need to be considered for long-term care placement rather than continued higher volumes of support service. This interaction supports other research findings that formal home care services complement and support informal sources of care, not replace it (Lafrenière, Carrière, Martel, & Bélanger, 2003; Penning, 2002). This relationship is further evident in the finding that clients in this study received an average of 13 hours of informal support per week, a rate twice that of the 6.5 hours of public home care per week they received.

Regardless of its lower prominence as a predictor of nursing volume, level of ADL dependence was still only one of two characteristics that was a significant predictor in all three high user groups. The other predictor common to all high users was the client need characteristic of priority care level based on the MAPLe algorithm. The MAPLe algorithm was designed to serve as a decision-support algorithm for allocating home care resources based on the RAI-HC. Fourteen RAI-HC indicators from a broad range of assessment areas, such as ADL functioning, cognition, behaviours, and living environment, are considered in the derivation of a client's MAPLe score (Hirdes et al., 2008). Previous research demonstrates that the MAPLe algorithm is a strong predictor of placement in a long-term care facility, caregiver distress, and for a home care client being considered better off in another living environment than their current community setting

(Hirdes et al., 2008). In this study, higher MAPLe care levels were associated with greater odds of being a high home care user, and when it came to predicting high total users, odds of being a high user were further intensified at the two highest priority levels of the MAPLe algorithm if the client lived alone. The interaction with living arrangement exemplifies a home care program responding to clients in most need, since the potential of informal support is not as easily and readily accessed by clients living alone. It was beyond the capacity of this study to identify if the greater home care volume allocated to clients with higher MAPLe scores prevented or delayed an at-risk client in the community from being institutionalized. Such an examination would be useful in future research.

The remaining client need variables identified as predictors of high home care users demonstrate the different functions, and therefore different clients, addressed by home support and home nursing service. New client status associated with significantly reduced odds of being a high total user or high home support user is likely a reflection of a program approach to service allocation. A more judicious approach to service allocation may be initiated for clients new and unknown to home care staff until the full extent of a client's needs are realized. If that is the contributing factor to the association found, the argument could be made that new client status is more of a health care system variable within the Andersen-Newman model than a need characteristic, as it was positioned in this study.

Self-reported poor health was not a predictor of higher amounts of home support, but it was a predictor of higher amounts of total home care and nursing. The relationship of poor self-rated health in older adults and home care volume has been previously

studied, but the health indicator was not found to be a significant predictor (Kempen & Suurmeijer, 1991). However, the previous study combined both home support and nursing services in their home care variable. The significant relationship revealed in this study suggests self-reported poor health in this study population is reflective of some underlying biological process, perhaps not yet specified, or not detected by the physical health status indices in the assessment. Self-rated health may capture subtle symptoms of subclinical disease (Bosworth, Butterfield, Stechuchak, & Bastian, 2000), and the association between self-rated health and nursing volume may be attributable to unmeasured health status indicators.

Surprisingly, having at least one overnight hospital stay in the 90 days before assessment was significantly related to high home support use, not high nursing use. The significant relationship was a negative one, indicating the needs of the clients in hospital were more medical and were not having an impact on functioning and greater need for home support.

Once again, cognitive impairment indicators produced conflicting results with home care volume, as had been previously indicated in the literature review section. Cognitive impairment was a predictor only for high nursing use. It was not a factor in total home care or home support service amounts. For nursing, an interaction was discovered between cognitive impairment and caregiver distress. Increase in cognitive impairment was associated with higher odds of high nursing use only among clients whose caregivers were not exhibiting distress. Among caregivers exhibiting distress, an increase in cognitive impairment had a negative impact on the amount of nursing service received after the assessment. Perhaps the greater amount of nursing service provided to

higher impaired clients whose caregivers were not distressed was an effort to maintain the health of both client and caregiver. If that higher amount of nursing service was already in place at the time of the assessment, that clinical support may be the reason there was no caregiver distress. Conversely, if the caregiver was found to be distressed at the time of the assessment and the client had higher cognitive impairment, the client needs creating the burden may not have been in an area nursing could address. If the nursing service was in place at the time of the assessment and it was found to be ineffectual in meeting the needs of the client and/or the caregiver that may have contributed to the caregiver's distressed status at assessment.

In a study of adults with dementia, Forbes, Jansen, and colleagues (2008) found that among the individuals who received public home care, which was only 30.0% of the study population, nursing was the most frequent service, slightly more frequent than personal care. The authors suggested that the type of support needs that individuals with dementia require might not be adequately addressed by home care. The evidence from this study suggests nursing is not addressing all client and caregiver needs either when cognitive impairment is present, but still may be able to provide valuable support for certain needs.

Furthermore, the significant negative relationship in this study that client's decline in decision-making²³ had with high total home care use or high home support use was unexpected. Although further investigation indicated that the level of ADL functioning was largely independent for these clients, their cognitive impairment was at a moderate level that was higher than seen in the high total users or high home support

²³ Decline in decision-making was assessed from the RAI-HC item that questions whether the client has worsening in decision-making compared to status of 90 days ago (yes/no).

users. Forbes, Jansen, and colleagues (2008) propose that home care programs may be better able to meet the physical and functional needs of persons with dementia rather than their cognitive needs, which may be the circumstance in this study. Continued exploration is warranted to determine if the negative relationship revealed in this study is a reflection of home care not meeting the needs of older clients exhibiting declines in decision-making, or if those clients were having their needs met in a supported living environment instead.

Nonetheless, the findings from this study show cognitive impairment indicators are generally either not associated with home care volume, or are negatively related. If the negative relationship with amount of support service or nursing service when the caregiver is distressed is due to the fact that these clients are in, or are being transitioned into supportive housing or even a long term care facility, then the indication still is that home care cannot meet the needs of these individuals in the community.

The remaining client characteristics found to be predictors of high home care users are all disease related and not surprisingly, mainly associated with high use of nursing service. The one exception was stroke being associated with high home support use, not high nursing use. While the impact stroke has on functional ability and therefore home support needs is understandable, this particular disease diagnosis remained an independent predictor after controlling for ADL and IADL level of functioning.

However, a similar result was obtained in previous research of older home care clients (Fortinsky et al., 2004). Discussions with WRHA home care professionals indicate that clients who have suffered a stroke often are initially allocated quite substantial service amounts to assist the client and family with the traumatic sudden onset of care needs. It

may be that once initiated, the higher home support amount is not tapered off even when the client gains some improved level of functioning (L. Nichol, personal communication, June 4, 2008).

The other disease diagnoses associated with high nursing users highlighted in Table 6.1 have anticipated positive associations, with the exception of arthritis. The impact arthritis has on physical functioning would necessitate home support service rather than nursing service and that is reflected in the lower odds of high nursing among clients with arthritis. This negative relationship with home nursing is consistent with previous research (Marek, 1996). The positive relationship between diabetes and amount of home nursing found in this study has been documented in previous research as well (Fortinsky et al., 2004).

Already noted, the presence of skin ulcers produced the greatest odds of being a high nursing user. When Brega and colleagues (2003) found a significant association between skin ulcers and skilled nursing volume, they reported that more visits would be needed with this condition for wound care and dressing changes, which coincides with what was found in the pattern of tasks to high nursing users. Wound care ranked third in provision to this study's users and had the third highest visit rate. Likely the affected clients required a combination of tasks in other nursing categories as well, such as medications and therapeutic measures.

Peripheral vascular disease, glaucoma, and diabetes share the common feature of being chronic conditions requiring continued monitoring and/or treatment from nursing staff. These diseases' significant performance with nursing volume provides some insight into the chronic diseases drawing on home care's nursing resources.

The number of medications a client was taking did not register with high home support users, but was significantly associated with high total users and high nursing users. Given how medication-related tasks figured so prominently in the allocation of nursing service examination, a different finding would have been questionable. The relationship number of medications had with high total users was likely due to the nursing service component included in total home care use. Marek (1996) found that a prescribed medication regimen was the strongest predictor of home nursing volume, and concluded it was the result of time devoted to medication monitoring and teaching. Both of those tasks figured prominently in nursing allocation in this study as well.

The relationship that receipt of special treatments had with high nursing users alone, again is as expected since this indicator was composed of a wide variety of treatments²⁴ that reflected medical needs or services that could only be provided by professional skilled nursing staff or would create nursing needs after the treatment.

Andersen (1995) notes that he has been criticized for overemphasizing the importance of need characteristics in determining service use. He responded that evaluated need will be more associated with the kind and amount of services used, and this present study tends to confirm his argument.

6.4.3 Caregiver Need

Two caregiver need variables emerged as predictors of high home support users and high nursing users, but not high total users. The two variables, caregiver distress and caregiver ability to care, were involved in interactions with client need. How caregiver

²⁴ Specialty treatments included respiratory treatments, alcohol/drug treatment, blood transfusions, chemotherapy, dialysis, IV infusion, medication by injection, ostomy care, radiation, tracheostomy care

distress interacts with cognitive impairment among high nursing users, and how caregiver ability to continue care interacts with ADL dependence among high home support users was already discussed. What is notable is that none of the caregiver need variables were significant initially when they were entered individually into each of the high user multivariate models (see Tables 5.50 and 5.65). Caregiver need did not become significant until the interaction with client need was considered. Overall, the influence of caregiver need on home care volumes was minimal compared to client need. The few studies that addressed caregiver need in the literature review by Kadushin (2004) did not find a relationship between caregiver need and home care volume, but a recent study by Hawranik (2002) did suggest that such an association existed for older clients. This study adds to the literature highlighting a relationship between caregiver need and home care utilization among older adults.

6.4.4 Client Enabling

What was most striking about the client enabling results is that they too emerged most significantly when examined in interactions with other factors, namely client need or another client enabling indicator. Only one enabling variable – whether the caregiver was providing ADL care or not – had a significant (and negative) relationship with high nursing user status. The negative association suggests that when functional dependency is present the client is on home care likely for home support needs and therefore would be less likely to require higher amounts of nursing. The caregiver supporting such ADL needs may also be providing the type of care that could mollify the need for high use of nursing.

As indicated previously, the enabling characteristic of living arrangement was an important predictor of high user status when the client's ADL impairment of priority level for care were considered. Clients living alone with greater levels of need influenced both higher use of total home care and higher use of nursing service. In the review of the literature, living arrangement produced conflicting results in some studies when examined with home care volume (Kadushin, 2004). The evidence from this study suggests that home care research should not examine living arrangement independent of some other indicator of need.

The different results that caregiver relationship (spouse or non-spouse) produced among clients receiving above average amounts of informal care requires further exploration. Since non-spouse caregivers providing greater amounts of informal care were more likely to be supported by higher amounts of formal care than spouse caregivers, it needs to be determined why clients with spouse caregivers were at lower odds of being high users. Is it that spouses are better able to cope with the care demands than non-spouse caregivers? Perhaps spouses are reluctant to accept more formal care, or possibly home care is not as responsive to formal care needs when a spouse is involved. Data exists that indicates female caregivers in general, and wives specifically, are less likely to receive formal and informal support than men, with female reluctance to accept support as a factor (Bédard et al., 2005; Forbes, Jansen, et al., 2008). When client dementia is an issue some caregivers are reluctant to initiate use of services due to the stigma that surrounds dementia (Morgan, Semchuk, Stewart, & D'Arcy, 2002). The gender of the spouse was not examined in this study but merits attention given the interaction that was found. It could be that once formal care is initiated, as is the case

with this population, there is reluctance to accept greater amounts by female caregivers in particular or, due to stigma, reluctance from caregivers in general to acknowledge the greater amount of care the client requires.

6.4.5 Client Predisposing

Client predisposing characteristics had minor influence in predicting high home care use. Gender was a predictor of being a high home support user, with females being more likely to be high users. This association may be related to the discussion in the previous section where caregiver gender is a factor in formal support volume. Male clients likely had wives present to support their functional needs. For the most part, the female clients in this study either had a spouse caregiver or a child(in-law) caregiver. Both husband and children informal caregivers are more likely to seek and accept formal sources of support to assist in caring than are wives (Bédard et al., 2005; Forbes, Jansen, et al., 2008).

Clients age 85 or older were more likely to be high users of nursing service even after controlling for functional impairment, health status, and disease state. The relationship between health status and age is well established. With age individuals become more physically vulnerable to disease and illness and often experience a decline in various biological systems (Davitt et al., 2002; Prus, 2007). In the present study population, all relevant indicators of physical and clinical need may not have been addressed by the data, thereby allowing the age-health relationship to be a factor in high home care user status. Moreover, the professional nursing staff may be more inclined to

visit the oldest clients for continued monitoring and/or preventative purposes due to their vulnerable position.

Education was not a significant predictor of any high user categories. As a widely applied and validated indicator of socioeconomic status in health-related research (Prus, 2007), this non-significant finding with education likely is related to the fact that there is no income testing to access home care in Manitoba. There is universal access to the publicly funded program (Chappell & Blandford, 1987).

6.4.6 Interactions with Informal Care

The Andersen-Newman model was modified in this study to address previous criticism that the model did not illustrate the potential interactions between concepts and factors within the model. The approach taken in this study was valuable in determining which concepts are driving volume and allocation decisions and the complex interaction between factors, since six significant interactions were revealed. The common thread in all the interactions identified and discussed was the involvement of some aspect of the informal support system – caregiver relationship, caregiver's ability to care, caregiver distress, amount of informal care, or living arrangement. With the exception of one interaction (amount of informal support and caregiver relationship), informal support was interacting with client need – ADL dependence, cognitive impairment, and level of care need (MAPLe). This study shows that although client need is obviously the greatest influence on the amount of home care service allocated, volume is affected and modified by additional factors, namely those related to the informal support system.

The interactions reveal the intricate relationship between informal care and formal care. Chappell and Blandford (1991) suggested, and others concur (Lafrenière et al., 2003; Penning, 2002) that a complementary relationship exists between informal and formal care in that tasks are shared between the two systems. Formal care is utilized when health deteriorates to a level that informal caregivers require support to cope or there is a lack in the informal network. The two systems are complementary since a sharing is created when the informal network cannot meet all the demands for care or informal support is less available.

This complementary relationship in home care is evident from some of the significant interactions in this study. Individuals living alone were more likely to be high users of overall home care and nursing service as their care level or level of ADL dependency increased. However, the complementary relationship seems to have a limit. As discussed previously, if a caregiver was willing and able to continue providing care, the likelihood of a client being a high home support user increased dramatically as ADL dependency increased. The high user-ADL dependency relationship, while still present, was not as dramatic if a caregiver was unable to continue in caring for the client. Moreover, the complementary relationship may be service-specific since as discussed previously as well, caregiver distress did not increase the likelihood of higher nursing service for clients with increasing cognitive impairment.

As identified in this research, interaction terms are an important component in home care research to clarify the relationship or linkages between factors in the Andersen-Newman model and serve to improve the explanatory power of models focused on home care utilization. Most authors pointed to exploring interaction of factors with

need variables (Bass et al., 1992; Calsyn & Winter, 2000) but particularly need with informal support (Penning, 2002) and this study confirms the importance of including such interactions in predicting high use of home care.

6.5 Implications of the Research

6.5.1 Research Implications

This study has implications for both home care research and home care policy. At the research level, this study extends the knowledge about factors associated with the amount of home care allocated to clients in a program and the predictors of specific home care service volumes, in this case, home support and home nursing services. It is important to note that the predictors for high total users and high home support users were dissimilar to the predictors for high nursing users. Even between the high total users and high home support users, which were comprised largely of the same clients, the predictors for the two groups had variation. These results further reinforce that different factors are involved in the volume of home care provided to clients, depending on the service in question. To ignore this service-dependent factor in home care research could result in meaningful associations being obscured. The results would therefore be limited in their evidence for programs that are trying to target populations and services appropriately. This implication identified by the current research echoes the earlier indictment by Wolinsky (1994) when he stated that undifferentiated measures of home care volume are limited in utility and hamper policy discussions.

Similarly, different home care utilization patterns emerged in this long-term, population (e.g., the proportion receiving home support or nursing care) than in general

home care populations with length of stay undifferentiated (Forbes et al., 2003), or short-term clients (Laporte et al., 2007) examined in previous research. The population under study is also a critical component to consider when conducting home care research and interpreting results. This study contributes to the evidence that the characteristics differ between long-term and short-term clients. Older, long-term clients have chronic functional needs while short-term clients have acute, medical or rehabilitation needs (Laporte et al., 2007). Therefore, different client characteristics will emerge with not only the type of service examined, but with the length of service provision. To ignore this length-related feature of home care use will also distort research results and again may limit their relevance.

6.5.2 Policy Implications

At the policy level, merging the two program information sources as was done in this study provides a wealth of information important for program evaluation, planning, policy purposes, and decision-making ability. A profile was composed of the older, long-term, community-coordinated client, the resources they are utilizing, and the potential impact an aging population could have on the Home Care program in the future. The result of a study such as this is that program staff better understand how services are being used and can target different groups in a more meaningful manner. It is important for health care professionals and policy makers to gain insight into the factors that account for the amount of care that home care clients receive. By focusing on the high users of home care, a program can determine if strategies are required to encourage more

prudent use of service or if the development of an economical alternative form of care is necessary.

Undoubtedly, one of the critical components of home care program evaluation is information regarding service use patterns and client profiles. The factors that influence home care utilization need to be understood to be able to have an informed discussion about the distribution of resources for home care service. As most home care programs are experiencing the pressure of limited resources in a burgeoning program, this is vitally important. This study's information can improve the accuracy of estimation of service needs of older long-term clients in the near future to support more effective planning for the provision of home care. Moreover, as an important feature for program monitoring, this research provides a baseline to compare client profiles and resource utilization over time.

Analyzing client profiles and service characteristics provides an evidence-based model for home care. Critical in this analysis is whether or not appropriate indicators of need are determining higher service use or if other factors are affecting allocation of service. This study confirms current services are being allocated in agreement with program policies and goals of the WRHA. Need indicators were the dominant predictors of the amount of home care service allocated to older, long-term clients. The contribution of predisposing, enabling, and health care system characteristics were minimal by comparison.

Overall, the study results indicate that higher allocation of home care service is essentially driven by client need. Yet, one needs to be mindful that while more service was provided to those most in need, this study did not examine if the volume of service

was adequate to meet needs. Whether the higher volume of home care was sufficiently meeting client needs or if some needs were still inadequately addressed should be examined in future research. Within their policies and terms of provision, the WRHA Home Care program is able to provide more hours of care and a broader range of service than some other home care programs in Canada. Nonetheless, the non-significant and negative associations that cognitive impairment indicators had with amount of care, namely home support service, suggest further examination of the care needs of those clients is warranted. Previous research reports that 9.0% of individuals with dementia indicated their health care and home care needs were unmet (Forbes, Jansen et al., 2008).

Implications of unmet need is not reserved for the home care clients alone. The caregivers to these clients figure prominently in supporting care needs. Weekly informal care hours were double the amount of weekly formal home care. But caregiver need did not figure independently in the study as a predictor of home care volume. Instead, caregiver need interacted with client need to *decrease* the likelihood of higher amounts of home care. Moreover, compared to non-spouse caregivers providing above average amounts of informal care, spouses providing above average amounts of informal care were less likely to be supported by higher amounts of home care in general and home support service specifically. These findings imply the WRHA Home Care program needs to provide greater attention to informal caregivers in general and spouse caregivers in particular. An initiative underway in the WRHA will address that very issue. The WRHA Home Care Program is addressing caregiver need issues through a Caregiver Support Strategy, which will provide enhance services that better support caregivers (Trinidad, 2008).

The variations in statistically significant predictors of home care volume in comparison to previous research are due to different approaches and methodology in the present study, but as Meinow and colleagues (2005) point out, are also an indication of the different programs and policies leading to formal, public, home care utilization. While the policy implications of the results of this study are specific mainly to the Winnipeg Health Region, the findings do have some implication for other jurisdictions, such as Ontario for example. In Ontario, personal support/homemaking services are provided only up to 60 hours per month, although additional hours can be provided in extraordinary circumstances (CHCA, 2008). The high users of home support identified in this study received at a minimum 13.9 hours or more home support service per week. This figure translates into a minimum of 61.5 hours of home support service in 31 days and therefore is nearly identical to the cap imposed on home support in Ontario. These results serve as an indication to Ontario which client needs would contribute to over-protocol clients if they were to consider removal of the hourly home support restriction.

In addition, the capacity to work at the task level for service information, in concert with assessment information, could prove important for program initiatives. As an example, the WRHA, similar to other jurisdictions, are currently introducing the concept of delegated tasks into the Home Care program, where tasks traditionally provided by nursing staff are provided by specially-trained home care attendants (WRHA, 2006). The high user findings in this study identify tasks that are prominent in home care. This information could aid in identifying a task for potential delegation. The combined service and assessment data could define the impact delegation would have on the volume of nursing visits as well as provide a profile of the affected client. Reviewing

task scheduling on an on-going basis would identify other tasks that are useful candidates for delegation, specific to identified criteria, such as volume of visits and clients shown to be at minimum risk.

A final important policy implication of this study is related to the long-term use of home support service by older adults. It is important to note that the WRHA Home Care program provides laundry and light housekeeping, free of charge, to those in need. This is in contrast to many other programs in Canada (CHCA, 2008). This study shows how important home support in general and these two service categories are in the allocation of services to older long-term home care clients. Over half of the study population received cleaning or laundry services and this proportional allocation was consistent regardless of high user or other user status as well. A major home care policy debate in Canada involves the issue of long-term maintenance and preventative home care, which includes services such as laundry and housekeeping. The current focus of the Federal government is on short-term and post-acute (i.e., nursing) home care for Canadians (Kirby, 2002; Romanow, 2002). Hollander and colleagues have been providing evidence, and are vocal in their insistence, that home care priorities need to be rebalanced so that the importance of long-term and home support services are recognized, particularly for older adults (Hollander, 2003; Hollander, Chappell, Prince, & Shapiro, 2007). Forbes, Jansen, and colleagues (2008) echo this sentiment and advocate for supportive services to be included in a core set of services provided in provinces to permit older Canadians to age in place. The empirical evidence from this current research only reaffirms the important role that personal support and homemaking service has in supporting frail older adults in the community. Home care priorities that focus

only on short-term and post-acute care would not be addressing the needs of older adults and an aging population.

6.6 Study Strengths

The present research has many strengths, in particular strengths related to the high user research approach, the data sources utilized, and the population perspective that was sought in the study.

6.6.1 High User Approach

Identification of high users of health services and the characteristics associated with an individual becoming a high user have been important objectives of research in the areas of primary care and acute care service utilization. Studies in the high user arena have been instrumental in describing health service use patterns and revealing whether high users are those individuals who do require the greatest amount of service. The high user research has illuminated potential strategies and/or programs in the service areas studied that are needed to minimize high use or to address the needs of high users more appropriately.

The 'high user' approach has not previously been used in studies examining home care utilization. In light of increasing home care costs, and anticipated future growth in this sector, high users of the service are an important population to understand, as has been done for other sectors of health care. Development of an explicit focus to describing and understanding high users of home care confers a number of advantages. For one, the approach allows comparison of the characteristics of high users across

sectors of the health care system. Secondly, the approach provides a generic approach to client examination that is not specific to any one home care program. The approach therefore supports explicit comparisons both across home care programs as well as across categories of home care provision (e.g., total service use, home support services, and nursing services). As Foster and colleagues (2006) suggested in their study of frequent users of primary care, using the percentile approach to define high users of a service, as was done in this study, provided them more meaningful comparisons between practices. This strength certainly extends itself to home care as well.

This study establishes that the high user approach provides meaningful evidence regarding the characteristics of individuals who are high users of home care and whether services are being allocated in relation to need. Finally, the concept of identifying persons who are high users resonates with service providers, and makes it easier to translate findings from research about the relationship between use of services and need into more actionable programmatic guidance for provision of services to clients.

6.6.2 Data Sources and Linkage

The data sources utilized in this study were a major strength due to the richness of information provided by the assessment and service data, as well as their linkage to further maximize their utility. The RAI-HC assessment data is composed of over 300 standardized, reliable and valid items. Due to the breadth of information collection, the RAI-HC data contained extensive information on client and caregiver characteristics shown to be relevant in the literature to home care utilization and therefore necessary for inclusion in this research. The established psychometrics of the RAI-HC assessment

from previous research and the good quality of the data identified in this study provided a high level of confidence in the results. The comprehensiveness of the client data in this study allowed the research to address limitations that other authors cited in their own home care research, such as lack of important client variables (Laporte et al., 2007).

Use of administrative data from the WRHA Home Care program's scheduling system provided a second source of rich home care service information for this study that complemented the RAI-HC data well. The Procura service data was able to provide task-level information for home support and nursing service that was necessary for an in-depth examination of service provision. As a result, use of this data provided a level of detail for home care utilization research not seen in other Canadian home care studies, while other important dimensions of service utilization such as duration and frequency were still captured. The service data could address limitations noted in previous home care provision research as well, such as inability to identify specific tasks scheduled for clients (Laporte et al., 2007; Meinow et al., 2005), or no information on the amount of home care clients received (Forbes et al., 2003).

The two data sources used in this study were strong research resources on their own, but by linking the comprehensive client assessment data and the detailed service provision data, the research opportunities were magnified. A unique perspective on the utilization of home care resources could be obtained. Previous home care volume literature indicated that different home care services would have their own unique client and contextual predictors (Bass et al., 1992; Diwan et al., 1997). Those relationships could be examined and identified in greater depth in this study because of the strength of the data sources working in combination.

In addition, this study was able to avoid problems inherent to self-reported data by using a home care program's standardized assessment and service data. The validity of self-reported use of health care services is often a limitation in general, but previous researchers point specifically to difficulties with data on home care utilization based on self-reports from users (Bass et al., 1992; Diwan et al., 1997). At issue is the difficulty for clients or family members to recall details about service use, particularly when seeking information on volume of service use. To provide a more accurate measure of home care service utilization, both authors advocate for service data collected in home care agencies' information systems. Use of these form of service data also eliminate the effect of non-response bias that can occur with health survey data. As Gundgaard and colleagues (Gundgaard, Ekholm, Hansen, & Rasmussen, 2008) indicate, health survey data may underestimate health service utilization as well as lack a representative population when non-response among invited participants is systematically related to particular study variables.

Moreover, Diwan et al. (1997) contend that use of agency-based (program) service data in research provides more practical information for program planners and the research findings are more relevant to evaluation of the agencies' programs. The result is information that is more meaningful and useful to program staff.

6.6.3 Population Perspective of Home Care Utilization

The strength of the study population in the present research deserves final mention. All older long-term clients in the WRHA Home Care program were targeted for this study. By using a population-base approach, the study provided an in-depth

understanding of home care services received by a population in an urban setting. The study was better able to identify the impact of programmatic decisions as a result. By targeting a particular population that is typically the largest home care population at any one point in time, the size of the study population could avoid issues inherent to small sample sizes, such as limited information, lack of statistical power and inability to detect significant associations. The study population's size further strengthened the ability to differentiate between types of home care service users. Carpenter and colleagues (2004) suggest that evidence-based home care service delivery and organization require large-scale studies based on precise comparable standardized information, and this study meets those criteria.

6.7 Study Limitations

There are several limitations of this study which merit consideration. None of the data sources utilized identified which clients were living in assisted living or supportive housing. These supported living environments available to older adults in Winnipeg provide services such as meals, housekeeping and laundry. In supportive housing there is the addition of 24-hour support care and supervision (Mitchell et al., 2008). Clients in these settings tend to rely on nursing services from the Home Care program, if home care is required, but some clients do receive additional home support services. In those cases, the clients would be included in this study population since they would have both home support and nursing services scheduled.

Of particular concern is the finding by Mitchell and colleagues (2008) that supportive housing clients are much more impaired in certain characteristics, particularly

cognition, than other home care clients. Yet their higher levels of need would not equate with higher home support in this study since the supportive housing staff would provide much of that form of care, and the service from the Home Care programs home support staff would be minimal by comparison. The potential discrepancy in characteristics and home care volume created by clients in supportive housing and assisted living was limited in this study since these clients comprise about only 10.0% of home care clients (Mitchell et al., 2008) and even fewer would need additional support from home care (and therefore be included in this study). Nonetheless, this issue is still noteworthy due to some of the findings that emerged.

Two forms of missing data should be considered too. First, this study could only examine home support and home nursing services provided to older clients. Clients do receive therapy services as well, but since the WRHA contracts out that service to a private agency, their data is not captured in the Procura scheduling system, and therefore could not be examined. However, the results section indicated that few clients in this study population were receiving any type of therapy services. Table 5.4 revealed that based on items in the RAI-HC assessment, only 7.0% of the clients received any form of therapy in the week before their assessment, be it exercise therapy, occupational therapy, or physical therapy combined.

The other missing data to note is the loss of many older clients in this study who had a RAI-HC assessment but no service information scheduled in Procura following the assessment. As already specified, this loss could be due to the early state of implementing the Procura system for scheduling home support service in the WRHA Home Care program at the time of this study. The result of this data loss would affect the

home support service examination, in that the proportion of older, long-term, community-coordinated clients allocated home support may be underreported.

It is also important to recognize that the duration of nursing visits scheduled in Procura are not verified for payroll purposes, unlike the home support visits. Therefore, the volume of nursing hours identified in this study represent the assessed need of the client and may not represent what the client actually received. Discussion with WRHA staff indicated that what is scheduled would be an accurate depiction of what was received for the most part, although situations do arise where visits may be cancelled or durations are altered. Nonetheless, what was found in the scheduling data is an accurate indication of the nursing volume assessed as required, but the distinction between scheduled and received still needs to be restated.

Of last note is the generalizability of these results outside of Winnipeg. The service allocation patterns illuminated in this research are not easily transferable to other jurisdictions. Moreover, the service allocation examination was restricted to the older home care population and therefore does not represent service provision to clients under the age of 65. The type and amount of service allocated to home care clients in Canada is in accordance with the region's policies, many of which differ significantly from what is mandated in the Winnipeg Health Region. For example, the high users identified in our home support group would not exist in Ontario due to their policy of restricting public personal support/homemaking hours to 60 hours per month (CHCA, 2008). Similarly, the allocation of laundry and light housekeeping service, which is a large component of home care service for this study population, may be restricted in its availability to public home care clients in British Columbia (CHCA, 2008; Hollander, 2003). Any comparison

of this study's results to similar research in other jurisdictions in the future needs to be mindful of the context of home care provision in the programs involved.

6.8 Future Research

Numerous areas for future research have been alluded to in previous sections of this final chapter and are restated here along with other initiatives. The relationship between home care office and home care volume merits further attention. Home care research in Canada has focused more on home care utilization differences based on region (Laporte et al., 2007; Peterson, Shapiro, 2004, & Roos, 2004) rather than office. Future research with a home care office variable should focus on better exploring potential staffing or community influences on home care resource utilization.

The issue of unmet need is an important consideration in future home care research. Even though this study identified that client need was essentially the main contributor to higher amounts of home care service, the adequacy of the amount was not examined. The results of this study identify two areas of focus. One would be further clarification of why clients with non-spouse caregivers providing higher amounts of informal care were more likely to have more home care than spouse caregivers. Are spouses who are providing greater amounts of informal care putting themselves at increased health risk by either not accepting formal support or is the program not as generous with spouses due to potential expectation of caring from women? Including the caregiver gender in future research may better clarify this interaction.

A qualitative research approach may better lend itself to exploration of unmet need among home care clients and their caregivers. Forbes, Markle-Reid, and colleagues

(2008) applied such a methodology to gain in-depth caregiver perspective of the use of home care and other community services. By integrating the results of a qualitative study with the quantitative results provided by this present research, conclusions and inferences are possible that may be more comprehensive and meaningful for program and policy development (Tashakkori & Creswell, 2007).

The other focus for potential unmet need should be on the negative relationship cognitive impairment had with high use of home support service. The role that supportive housing may be playing in terms of supporting individuals showing decline in decision-making in particular would be useful information for the Home Care program. In general, an examination of the differential service utilization patterns of clients in assisted living or supportive housing compared to home care clients in the community would be useful to better understand where additional service for these clients is still required once living in a supported environment.

Future research should examine whether service provision differs in younger home care populations as well since this study focused only on older clients. Service allocation patterns to the younger population may have different implications for home care programs due to the potential longer length of time service may be required. Moreover, the other home care populations that merit examination of service provision are the short-term clients and nursing-coordinated clients since they were excluded from this study and seem to be the focus of the Federal government.

To inform the national home care debate on the role of home support services, particular categories of home care service should be further examined for their predictors of use, such as Forbes and colleagues (2003) did in their study of the housework

assistance category of home care. The regional data utilized in the present study would provide sufficient sample size to look in-depth at cleaning, laundry, or any of the specific home support categories and the client profiles attached to particular categories. Such an investigation could provide information on possible risk to populations if such services were limited or unavailable to clients as well as whether the appropriate populations are receiving particular service categories. Nursing categories would prove to be more difficult to examine in this long-term population since so fewer clients received the service, but certainly the medication category and therapeutic measures could be examined.

It was beyond the scope of this study to examine the outcomes of high use of home care service. An important sequel to the present research would be a follow-up of the 2004 cohort to determine whether the greater volume of service provided particular benefits, such as preventing or delaying institutionalization, improved client status, or minimized the use of other services, namely acute care. Does the higher levels of service provided to high users lead to better quality of life for clients and caregivers or do they represent less effective use of resources? More than half of the high total users in this study population were clients ranked as in high or very high need of care on the MAPLe algorithm, which places them at increased risk of institutionalization (Hirdes et al., 2008).

A longitudinal research approach would be beneficial for examination of home care volume from another perspective. As the literature review in this thesis demonstrated, longitudinal studies of home care utilization are rare. Yet, such an approach would better inform the trajectory of high use of service. Is functional decline gradual and therefore potentially modifiable before high use occurs? Are there abrupt

events that put older adults at greater risk of high use, such as fractures or stroke? The timing of events that lead up to high use of home care services would be enlightened by longitudinal research.

In another area for future investigation, the review of the high user literature produced in other health care sections identified that high users of one form of health care service is associated with high use of other health care services (e.g., Blank et al., 2005; McColl & Shortt, 2006), but whether this association is maintained in high home care users has not been investigated. The evidence from this study indicates that high use of one category of home care service does not result in high use of another category of home care service - high home support users were not high nursing users. Whether this result suggests high home care users would not be high users of other health services is unknown due to lack of research on high home care users. However, a previous study did identify that among older home care clients (with amount of care unspecified), nursing home residents, and community-dwelling elderly, the home care clients were higher users of other health care services, such as inpatient hospital care, emergency room visits, and ambulatory procedures, compared to the other two groups of older adults (Wilson & Truman, 2005).

Lastly, now that Procura is a normal part of operation when scheduling home support service in the Winnipeg Health Region, it would be useful to do a follow-up project to identify any differences in service allocation patterns when a fuller complement of the home care population would be available. The follow-up should attempt to integrate therapy service provision into the research as well.

6.9 Conclusion

The objectives of the study were to profile older, long-term, community-coordinated clients receiving public home care in Winnipeg, Manitoba; to examine their service allocation patterns; and to identify the client and contextual characteristics related to high users of home care services. Linking two rich data sources from the WHRA Home Care program allowed the study objectives to be met. Moreover, high users of home care services were examined by applying a high user methodology commonly used in other health services utilization research.

The data sources utilized in this study were able to provide a unique look at home care utilization. This study was able to illustrate the wide range of characteristics and needs of older, long-term, community-coordinated home care clients. The examination of service allocation indicates that these clients are drawing largely on home support and very little nursing service. Personal care and homemaking services figure prominently in this population. However, informal support plays an important role in maintaining these clients.

The high user methodology revealed that client need is the major contributor to predicting the high users while other characteristics play a lesser role in the amount of home care allocated to these clients. This study establishes that the high user approach provides meaningful evidence regarding the characteristics of individuals who are high users of home care and whether services are being allocated in relation to need. The high user approach merits continued application in home care utilization research to ensure clients most in need are in fact the clients receiving the most home care and to provide continued monitoring for program planning and evaluation.

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APPENDIX A:
DATA QUALITY CHECKS AND DATA CLEANING

Data Quality Checks and Data Cleaning

Data quality checks and cleaning were carried out separately for the Procura home care service data and the RAI-HC client assessment data. The initial focus was on the Procura data. Once the Procura data were checked and cleaned they were merged with the RAI-HC assessment data to identify which clients had service provision data. Additional checks were conducted to achieve the final dataset used for analyses in this study.

Scheduled Home Care Service: Procura Data Cleaning

The original Procura dataset received for this study contained 2,546,384 home care service records for 6963 home care clients. Data cleaning focused on removing illegitimate records due to inappropriate task codes or out of range values.

Inappropriate Task Codes

The inappropriate task codes identified in the data fell into three categories: 1) cancelled visits; 2) comment records; and 3) unidentifiable task codes.

Cancelled visits – when direct service staff visit a client and the client is not home at the scheduled time, the visit remains in Procura with a code identifying that the client was not home. These visits were removed from the study data since no hours of service were actually provided to client. Only a few nursing records had any ‘client not home (P1)’ codes and they were removed from the data (n=6 records).

Comment records – staff can insert comments into the task category code section of the Procura software to flag particular actions for care. As a result, several records had descriptors instead of codes in the task category section, such as ‘COMMENT’,

‘CUSTOM’, ‘FAMILY’, ‘OBJECTIVE’, and ‘SITUATION.’ Since these records do not reflect any tasks the client received, they were removed from the data (n=1303 records).

Unidentifiable codes – several tasks were found in the data that were not codes used by the Home Care program, such as ‘S05’ or identified that a system error had occurred, such as ‘NP5.’ These illegitimate codes were removed from the data (n=83 records).

When the records with illegitimate task codes were removed for the study’s Procura dataset, the number of clients remained the same, but the number of records dropped to 2,544,992.

Out of Range Values

Examination of the Procura data revealed out of range values in two areas: 1) the number of tasks allocated at the visit, and 2) the visit duration.

Excessive Task Allocation – Communication with WRHA staff revealed that direct service staff would not be assigned to perform more than 30 tasks at a visit, although there would be some legitimate visits with slightly more tasks assigned (Don Thiessen, personal communication, August 11, 2005). While the visit would be legitimate, the task assignment likely would not be accurate. To err on the side of caution, visits with more than 35 tasks assigned were considered inappropriately coded. The visit date, duration, and provider type were kept in the dataset, but the tasks codes were removed. A total of 483 visits to 28 clients had excessive task assignments. Removal of the excessive task records reduced the dataset by 24,995 records, to a total of 2,519,997 records, but the number of clients was not affected and remained at 6963 home care clients.

Durations – Communication with WRHA staff revealed that the amount of time assigned for a visit’s duration should not be lower than one minute or exceed 12 hours.

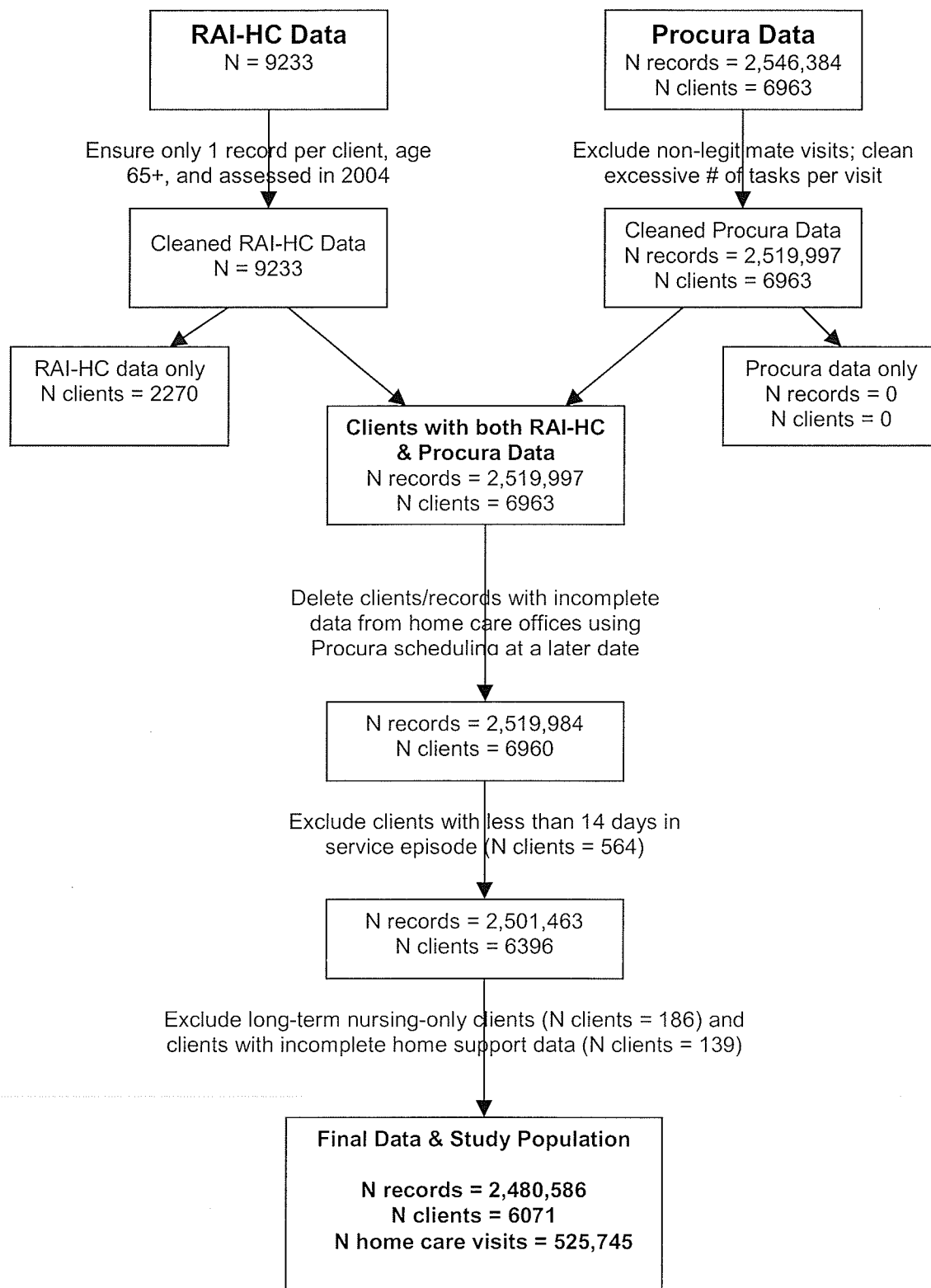
Examination of the data revealed that 6746 visits had durations less than 1 minute and 1582 visits had durations greater than 12 hours. The duration values for those visits were coded as missing and all of the other variables for the affected visits were retained. This duration cleaning process did not affect the number of clients or the number of records that remained in the Procura dataset. The final, cleaned Procura dataset merged with the RAI-HC assessment data contained 2,519,997 records for 6963 home care clients. The flowchart in Figure A1 depicts the process for cleaning the data for this study and the final number of records and clients in the study.

Data Checks on Merged Data

After the Procura data were merged with the RAI-HC assessment data it was possible to refine the study population to those clients with both assessment data and service provision data. Of the 9233 older home care clients with a RAI-HC assessment, only 6963 had any scheduled service information in the Procura system. Therefore, 2270 clients were removed from the study population.

After the data were merged it was also possible to identify clients who were from home care offices where use of Procura for scheduling home support services occurred at a later date, to an extent that it would affect the completeness of the client data for this study. Three clients in the RAI-HC dataset were identified as having incomplete data due to these circumstances and they and their 13 Procura service records were removed from the study dataset.

Figure A1: Flowchart – Data Cleaning and Creation of Final Study Population



Clients with RAI-HC data were then excluded if they did not have 14 days of service in the service episode created from the Procura data. If the time period from the date of the client's first home care visit record to the date of the client's last home care visit record created a service episode of less than 14 days, the client was excluded. This exclusion criteria was instituted since clients with less than 14 days in their service episode could potentially be missing information on services that the Home Care program provides only once every two weeks, namely laundry and light housekeeping service. As indicated in Figure A1, 564 clients had less than 14 days in their service episode and were excluded from the study population.

The final check on the merged RAI-Procura dataset was on the clients who only had nursing visits in their Procura service data. Two possible scenarios would result in these long-term clients having only nursing service. The first scenario would be that the client's home support service was not yet entered into the Procura system. Most home care offices were not able to schedule home support visits in Procura immediately for all clients. Due to workload pressure, it could take several months before all clients had that information in the system (Don Hilder, personal communication, March 17, 2007).

The second scenario could be that the client was a long-term nursing-only client, that is, the only type of service the client required was nursing service. These clients tend to be short-term clients but a small proportion of nursing clients have long-term nursing needs. Some long-term nursing coordinated clients received assessment with the RAI-HC since its implementation in the program, but by 2005, this practice had ceased (L. Orlikow, personal communication, April 4, 2006). Due to lack of consistency in assessing long-term nursing coordinated clients, and to be consistent with the current

policy of using the RAI-HC to assess only long-term community coordinated home care clients, nursing-only clients were to be excluded from this study.

To check for the first scenario, clients with incomplete home support service data, information was examined in the RAI-HC assessment pertaining to home care services provided. If the assessment indicated the client was receiving home support service (indicated as home health aide or homemaking service in the RAI-HC) but such service was not reflected in the Procura records, the service data were considered incomplete and the client was excluded. From this examination 139 clients were identified as having home support service in the RAI-HC assessment, and were therefore considered to have incomplete home support Procura data and were excluded from the study population.

To address the second scenario, that of the nursing-only home care client, the clients were again identified first through the Procura data, where only nursing services were recorded. Examination of service provision in the RAI-HC assessment for these clients identified that they had not received any support services in the week before their assessment. This examination resulted in only 186 clients being identified as nursing-only clients, and they were excluded from the final study population.

As is depicted in the flowchart in Figure A1, the final study population consisted of 6071 clients with 2,480,586 home care service records. The number of service records was excessive since at each visit, each task that was scheduled for the client was depicted as its own record in the Procura system. For example, at a visit where the client was scheduled to receive 12 tasks, that visit would create 12 separate records in the Procura data. Given the number of tasks usually assigned at each home care visit, particularly for home support visits, it is understandable how 2.5 million records are generated in a 3-

month period. To make the Procura data more interpretable, the task records were grouped by their unique visit identifier. Once grouped in this manner, it was revealed that the final Procura dataset encompassed 525,745 home care visits to the 6071 older long-term clients.

Home Care Client Assessment Information – Cleaning RAI-HC Data

Once the final study population of 6071 clients was identified, the RAI-HC assessment data for these clients was checked for any quality issues. Frequencies of the assessment variables revealed there were no missing data and all of the values for each assessment variable had the appropriate range of codes. There are several methods that can be used to assess the overall quality of data and the integrity of coding items in the RAI-HC assessments. The Cronbach alpha statistic provides a measure of the reliability of a scale (the internal consistency) based on parallel items. Table A1 shows the Cronbach alpha statistic for three scales in the RAI-HC: the Depression Rating Scale (DRS), the Activities of Daily Living (ADL) Long Form Scale, and the Instrumental Activities of Daily Living (IADL) Summary Performance Scale. For RAI instruments, a cut-off of 0.70 for the alpha statistic is considered acceptable reliability and an alpha value of 0.80 or higher is considered an excellent indicator of reliability (Hirdes et al., 2007). The values are excellent for the ADL and IADL scales but not quite acceptable for the Depression scale. The Depression scale is known to provide lower alpha values than other measures in RAI-HC instruments, but still acceptable statistics (Hirdes, Poss, & Reidel, 2005). Overall, examination of the scales indicates good reliability in how the home care data were coded.

Table A1: Cronbach Alpha Statistic for Study Population Using Three RAI-HC Scales

Items	Cronbach Alpha
Depression Rating Scale Items	0.62
ADL Long Scale	0.91
IADL Summary	0.84

A second method used to check the quality of the data was through an examination of correlation measures. Measures of association among clinically related variables can serve as indicators of convergent validity. Table A2 outlines the level of association among related variables in the WRHA RAI-HC data. All the associations are in the anticipated direction and at a magnitude similar to previous research (Poss, 2006) which indicates again good data quality overall.

Table A2: Spearman Correlation Coefficients for Selected RAI-HC Items

Items	Spearman Correlation Coefficient	Lower Confidence Limit	Upper Confidence Limit
Expression with Comprehension (C2 with C3)	0.60	0.58	0.61
Dementia diagnosis with CPS*	0.59	0.57	0.61
Memory Short-term with Procedural (B1a with B1b)	0.54	0.52	0.56
ADL Long Scale with CPS	0.27	0.25	0.29
Arthritis diagnosis with Pain scale	0.30	0.28	0.32
Psychiatric diagnosis with Depression Rating scale	0.20	0.18	0.23
Pain scale with CPS	-0.21	-0.23	-0.19
Bowel incontinence with CPS score 3+	0.20	0.18	0.23
Vision diagnosis and vision problem	0.15	0.13	0.18
Better off elsewhere with Caregiver stress	0.17	0.15	0.20

* CPS = Cognitive Performance Scale

The final method used to check the quality of the RAI-HC data was to examine logical coding in assessment item pairs. For example, in the home care assessment, one check for logical coding is if the assessment indicates the client is totally dependent on others for locomotion in the home (item H2c), then the assessment should *not* indicate that there was an instance of the client wandering in the same timeframe (item E3a). There were 52 such logical data coding checks examined for the RAI-HC data. A summary of the percent of assessments with inconsistency in coding among the checks is presented in Table A3. This examination of the data found considerable consistency in the coding checks. Most of the checks revealed inconsistencies in 1.0% or less of the total assessments. There were some items where coding discrepancies were more prevalent. One check of medication management revealed that among clients not receiving any medications (item Q1), a small percent were still assessed as having some form of IADL self-performance for medication management (item H1dA) in the same assessment timeframe (2.0% of assessments). Discrepancy in coding Formal Care Service Utilization (section P1) items is where greatest coding inconsistencies occurred. In particular, the number of days of formal care for home health aides, physical therapy, visiting nurses, homemaking services, and meals is being entered in the assessment but the corresponding number of hours and/or minutes is not. The percent of assessments affected by logical coding discrepancies is small overall (less than 4.0% for any one coding check), and again confirm the good quality of the assessment data.

Table A3: RAI-HC Logical Coding Data Checks

Data Check	Affected assessments - % (n=6071)
Date case opened (CC1) before date of birth (BB2a)	0.0
Date case opened (CC1) after date of assessment (A1)	0.5
Mood indicators (E1a through E1i) equal zero and mood decline (E2) equals 1 (one)	0.8
Wandering (E3a) equals '1' or '2' and locomotion (H2c) is greater than or equal to '6'	0.0
G1fA and G1fb are both equal to '1' (spouse)	0.2
No primary caregiver (G1eA=2) and G1Fa through G1La are completed	0.0
No secondary caregiver (G1eB=2) and G1Fb through G1Lb are completed	0.0
No primary caregiver or secondary caregiver (G1eA and G1eB=2) and caregiver status (G2d) equals zero	0.02
Medication management did not occur (H1dA=8) and Q2 drugs (Q2a, Q2b, Q2c, Q2d) equals '1'	0.1
Number of medications (Q1) equals zero and medication management is not equal to '8' (did not occur) and vice versa	2.1
Number of medications (Q1) greater than zero and medication management (H1dA=8)	0.4
Any of Q2 drugs (Q1a through Q2d) equals '1' and number of medications (Q1) equals zero	0.4
Locomotion inside home did not occur (H2c=8) and H4a does not equal '8'	0.0
H4a equals '8' and locomotion inside home occurred (h2c not equal to '8')	0.1
Locomotion outside the home did not occur (h2d=8) and H4b does not equal '8'	1.0
H4b equals '8' and locomotion outside the home occurred (h2d not equal to '8')	1.6
Locomotion in home did not occur (both H2c and H4a=8) and stair climbing not equal to '2'	0.02
No bowel movement in 7 day period (I3=8) but bowel movement in last 3 days (K3b=0)	0.02
No pain (k4a=0) and remainder of pain questions (k4b through k4e) not equal to zero	0.0
No intensity of pain (K4b=0) and k4a, k4c through k4e not equal to zero	0.0
Character of pain (k4d=0) and k4a, k4b, k4c, k4e not equal to zero	0.0
Eating did not occur (h2g=8) and ate one or fewer meals a day in last 3 days not checked off (L2a=0)	0.02
Enteral tube feeding (L2d=1) and swallowing (L3) does not equal '3' or '4'	0.02

Data Check	Affected assessments - % (n=6071)
No enteral tube feeding (L2d=0) and swallowing (L3) equals '3' or '4'	0.05
Formal care for meals (P1dA or P1dB or P1dC > 0) and meal preparation was independent or did not occur (h1aA=0 or 8)	1.3
Occupational therapy treatment (P2o=1 or 2) and formal care occupational therapy equals zero (P1gA+ P1gB + P1gC=0)	0.4
No occupational therapy treatment (P2o=0) and receipt of formal care – occupational therapy occurred (P1gA > 0 or P1gB > 0 or P1gC >0)	0.4
Physical therapy treatment (P2p=1 or 2) and formal care physical therapy equals zero (P1fA+ P1fB + P1fC=0)	2.1
No physical therapy treatment (P2p=0) and receipt of formal care – physical therapy occurred (P1fA > 0 or P1fB > 0 or P1fC >0)	0.6
Dialysis treatment (P2g=1 or 2 or 3) and no renal failure (J1aa=0)	0.03
Oxygen equipment (P3a=1 or 2 or 3) and no oxygen treatment (P2a=0)	0.2
Formal care – health care aides (P1aA > 0) and hours and minutes of help equal 0 (P1aB=0 and P1aC=0)	3.8
No formal care – health care aides (P1aA=0) and hours and minutes of help not equal to zero (P1aB > 0 and P1aC >0)	0.4
Formal care – visiting nurses (P1bA > 0) and hours and minutes of help equal 0 (P1bB=0 and P1bC=0)	1.6
No formal care – visiting nurses (P1bA=0) and hours or minutes of help not equal to zero (P1bB > 0 or P1bC >0)	0.3
Formal care – homemaking services (P1cA > 0) and hours and minutes of help equal 0 (P1cB=0 and P1cC=0)	3.2
No formal care – homemaking services (P1cA=0) and hours or minutes of help not equal to zero (P1cB > 0 or P1cC >0)	0.6
Formal care – meals (P1dA > 0) and hours and minutes of help equal 0 (P1dB=0 and P1dC=0)	2.3
No formal care – meals (P1dA=0) and hours or minutes of help not equal to zero (P1dB > 0 or P1dC >0)	0.2
Formal care – volunteer services (P1eA > 0) and hours and minutes of help equal 0 (P1eB=0 and P1eC=0)	0.0
No formal care – volunteer services (P1eA=0) and hours or minutes of help not equal to zero (P1eB > 0 or P1eC >0)	0.02
Formal care – physical therapy (P1fA > 0) and hours and minutes of help equal 0 (P1fB=0 and P1fC=0)	0.3
No formal care – physical therapy (P1fA=0) and hours or minutes of help not equal to zero (P1fB > 0 or P1fC >0)	0.05
Formal care – occupational therapy (P1gA > 0) and hours, minutes of help equal 0 (P1gB=0 and P1gC=0)	0.1
No formal care - occupational therapy (P1gA=0) and hours or minutes of help not equal to zero (P1gB > 0 or P1gC >0)	0.03

Data Check	Affected assessments - % (n=6071)
Formal care – speech therapy (P1hA > 0) and hours, minutes of help equal 0 (P1hB=0 and P1hC=0)	0.02
No formal care - speech therapy (P1hA=0) and hours or minutes of help not equal to zero (P1hB > 0 or P1hC >0)	0.0
Formal care – day care or day hospital (P1iA > 0) and hours, minutes of help equal 0 (P1iB=0 and P1iC=0)	0.7
No formal care – day care or day hospital (P1iA=0) and hours or minutes of help not equal to zero (P1iB > 0 or P1iC >0)	0.05
Formal care – social worker (P1jA > 0) and hours, minutes of help equal 0 (P1jB=0 and P1jC=0)	0.1
No formal care – social worker (P1jA=0) and hours or minutes of help not equal to zero (P1jB > 0 or P1jC >0)	0.0

APPENDIX B:
SENSITIVITY ANALYSIS TO IDENTIFY HOME CARE HIGH USER GROUPS

Sensitivity Analysis To Identify Home Care High User Groups

In this study, high users of home care were defined as clients in the top 10% of average weekly home care service hours. Sensitivity analysis was undertaken to ensure the top 10% of high users were in fact different from other users. Chi-square tests were employed to test for differences in the distribution of specific characteristics between the top 10% and the bottom 50% of clients based on average weekly hours of home care service. This is a sensitivity approach for high users of medical care described by Monheit (2003). To ensure a cut point of the top 10% was sufficiently unique, different high use cut points were examined against the bottom 50th percentile group to see if high users emerged at a specific point (the top 10%, 15%, 20%, and 25%). Shenkman and colleagues (2007) described this methodology in their study of high users of medical care. For nursing service, 69% of clients did not receive any nursing service. It was this 69% of clients that became the comparison group against the various high use cut points in the sensitivity analysis, instead of the bottom 50% that were used for the total home care hours. Preliminary examination of the study population identified that high users of overall home care were nearly the identical clients in the high users of home support service group, but high users of nursing service were nearly completely different individuals. Therefore, the sensitivity analysis of high users was only conducted for the high users of overall home care service and for the high users of nursing service.

Table B1 shows the results of the sensitivity analysis for different high user cut-points for high users of overall home care service (high total users). With the exception of age, all of the characteristics examined were significantly different between the high users and clients in the lower 50% of weekly hours, regardless of the cut-point employed.

Table B2 presents the results of the sensitivity analysis for different high user cut-points for high users of home nursing service (high nursing users). Again, the chi-square results indicated that the majority of the characteristics were significantly different between the high nursing users and clients in the lower 50% of weekly hours, regardless of the cut-point employed. The exceptions were the informal care and caregiver need characteristics, where significant differences did not emerge at any level or varied by characteristic. Since no clear pattern of high use emerged from this comparative analysis, high users remained defined as the top 10% of clients for each of the three different service dependent variables to be consistent with other high user studies conducted in other health care sectors.

Table B1: Characteristics of High Total Users at Different High Use Cut-Points

Characteristic	Bottom 50% (n=3,038)	Top 10% (n=608)	Top 15% (n=911)	Top 20% (n=1214)	Top 25% (n=1518)
Age:					
65-74	16.4%	16.8%	16.8%	16.7%	16.0%
75-84	47.5%	45.4%	44.8%	43.9%	44.1%
85+	36.1%	37.8%	38.4%	39.4%	39.9%*
Sex:					
Male	23.9%	31.3%	31.9%	32.7%	31.0%
Female	76.1%	68.7%***	68.1%***	67.3%***	69.0%***
Cognitive Performance Scale:					
0	69.1%	32.4%	34.0%	35.9%	37.7%
1	14.5%	13.3%	13.4%	14.0%	15.2%
2	7.9%	7.9%	11.0%	11.3%	11.5%
3	7.6%	31.9%	30.3%	29.2%	27.2%
4	0.3%	3.1%	2.4%	2.1%	1.7%
5	0.6%	8.9%	7.1%	6.2%	5.5%
6	0.03%	2.5%***	1.8%***	1.3%***	1.1%***
ADL Hierarchy Scale:					
0	90.6%	22.4%	27.8%	33.7%	38.0%
1	3.3%	11.3%	12.8%	12.4%	11.9%
2	4.7%	27.5%	29.1%	27.7%	26.7%
3	1.2%	19.4%	16.0%	14.7%	13.6%
4	0.2%	10.5%	7.8%	6.5%	5.4%
5	0.03%	5.8%	4.3%	3.5%	3.0%
6	0.03%	3.1%***	2.2%***	1.6%***	1.4%***
IADL Capacity Scale:					
0	3.1%	0.0%	0.1%	0.3%	0.4%
1	18.0%	0.2%	0.7%	1.0%	1.1%
2	13.3%	2.8%	4.2%	4.6%	5.1%
3	0.8%	0.0%	0.2%	0.6%	0.6%
4	44.5%	13.7%	17.3%	20.3%	23.1%
5	17.8%	53.8%	53.3%	52.6%	52.0%
6	2.5%	29.6%***	24.1%***	20.6%***	17.7%***
Living Status:					
Does not live alone	33.6%	59.7%	55.5%	52.1%	50.3%
Lives alone	66.4%	40.3%***	44.5%***	47.9%***	49.7%***
Self-reported Health Status:					
Not poor health	84.0%	72.5%	73.5%	73.8%	74.8%
Poor health	16.0%	27.5%***	26.5%***	26.2%***	25.2%***
Bladder Incontinence:					
Continent	71.0%	41.6%	44.7%	47.3%	48.4%
Incontinent	29.0%	58.4%***	55.3%***	52.7%***	51.6%***

Characteristic	Bottom 50% (n=3,038)	Top 10% (n=608)	Top 15% (n=911)	Top 20% (n=1214)	Top 25% (n=1518)
MAPLe Priority Level					
1	40.8%	2.3%	2.7%	3.4%	4.3%
2	23.7%	3.1%	4.8%	6.4%	8.2%
3	17.6%	38.5%	38.4%	38.8%	39.1%
4	14.8%	40.3%	39.7%	38.1%	35.7%
5	3.1%	15.8%***	14.3%***	13.3%***	12.6%***
Informal Care per Week:					
0-7 hours	62.5%	28.0%	32.1%	34.4%	37.2%
8-14 hours	20.7%	17.1%	19.2%	20.4%	21.0%
15+ hours	16.9%	54.9%***	48.7%***	45.1%***	41.8%***
Number of chronic conditions:					
0-5	88.7%	79.4%	80.1%	80.4%	80.4%
6+	11.3%	20.6%***	19.9%***	19.6%***	19.6%***
Number of medications:					
0-8	69.6%	59.4%	60.8%	61.4%	61.5%
9+	30.4%	40.6%***	39.2%***	38.6%***	38.5%***
Primary caregiver distress:					
No	96.9%	87.5%	88.1%	88.6%	89.1%
Yes	3.1%	12.5%***	11.9%***	11.4%***	10.9%***
Caregiver unable to continue care:					
No	94.3%	87.5%	87.5%	88.0%	89.3%
Yes	5.7%	12.5%***	12.5%***	12.0%***	10.7%***

χ^2 tests are used to test the null hypothesis of no difference in the distribution of specific characteristics between persons in the top 10%, top 15%, top 20% and top 25% of average weekly hours of total home care service compared to those in the bottom 50%.

* = $p < 0.05$

** = $p < 0.01$

*** = $p < 0.001$

Table B2: Characteristics of High Nursing Users at Different High Use Cut-Points

Characteristic	No nursing hours (n=4,217)	Top 10% (n=608)	Top 15% (n=911)	Top 20% (n=1214)	Top 25% (n=1519)
Age:					
65-74	15.8%	16.6%	17.5%	16.7%	17.1%
75-84	47.0%	39.3%	41.8%	41.4%	42.0%
85+	37.2%	44.1%**	40.7%*	41.9%**	40.9%**
Sex:					
Male	25.7%	28.8%	30.4%	29.4%	30.0%
Female	74.3%	71.2%	69.6%**	70.6%*	70.0%**
Cognitive Performance Scale:					
0	58.8%	49.8%	52.3%	51.1%	52.7%
1	14.4%	16.4%	16.0%	17.1%	16.8%
2	9.1%	10.2%	10.6%	12.2%	11.9%
3	14.6%	19.9%	17.9%	16.8%	15.5%
4	0.8%	1.2%	1.1%	0.8%	1.0%
5	2.1%	2.0%	1.6%	1.5%	1.6%
6	0.3%	0.5%**	0.4%*	0.5%***	0.5%***
ADL Hierarchy Scale:					
0	75.3%	63.0%	61.4%	62.6%	64.0%
1	6.7%	7.9%	8.1%	8.2%	7.6%
2	11.5%	17.4%	18.7%	18.0%	17.5%
3	4.1%	6.4%	6.8%	6.8%	6.7%
4	1.5%	3.3%	2.7%	2.5%	2.2%
5	0.6%	1.3%	1.8%	1.5%	1.4%
6	0.4%	0.7%***	0.6%***	0.5%***	0.5%***
IADL Capacity Scale:					
0	1.9%	1.6%	2.3%	2.1%	1.9%
1	12.9%	5.6%	5.7%	6.2%	6.6%
2	10.9%	10.2%	9.2%	10.2%	9.8%
3	0.9%	0.8%	0.7%	0.6%	0.6%
4	39.2%	35.0%	34.4%	33.9%	34.6%
5	26.6%	40.3%	41.3%	40.7%	40.2%
6	7.7%	6.4%***	6.5%***	6.3%***	6.3%***
Living Status:					
Does not live alone	39.4%	33.1%	35.7%	34.6%	35.0%
Lives alone	60.6%	66.9%**	64.3%*	65.4%**	65.0%**
Self-reported Health Status:					
Not poor health	83.1%	71.9%	71.2%	71.2%	72.9%
Poor health	16.9%	28.1%***	28.8%***	28.8%***	27.1%***
Bladder Incontinence:					
Continent	63.2%	59.5%	59.7%	59.2%	60.0%

Characteristic	No nursing hours (n=4,217)	Top 10% (n=608)	Top 15% (n=911)	Top 20% (n=1214)	Top 25% (n=1519)
Incontinent	36.8%	40.5%*	40.3%*	40.8%*	40.0%*
MAPLe Priority Level:					
1	29.0%	14.3%	14.3%	14.7%	15.2%
2	19.8%	14.8%	15.4%	15.9%	16.7%
3	23.0%	32.9%	34.6%	34.3%	34.6%
4	21.9%	29.3%	27.9%	27.3%	25.8%
5	6.3%	8.7%***	7.9%***	7.7%***	7.7%***
Number of chronic conditions:					
0-5	88.1%	78.5%	79.6%	79.0%	79.2%
6+	11.9%	21.5%***	20.4%***	21.0%***	20.8%***
Number of medications:					
0-8	70.7%	53.6%	54.8%	55.0%	55.6%
9+	29.3%	46.4%***	45.2%***	45.0%***	44.4%***
Informal Care per Week:					
0-7 hours	54.6%	50.7%	49.5%	50.4%	51.5%
8-14 hours	20.8%	24.8%	22.6%	22.1%	21.7%
15+ hours	24.6%	24.5%	27.9%*	27.5%*	26.9%
Primary caregiver distress:					
No	93.7%	91.6%	92.2%	92.6%	93.1%
Yes	6.3%	8.4%*	7.8%	7.4%	6.9%
Caregiver unable to continue care:					
No	93.1%	91.8%	92.4%	92.4%	92.4%
Yes	6.9%	8.2%	7.6%	7.6%	7.6%

χ^2 tests are used to test the null hypothesis of no difference in the distribution of specific characteristics between persons in the top 10%, top 15%, top 20% and top 25% of average weekly hours of home nursing service compared to those with no nursing service (bottom 69%).

* = $p < 0.05$

** = $p < 0.01$

*** = $p < 0.001$

APPENDIX C:
TASKS SCHEDULED FOR HIGH USER AND OTHER USER GROUPS:
COMPARISON OF PROPORTIONS AND FREQUENCY

Tasks Scheduled For High User And Other Users Groups:

Comparison Of Proportions And Frequency

The following tables identify the specific tasks scheduled for high users. Each table indicates the proportion of clients who were scheduled for each task for high users and other users, and then among the users in both groups, the average and median number of times per week the task was scheduled. For the percent of clients who used each task, the p value results are for a chi-square test. For the number of times per week a task was scheduled, the p value results are for a Mann Whitney U test. If the results are non-significant, no p value is shown (--). Table C1 presents the home support tasks comparison for high total users. Table C2 presents the nursing tasks comparison for high total users. Table C3 presents the home support tasks comparison for high home support users. Table C4 presents the nursing tasks comparison for high nursing users

Table C1: Home Support Task Use for High Total Users and Other Users

Support Services Category - Code	Task Activity Description - Code	High Total User (n=608) / Other User (n=546)	Percent who used this task	Clients who used this task: Average times per week received	
				Mean	Median
Assist Client: Hygiene – HX	Tub bath, stool, bath board - H1	High user	53.6	2.7	1.8
		Other	53.9	1.3	1.0
		p value ²⁵	--	<0.0001	
	Sponge bath – H2	High user	61.7	6.2	5.9
		Other	26.2	4.4	4.6
		p value	<0.0001	<0.0001	
	Shaving – H3	High user	24.8	5.3	5.6
		Other	14.2	2.9	1.8
		p value	<0.0001	<0.0001	
	Hair care – H4	High user	71.7	5.1	5.0
		Other	55.9	2.4	1.1
		p value	<0.0001	<0.0001	
	Care of hands and feet – H5	High user	59.5	4.6	4.3
		Other	45.8	2.3	1.1
		p value	<0.0001	<0.0001	
	Mouth and denture care – H6	High user	60.4	6.6	6.1
		Other	28.8	3.7	2.0
		p value	<0.0001	<0.0001	
	Skin care – H7	High user	75.0	6.9	6.3
		Other	55.5	3.1	1.4
		p value	<0.0001	<0.0001	
	Assist with toileting – H8	High user	62.0	10.3	7.4
		Other	17.8	4.7	3.2
		p value	<0.0001	<0.0001	
	Assist with perineal care – H9	High user	68.3	8.9	6.8
		Other	32.3	4.1	2.2
		p value	<0.0001	<0.0001	
Nutrition – FX	Special Diet – F0	High user	21.2	7.1	6.2
		Other	4.9	4.4	3.4
		p value	<0.0001	<0.0001	
	Cooking meal – F1	High user	66.9	7.2	6.4
		Other	23.2	4.8	5.0
		p value	<0.0001	<0.0001	
	Heat and serve – F2	High user	62.0	7.1	6.0
		Other	16.7	4.6	4.3
		p value	<0.0001	<0.0001	

²⁵ For the % who used this task, the p value results are for a chi squared test. For the number of times per week a task was scheduled, the p value results are for a Mann Whitney U test. If the results are non-significant, no p value is shown (--).

Support Services Category - Code	Task Activity Description - Code	High Total User (n=608) / Other User (n=546)	Percent who used this task	Clients who used this task: Average times per week received	
				Mean	Median
Nutrition – FX	Storing of food – F3	High user	59.0	7.4	6.0
		Other	19.8	4.5	3.9
		p value	<0.0001	<0.0001	
	Washing dishes after meal prep – F4	High user	78.5	8.9	7.3
		Other	29.0	5.3	4.9
		p value	<0.0001	<0.0001	
	Meal planning – F5	High user	16.8	4.6	3.6
		Other	6.4	3.0	1.5
		p value	<0.0001	<0.0001	
	Leaving prepared meals – F6	High user	20.4	5.2	5.6
		Other	12.0	4.0	4.4
		p value	<0.0001	<0.001	
	Bulk meal preparation – F7	High user	14.5	1.6	1.1
		Other	6.2	1.0	0.9
		p value	<0.0001	<0.0001	
	Escort to/from congregate meal – F8	High user	3.3	12.6	7.7
		Other	5.3	11.1	10.4
		p value	<0.05	--	
Assist Client Dressing – CX	Assist client to dress-undress – C1	High user	82.2	9.1	7.8
		Other	56.4	4.6	2.7
		p value	<0.0001	<0.0001	
Supervision – DX	Assist Client with eating – D1	High user	21.6	5.1	3.6
		Other	2.7	3.5	2.0
		p value	<0.0001	<0.0001	
	Assist Client with moving – D2	High user	26.8	4.5	3.6
		Other	4.5	2.5	1.7
		p value	<0.0001	<0.0001	
	Supervision of toileting – D3	High user	22.4	4.8	3.8
		Other	3.2	2.4	1.5
		p value	<0.0001	<0.0001	
	Social interaction & activity – D4	High user	45.1	4.0	3.6
		Other	7.9	1.6	1.2
		p value	<0.0001	<0.0001	
	Taking Client for a walk – D5	High user	34.7	4.7	3.7
		Other	6.3	2.2	1.5
		p value	<0.0001	<0.0001	
	Oral medication reminder – D6	High user	55.3	9.3	6.7
		Other	20.6	8.2	6.8
		p value	<0.0001	--	
	Stand-by bath assistance – D7	High user	5.6	3.1	1.1
		Other	3.1	1.5	1.0
		p value	<0.01	--	

Support Services Category - Code	Task Activity Description - Code	High Total User (n=608) / Other User (n=546)	Percent who used this task	Clients who used this task: Average times per week received	
				Mean	Median
Cleaning of Living Area – MX	Sponge mop floors-Kitchen-Bath – M1	High user	42.4	1.5	0.6
		Other	50.5	0.6	0.5
		p value	<0.001	<0.0001	
	Disposing of garbage – M2	High user	47.5	3.0	0.9
		Other	50.6	1.0	0.5
		p value	--	<0.0001	
	Clean bathroom sink, toilet, tub – M3	High user	47.4	2.4	0.8
		Other	51.9	0.8	0.5
		p value	<0.05	<0.0001	
	Vacuuming – M4	High user	40.6	1.3	0.5
		Other	50.1	0.6	0.5
		p value	<0.0001	<0.0001	
	Dusting – M5	High user	36.4	1.3	0.5
Other		47.0	0.6	0.5	
p value		<0.0001	<0.001		
Cleaning of Living Area – MX	Cleaning of kitchen – M6	High user	39.0	1.5	0.5
		Other	48.5	0.6	0.5
		p value	<0.0001	<0.001	
	Clean oven - defrost fridge – M7	High user	36.0	1.2	0.5
		Other	46.1	0.6	0.5
	p value	<0.0001	<0.01		
Laundry – WX	Making bed – W1	High user	54.3	3.8	2.1
		Other	53.2	1.3	0.5
		p value	--	<0.0001	
	Washing laundry by machine – W2	High user	41.1	1.6	0.6
		Other	47.6	0.6	0.5
		p value	<0.01	<0.0001	
	Hanging-drying laundry – W3	High user	41.8	1.5	0.6
		Other	47.1	0.6	0.5
p value		<0.05	<0.0001		
Assist Client Move Around Home – AX	Assisting to walk – A1	High user	41.4	7.1	5.9
		Other	10.5	3.8	2.1
		p value	<0.0001	<0.0001	
	Assisting in-out of bed-chair – A2	High user	47.2	8.4	6.8
		Other	10.5	4.4	2.8
		p value	<0.0001	<0.0001	
	Assist with positioning – A3	High user	31.7	8.0	5.1
		Other	6.2	4.0	2.2
p value		<0.0001	<0.0001		

Support Services Category - Code	Task Activity Description - Code	High Total User (n=608) / Other User (n=546)	Percent who used this task	Clients who used this task: Average times per week received	
				Mean	Median
Provide Personal Care – PX	Complete tub & sponge bath – P1	High user	14.3	5.3	5.4
		Other	2.1	2.1	1.1
		p value	<0.0001	<0.0001	
	Perineal care – P2	High user	17.1	11.1	9.5
		Other	1.7	3.5	2.1
		p value	<0.0001	<0.0001	
	Shaving – P3	High user	5.4	6.3	6.3
		Other	0.6	3.3	2.2
		p value	<0.0001	<0.01	
	Hair Care – P4	High user	12.3	6.1	6.0
		Other	1.4	2.3	1.1
		p value	<0.0001	<0.0001	
	Care of hands and feet – P5	High user	11.3	6.4	6.3
		Other	1.3	2.1	1.1
		p value	<0.0001	<0.0001	
	Mouth and denture care – P6	High user	12.7	7.8	6.9
		Other	1.0	2.4	1.1
		p value	<0.0001	<0.0001	
	Skin care – P7	High user	16.9	10.5	8.0
		Other	1.8	3.0	1.8
		p value	<0.0001	<0.0001	
	Dressing – Undressing – P8	High user	21.7	9.8	7.6
		Other	5.0	5.5	5.0
		p value	<0.0001	<0.0001	
	Transfer – P9	High user	13.0	10.2	9.1
		Other	0.9	3.7	1.6
		p value	<0.0001	<0.0001	
	Transfer-mechanical lift – PA	High user	10.2	17.0	15.3
		Other	0.4	6.5	5.4
		p value	<0.0001	<0.001	
	Positioning – PB	High user	12.7	14.1	10.9
		Other	0.6	3.9	1.9
		p value	<0.0001	<0.0001	
	Passive exercises – PC	High user	9.9	6.1	5.2
		Other	0.7	2.8	2.3
		p value	<0.0001	<0.0001	
	Apply topical cream-ointment – PD	High user	4.6	9.5	7.3
		Other	0.7	5.6	4.7
		p value	<0.0001	<0.05	
	Feeding client – PF	High user	5.3	7.5	6.2
		Other	0.2	1.2	1.0
		p value	<0.0001	<0.001	

Support Services Category - Code	Task Activity Description - Code	High Total User (n=608) / Other User (n=546)	Percent who used this task	Clients who used this task: Average times per week received	
				Mean	Median
Provide Personal Care – PX	Provide bladder-bowel routine – PK	High user	6.3	8.1	5.3
		Other	0.2	5.3	2.3
		p value	<0.0001	--	
	Provide bedpan-urinal-commode – PL	High user	10.0	8.5	5.6
		Other	1.3	4.6	4.7
		p value	<0.0001	<0.05	
	Indwelling catheter care – PM	High user	3.3	12.7	12.4
		Other	0.6	7.5	6.0
		p value	<0.0001	<0.01	
	Condom catheter care – PN	High user	2.1	10.8	10.5
		Other	0.2	7.1	6.6
		p value	<0.0001	--	

Table C2: Use of Nursing Tasks by High Total Users and Other Users

Nursing Category - Code	Activity Description	High Total User (n=608) / Other User (n=546)	Percent who used this task	Clients who received this task: Average times per week received	
				Mean	Median
Assessment - AS	Assessment – AS	High user	5.9	0.1	0.1
		Other	7.2	0.1	0.1
		p value	--	--	
Elimination - EN	Bowel Care – BC	High user	2.3	2.8	2.2
		Other	0.3	0.8	0.3
		p value	<0.0001	<0.05	
	Urinary Care – UC	High user	3.1	2.1	0.4
		Other	0.8	1.6	0.7
		p value	<0.0001	--	
	Ostomy Care – OC	High user	1.5	2.9	2.0
		Other	1.1	1.8	1.9
		p value	--	--	
Diabetes - DN	Fasting Blood Sugar – FBS	High user	6.6	4.5	5.4
		Other	1.9	2.8	1.6
		p value	<0.0001	<0.01	
	Random Blood Sugar – RBS	High user	6.6	4.3	4.1
		Other	2.5	2.7	1.3
Medications - QN	Eye Care – ECEC	High user	8.4	10.0	8.1
		Other	3.2	8.0	6.9
		p value	<0.0001	--	
	Medication Injection – MI	High user	10.4	5.4	1.5
		Other	3.6	3.0	0.4
		p value	<0.0001	<0.05	
	Medication Monitoring – MM	High user	11.0	4.1	1.3
		Other	7.8	1.9	0.9
		p value	<0.01	<0.001	
	Medication Oral Essential – MO	High user	4.9	8.5	6.9
		Other	1.6	6.3	6.2
		p value	<0.0001	<0.05	
	Medication Set Up – MS	High user	7.2	3.0	1.0
		Other	4.0	1.6	1.0
		p value	<0.001	--	
	Medication Topical – MT	High user	6.3	4.3	3.2
		Other	1.8	4.0	2.5
		p value	<0.0001	--	
Airway Maintenance/ Respiratory - RN	Respiratory Assessment – RAS	High user	2.8	0.8	0.7
		Other	2.8	0.8	0.6
		p value	--	--	

Nursing Category - Code	Activity Description	High Total User (n=608) / Other User (n=546)	Percent who used this task	Clients who received this task: Average times per week received	
				Mean	Median
Palliative Care - PN	PC Health Supervision – PCHS	High user	2.0	2.1	2.1
		Other	0.6	1.3	0.9
		p value	<0.001	<0.05	
Therapeutic Measures - TN	Health Supervision – HS	High user	24.5	1.6	0.8
		Other	15.1	1.2	0.7
		p value	<0.0001	--	
	Health Teaching – HT	High user	3.5	1.9	0.8
		Other	2.9	1.3	0.7
		p value	--	--	
Wound Care - YN	Wound Care – WCWC	High user	12.3	3.5	2.6
		Other	6.8	2.3	1.6
		p value	<0.0001	<0.001	
Other - ON	Other Activity – OA	High user	10.2	5.2	2.4
		Other	4.3	2.8	1.0
		p value	<0.0001	<0.01	

Table C3: Use of Support Service Tasks by High Home Support Users and Other Support Users

Support Services Category - Code	Task Activity Description - Code	High Home Support User (n=608) / Other User (n=5463) / p value*	Percent who received this task category	Clients who received this task: Average times per week received	
				Mean	Median
Assist Client: Hygiene – HX	Tub bath, stool, bath board - H1	High user	53.8	2.7	1.8
		Other	53.9	1.3	1.0
		p value	--	<0.0001	
	Sponge bath – H2	High user	62.3	6.3	5.9
		Other	26.1	4.3	4.5
		p value	<0.0001	<0.0001	
	Shaving -- H3	High user	24.8	5.5	5.7
		Other	14.2	2.9	1.7
		p value	<0.0001	<0.0001	
	Hair care – H4	High user	71.7	5.2	5.1
		Other	55.9	2.4	1.1
		p value	<0.0001	<0.0001	
	Care of hands and feet – H5	High user	60.0	4.7	4.3
		Other	45.8	2.3	1.1
		p value	<0.0001	<0.0001	
	Mouth and denture care – H6	High user	62.2	6.8	6.2
		Other	28.6	3.7	2.0
		p value	<0.0001	<0.0001	
	Skin care – H7	High user	75.0	6.9	6.1
		Other	55.5	3.1	1.4
		p value	<0.0001	<0.0001	
	Assist with toileting – H8	High user	63.2	10.4	7.8
		Other	17.7	4.6	3.1
		p value	<0.0001	<0.0001	
	Assist with perineal care – H9	High user	69.1	8.9	6.8
		Other	32.2	4.1	2.2
		p value	<0.0001	<0.0001	
Assist Client Dressing – CX	Assist client to dress-undress – C1	High user	82.7	9.1	7.8
		Other	56.3	4.6	2.7
		p value	<0.0001	<0.0001	
Assist Client Move Around Home – AX	Assisting to walk – A1	High user	41.3	7.2	5.9
		Other	10.5	3.8	2.1
		p value	<0.0001	<0.0001	
	Assisting in-out of bed-chair – A2	High user	47.4	8.5	6.9
		Other	10.5	4.3	2.6
		p value	<0.0001	<0.0001	
	Assist with positioning – A3	High user	32.1	8.1	5.2
		Other	6.1	4.0	2.2
		p value	<0.0001	<0.0001	

Support Services Category - Code	Task Activity Description - Code	High Home Support User (n=608) / Other User (n=5463) / p value*	Percent who received this task category	Clients who received this task: Average times per week received	
				Mean	Median
Provide Personal Care – PX	Complete tub & sponge bath – P1	High user	14.1	5.3	5.4
		Other	2.2	2.1	1.1
		p value	<0.0001	<0.0001	
	Perineal care – P2	High user	16.8	11.3	9.8
		Other	1.7	3.5	2.0
		p value	<0.0001	<0.0001	
	Shaving – P3	High user	5.1	6.3	6.1
		Other	0.6	3.6	2.6
		p value	<0.0001	<0.05	
	Hair Care – P4	High user	12.3	6.1	6.0
		Other	1.4	2.3	1.1
		p value	<0.0001	<0.0001	
	Care of hands and feet – P5	High user	11.3	6.5	6.3
		Other	1.3	2.1	1.1
		p value	<0.0001	<0.0001	
	Mouth and denture care – P6	High user	12.3	7.9	6.9
		Other	1.1	2.5	1.1
		p value	<0.0001	<0.0001	
	Skin care – P7	High user	16.8	10.6	8.0
		Other	1.8	2.9	1.8
		p value	<0.0001	<0.0001	
	Dressing – Undressing – P8	High user	21.2	9.9	8.0
		Other	5.1	5.4	4.9
		p value	<0.0001	<0.0001	
	Transfer – P9	High user	13.2	10.1	8.6
		Other	0.9	3.7	1.6
		p value	<0.0001	<0.0001	
	Transfer-mechanical lift – PA	High user	10.2	17.3	16.3
		Other	0.4	5.6	5.0
		p value	<0.0001	<0.0001	
	Positioning – PB	High user	12.7	14.1	10.9
		Other	0.6	3.9	1.9
		p value	<0.0001	<0.0001	
	Passive exercises – PC	High user	9.9	6.1	5.2
		Other	0.7	2.9	2.5
		p value	<0.0001	<0.001	
	Apply topical cream-ointment – PD	High user	4.6	9.2	7.3
		Other	0.7	5.8	5.6
		p value	<0.0001	<0.05	
	Feeding client – PF	High user	5.4	7.3	6.1
		Other	0.2	1.1	1.0
		p value	<0.0001	<0.0001	

Support Services Category - Code	Task Activity Description - Code	High Home Support User (n=608) / Other User (n=5463) / p value*	Percent who received this task category	Clients who received this task: Average times per week received	
				Mean	Median
Provide Personal Care – PX	Provide bladder-bowel routine – PK	High user	6.3	8.1	5.3
		Other	0.2	5.3	2.3
		p value	<0.0001	--	
	Provide bedpan-urinal-commode – PL	High user	10.2	8.4	5.3
		Other	1.2	4.6	4.8
		p value	<0.0001	<0.05	
	Indwelling catheter care – PM	High user	3.3	12.7	12.7
		Other	0.6	7.4	6.0
		p value	<0.0001	<0.01	
	Condom catheter care – PN	High user	2.1	10.8	10.5
		Other	0.2	7.1	6.6
		p value	<0.0001	--	
Supervision – DX	Assist Client with eating – D1	High user	22.0	5.1	3.6
		Other	2.7	3.5	2.0
		p value	<0.0001	<0.001	
	Assist Client with moving – D2	High user	27.8	4.3	3.4
		Other	4.4	2.6	1.7
		p value	<0.0001	<0.0001	
	Supervision of toileting – D3	High user	21.7	4.7	3.8
		Other	3.2	2.5	1.6
		p value	<0.0001	<0.0001	
	Social interaction & activity – D4	High user	46.7	4.0	3.6
		Other	7.7	1.6	1.2
		p value	<0.0001	<0.0001	
	Taking Client for a walk – D5	High user	36.0	4.7	3.7
		Other	6.2	2.2	1.5
		p value	<0.0001	<0.0001	
	Oral medication reminder – D6	High user	55.8	9.2	6.6
		Other	20.5	8.2	6.8
		p value	<0.0001	--	
	Stand-by bath assistance – D7	High user	5.8	3.3	1.1
		Other	3.1	1.5	1.0
		p value	<0.001	<0.05	
Nutrition – FX	Special Diet – F0	High user	19.2	7.0	5.7
		Other	5.1	4.5	3.5
		p value	<0.0001	<0.0001	
	Cooking meal – F1	High user	66.3	7.5	6.5
		Other	23.2	4.8	4.9
		p value	<0.0001	<0.0001	
	Heat and serve – F2	High user	63.2	7.1	6.0
		Other	16.6	4.6	4.3
		p value	<0.0001	<0.0001	

Support Services Category - Code	Task Activity Description - Code	High Home Support User (n=608) / Other User (n=5463) / p value*	Percent who received this task category	Clients who received this task: Average times per week received	
				Mean	Median
Nutrition – FX	Storing of food – F3	High user	58.4	7.6	6.0
		Other	19.8	4.5	3.9
		p value	<0.0001	<0.0001	
	Washing dishes after meal prep – F4	High user	78.5	9.1	7.7
		Other	29.0	5.2	4.9
		p value	<0.0001	<0.0001	
	Meal planning – F5	High user	17.3	4.8	3.8
		Other	6.4	2.9	1.5
		p value	<0.0001	<0.0001	
	Leaving prepared meals – F6	High user	19.7	5.1	5.4
		Other	12.0	4.1	4.4
		p value	<0.0001	<0.01	
	Bulk meal preparation – F7	High user	14.5	1.6	1.0
		Other	6.2	1.0	0.9
		p value	<0.0001	<0.0001	
Cleaning of Living Area – MX	Sponge mop floors-Kitchen-Bath – M1	High user	40.3	1.6	0.6
		Other	50.7	0.6	0.5
		p value	<0.0001	<0.0001	
	Disposing of garbage – M2	High user	45.9	3.2	0.9
		Other	50.8	1.0	0.5
		p value	<0.05	<0.0001	
	Clean bathroom sink, toilet, tub – M3	High user	45.1	2.5	0.9
		Other	52.2	0.8	0.5
		p value	<0.001	<0.0001	
	Vacuuming – M4	High user	38.7	1.4	0.5
		Other	50.3	0.6	0.5
		p value	<0.0001	<0.0001	
	Dusting – M5	High user	34.4	1.4	0.5
		Other	47.2	0.6	0.5
		p value	<0.0001	<0.0001	
	Cleaning of kitchen – M6	High user	37.3	1.5	0.5
		Other	48.7	0.6	0.5
		p value	<0.0001	<0.0001	
	Clean oven - defrost fridge – M7	High user	35.4	1.3	0.5
		Other	46.1	0.6	0.5
		p value	<0.0001	<0.001	

Support Services Category - Code	Task Activity Description - Code	High Home Support User (n=608) / Other User (n=5463) / p value*	Percent who received this task category	Clients who received this task: Average times per week received	
				Mean	Median
Laundry – WX	Making bed – W1	High user	52.6	4.0	2.8
		Other	53.4	1.3	0.5
		p value	--	<0.0001	
	Washing laundry by machine – W2	High user	39.1	1.6	0.6
		Other	47.9	0.6	0.5
		p value	<0.0001	<0.0001	
	Hanging-drying laundry – W3	High user	39.0	1.6	0.7
		Other	47.4	0.6	0.5
		p value	<0.0001	<0.0001	

Table C4: Use of Nursing Tasks by High Nursing Users / Other Users

Nursing Category - Code	Task Activity Description - Code	High Nursing User (n=608) / Other User (n=5463) / p value*	Percent who received this task category	Clients who used this task: Average times scheduled per week	
				Mean	Median
Assessment - AS	Assessment – AS	High user	21.4	0.1	0.1
		Other	5.5	0.1	0.1
		p value	<0.0001	--	
Elimination - EN	Bowel Care – BC	High user	2.1	2.8	2.9
		Other	0.3	0.9	0.6
		p value	<0.0001	--	
	Urinary Care – UC	High user	3.1	4.3	1.8
		Other	0.8	0.7	0.5
		p value	<0.0001	<0.05	
	Ostomy Care – OC	High user	3.8	3.0	2.1
		Other	0.8	1.4	1.7
		p value	<0.0001	<0.0001	
Diabetes - DN	Fasting Blood Sugar – FBS	High user	15.3	4.5	5.3
		Other	0.9	0.8	0.7
		p value	<0.0001	<0.0001	
	Random Blood Sugar – RBS	High user	16.0	4.9	5.3
		Other	1.4	0.9	0.8
Medications - QN	Eye Care – ECEC	High user	3.0	10.1	8.1
		Other	0.8	1.5	0.9
		p value	<0.0001	<0.0001	
	Medication Injection – MI	High user	16.6	8.5	9.9
		Other	2.9	0.5	0.3
		p value	<0.0001	<0.0001	
	Medication Monitoring – MM	High user	24.7	5.4	4.9
		Other	6.3	0.8	0.7
		p value	<0.0001	<0.0001	
	Medication Oral Essential – MO	High user	15.6	8.1	6.9
		Other	0.4	1.1	0.8
		p value	<0.0001	<0.0001	
	Medication Set Up – MS	High user	15.8	3.5	1.7
		Other	3.0	0.8	1.0
		p value	<0.0001	<0.0001	
	Medication Topical – MT	High user	14.1	5.6	5.7
		Other	0.9	1.4	1.5
		p value	<0.0001	<0.0001	
Airway Maintenance/Respiratory - RN	Respiratory Assessment – RAS	High user	4.6	1.5	1.6
		Other	2.6	0.7	0.6
		p value	<0.01	<0.0001	

Nursing Category - Code	Task Activity Description - Code	High Nursing User (n=608) / Other User (n=5463) / p value*	Percent who received this task category	Clients who used this task: Average times scheduled per week	
				Mean	Median
Palliative Care - PN	PC Health Supervision – PCHS	High user	4.3	2.3	2.1
		Other	0.4	0.5	0.4
		p value	<0.0001	<0.0001	
Therapeutic Measures - TN	Supportive Care – SC	High user	1.6	0.9	0.7
		Other	0.5	0.7	0.7
		p value	<0.001	--	
	Health Supervision – HS	High user	35.2	3.1	2.0
		Other	13.9	0.7	0.6
		p value	<0.0001	<0.0001	
	Health Teaching – HT	High user	6.4	3.6	2.9
		Other	2.6	0.7	0.6
		p value	<0.0001	<0.0001	
Wound Care - YN	Wound Care – WCWC	High user	35.4	4.2	3.8
		Other	4.3	1.0	0.9
		p value	<0.0001	<0.0001	
Other - ON	Other Activity – OA	High user	25.7	5.6	4.5
		Other	2.6	0.8	0.6
		p value	<0.0001	<0.0001	

**APPENDIX D:
BUILDING LOGISTIC REGRESSION MODELS TO PREDICT HIGH HOME
CARE USERS**

Building Logistic Regression Models To Predict High Home Care Users

Three different logistic regression models were produced in this study to predict three different types of high users of home care service. For each model, the same preliminary steps were taken to towards creation of a final logistic model. Many characteristics were compared for high users and other users with chi-square tests. Variables that were found to be significantly different at $p \leq 0.20$ were entered into a logistic regression model in a hierarchical manner. In Step 1 of building each logistic model, significant health care system variables were entered in the model. In Step 2, significant client need variables were added to the model. In Step 3, significant caregiver need characteristics were added to the model. In Step 4, significant client enabling characteristics were added to the model. In Step 5, significant client predisposing characteristics were added to the model. The following three tables identify the characteristics that were significant by the end of Step 5 for each of the high user groups in this study. Table D1 presents the initial full model for predicting high total users. Table D2 presents the initial full model for predicting high home support users. Table D3 presents the initial full model for predicting high nursing users.

Table D1: Full Model for High Total Users

Characteristic	p-value for group	Estimate	Standard Error	Wald Chi-Square	p- value	Odds Ratio	95% Confidence Limits	
Intercept		-5.82	0.51	127.71	<.0001			
Health Care System								
Home care office (other)	0.02	0.50	0.28	3.26	0.07	1.66	0.96	2.87
Home care office 1		0.41	0.26	2.43	0.12	1.50	0.90	2.50
Home care office 2		0.33	0.26	1.61	0.20	1.39	0.84	2.32
Home care office 3		0.48	0.29	2.75	0.10	1.61	0.92	2.82
Home care office 4		0.61	0.23	7.23	0.01	1.84	1.18	2.88
Home care office 5		0.71	0.28	6.55	0.01	2.03	1.18	3.48
Home care office 6		-0.12	0.26	0.23	0.63	0.88	0.53	1.47
Home care office 7		0.23	0.21	1.19	0.27	1.26	0.83	1.92
Home care office 9		0.14	0.27	0.25	0.62	1.15	0.67	1.96
Home care office 10		0.36	0.22	2.62	0.11	1.44	0.93	2.23
Home care office 11		0.75	0.23	10.57	0.00	2.12	1.35	3.33
Home care office 12		0.49	0.38	1.60	0.21	1.62	0.77	3.45
Client Need								
New client	<.0001	-0.77	0.15	27.49	<.0001	0.47	0.35	0.62
Poor self-reported health	0.02	0.31	0.13	5.54	0.02	1.36	1.05	1.75
Bladder incontinence present	0.50	0.08	0.11	0.46	0.50	1.08	0.86	1.35
Bowel incontinence present	0.15	0.20	0.14	2.05	0.15	1.23	0.93	1.62
Skin ulcer present	0.56	0.12	0.21	0.35	0.56	1.13	0.75	1.72
Fell in past 90 days	0.72	-0.04	0.12	0.13	0.72	0.96	0.76	1.21
ADL Hierarchy Scale	<.0001	0.61	0.04	188.64	<.0001	1.85	1.69	2.02
ADL decline in last 90 days	0.23	-0.16	0.13	1.44	0.23	0.85	0.66	1.11
Great difficulty in 2 IADLs	<.0001	1.14	0.14	65.26	<.0001	3.11	2.36	4.10
Great difficulty in 3 IADLs		1.52	0.21	54.66	<.0001	4.56	3.05	6.81
CHESS score = 2-5	0.63	-0.07	0.14	0.24	0.63	0.93	0.70	1.24

Characteristic	p-value for group	Estimate	Standard Error	Wald Chi-Square	p-value	Odds Ratio	95% Confidence Limits	
Cognitive Performance Scale	0.99	0.00	0.06	0.00	0.99	1.00	0.89	1.12
Decline in decision-making in past 90 days	0.05	-0.35	0.18	3.53	0.05	0.71	0.49	0.99
Behaviour problems present	0.07	-0.33	0.19	3.16	0.07	0.72	0.49	1.03
Depression Scale score	0.51	-0.06	0.09	0.43	0.51	0.94	0.79	1.12
Mood decline in past 90 days	0.10	0.29	0.18	2.66	0.10	1.34	0.94	1.90
Conditions make health unstable	0.54	-0.07	0.12	0.37	0.54	0.93	0.73	1.18
Pain Scale score	0.36	-0.05	0.05	0.85	0.36	0.95	0.86	1.06
Coronary artery disease	0.16	-0.22	0.16	1.93	0.16	0.78	0.56	1.12
Any dementia	0.92	0.02	0.16	0.01	0.92	1.02	0.75	1.38
Arthritis	0.30	0.12	0.12	1.05	0.30	1.13	0.90	1.42
Cataract	0.62	-0.07	0.14	0.25	0.62	0.93	0.71	1.22
Psychiatric diagnosis	0.99	0.00	0.17	0.00	0.99	1.00	0.72	1.38
Cancer	0.17	-0.23	0.17	1.85	0.17	0.79	0.57	1.11
Diabetes	0.06	0.24	0.13	3.63	0.06	1.27	0.99	1.63
Asthma	0.55	-0.09	0.15	0.35	0.55	0.92	0.69	1.22
2-5 disease diagnoses	0.28	-0.18	0.22	0.69	0.41	0.84	0.55	1.28
6-13 disease diagnoses		0.03	0.27	0.01	0.92	1.03	0.60	1.76
Uses 5-8 medications	0.0002	-0.06	0.14	0.19	0.66	0.94	0.71	1.24
Uses 9+ medications		0.41	0.16	6.74	0.01	1.51	1.11	2.05
Psychotropic medication use	0.99	0.00	0.12	0.00	0.99	1.00	0.80	1.26
MAPLe score	<.0001	0.42	0.09	23.80	<.0001	1.52	1.28	1.80
Receives special treatments	0.28	0.17	0.18	0.93	0.34	1.19	0.84	1.69
Receives special therapies	<.0001	0.20	0.18	1.17	0.28	1.22	0.85	1.75
Caregiver Need								
Caregiver unable to continue care	0.39	0.15	0.17	0.75	0.39	1.16	0.83	1.60
Caregiver distress	0.94	0.01	0.17	0.01	0.94	1.01	0.72	1.42

	p-value for group	Estimate	Standard Error	Wald Chi- Square	p- value	Odds Ratio	95% Confidence Limits	
Client Enabling								
Lives alone	0.71	-0.06	0.17	0.13	0.71	0.94	0.68	1.31
Caregiver provides IADL care	0.36	0.17	0.19	0.84	0.36	1.19	0.82	1.71
Caregiver provides ADL care	0.54	0.09	0.14	0.38	0.54	1.09	0.83	1.44
Caregiver lives with client	0.79	-0.04	0.16	0.07	0.79	0.96	0.69	1.32
Non-spouse caregiver	<.0001	0.75	0.21	12.89	<.0001	2.11	1.41	3.18
Informal care hours per week > 15	0.002	0.42	0.13	10.05	0.002	1.53	1.18	1.99
Client Predisposing								
Male	0.30	-0.13	0.13	1.07	0.30	0.88	0.69	1.12
Married	0.78	0.01	0.19	0.00	0.95	1.01	0.69	1.47
Not married		-0.12	0.18	0.45	0.50	0.88	0.62	1.27
Grade 8 or less	0.07	-0.31	0.16	3.60	0.06	0.74	0.54	1.01
Grade 9-11		0.03	0.16	0.03	0.86	1.03	0.76	1.39
High school		-0.20	0.18	1.25	0.26	0.82	0.58	1.16
Education level unknown		0.10	0.20	0.24	0.62	1.11	0.74	1.65
Age 75-84	0.25	0.19	0.15	1.50	0.22	1.21	0.89	1.63
Age 85+		0.03	0.17	0.02	0.87	1.03	0.74	1.42
Service Episode Length								
31-60 days in service episode	0.87	0.08	0.21	0.13	0.71	1.08	0.72	1.62
61-99 days in service episode		0.01	0.18	0.00	0.97	1.01	0.71	1.43

Table D2: Full Model for High Home Support Users

Characteristic	p-value for group	Estimate	Standard Error	Wald Chi- Square	P value	Odds Ratio	95% Confidence Limits	
Intercept		-5.22	0.51	103.49	<.0001			
Health Care System								
Home care office (other)	0.002	0.46	0.28	2.64	0.10	1.58	0.91	2.74
Home care office 1		0.45	0.26	3.06	0.08	1.57	0.95	2.58
Home care office 2		0.28	0.26	1.10	0.29	1.32	0.79	2.21
Home care office 3		0.08	0.30	0.08	0.78	1.09	0.60	1.96
Home care office 4		0.57	0.23	6.30	0.01	1.77	1.13	2.76
Home care office 5		0.59	0.28	4.56	0.03	1.81	1.05	3.13
Home care office 6		-0.38	0.27	2.03	0.15	0.68	0.41	1.15
Home care office 7		0.22	0.21	1.08	0.30	1.25	0.82	1.88
Home care office 9		-0.20	0.29	0.51	0.48	0.82	0.46	1.43
Home care office 10		0.33	0.22	2.16	0.14	1.39	0.90	2.16
Home care office 11		0.72	0.23	9.63	0.00	2.05	1.30	3.23
Home care office 12		0.48	0.38	1.59	0.21	1.62	0.77	3.44
Client Need								
New client	<.0001	-0.84	0.15	30.09	<.0001	0.43	0.32	0.58
Poor self-reported health	0.08	0.24	0.13	3.13	0.08	1.27	0.98	1.64
Bladder incontinence present	0.17	0.16	0.12	1.93	0.17	1.17	0.94	1.47
Bowel incontinence present	0.52	0.09	0.15	0.41	0.52	1.10	0.82	1.46
Skin ulcer present	0.67	-0.10	0.23	0.19	0.67	0.91	0.58	1.41
Fell in past 90 days	0.83	0.03	0.12	0.05	0.83	1.03	0.81	1.30
Overnight hospital stay in last 90 days	0.03	-0.28	0.13	4.47	0.03	0.76	0.58	0.98
ADL Hierarchy Scale	<.0001	0.63	0.05	192.88	<.0001	1.88	1.72	2.05
ADL decline in last 90 days	0.16	-0.20	0.14	2.00	0.16	0.82	0.63	1.08
Great difficulty in 2 IADLs	<.0001	1.24	0.15	71.76	<.0001	3.45	2.59	4.59
Great difficulty in 3 IADLs		1.44	0.21	47.16	<.0001	4.22	2.80	6.37

Characteristic	p-value for group	Estimate	Standard Error	Wald Chi-Square	P value	Odds Ratio	95% Confidence Limits	
Cognitive Performance Scale	0.90	-0.01	0.06	0.02	0.90	0.99	0.88	1.12
Decline in decision-making in past 90 days	0.06	-0.33	0.19	3.16	0.06	0.72	0.50	1.04
Behaviour problems present	0.07	-0.34	0.19	3.16	0.07	0.72	0.49	1.03
Changes in behaviour	0.51	0.20	0.29	0.44	0.51	1.22	0.68	2.17
Depression score = 1,2	0.79	-0.09	0.13	0.46	0.50	0.92	0.71	1.18
Depression score = 3+		-0.04	0.20	0.04	0.84	0.96	0.65	1.41
Mood decline in past 90 days	0.15	0.26	0.18	2.08	0.15	1.30	0.91	1.87
CHESS score = 2-5	1.00	0.00	0.15	0.00	1.00	1.00	0.75	1.33
Conditions make health unstable	0.99	0.00	0.12	0.00	0.99	1.00	0.78	1.27
Any pain on Pain Scale	0.12	-0.19	0.12	2.40	0.12	0.83	0.65	1.05
stroke	0.01	0.34	0.12	7.74	0.01	1.41	1.11	1.80
Coronary artery disease	0.11	-0.20	0.15	2.39	0.11	0.73	0.60	1.04
Any dementia	0.26	0.18	0.16	1.28	0.26	1.20	0.88	1.64
Arthritis	0.18	0.16	0.12	1.77	0.18	1.17	0.93	1.48
Hip fracture	0.10	0.33	0.20	2.65	0.10	1.39	0.94	2.07
Psychiatric diagnosis	0.87	-0.03	0.17	0.03	0.87	0.97	0.70	1.35
Diabetes	0.67	-0.06	0.13	0.18	0.67	0.95	0.73	1.23
Asthma	0.31	-0.15	0.15	1.04	0.31	0.86	0.64	1.15
2-5 disease diagnoses	0.15	-0.36	0.21	2.93	0.09	0.70	0.46	1.05
6-13 disease diagnoses		-0.24	0.28	0.76	0.38	0.79	0.46	1.35
Uses 5-8 medications	0.06	-0.09	0.14	0.42	0.52	0.91	0.69	1.21
Uses 9+ medications		0.27	0.16	2.84	0.09	1.31	0.96	1.78
Receives special therapies	0.11	0.30	0.19	2.60	0.11	1.35	0.94	1.94
Psychotropic medication use	0.86	-0.02	0.12	0.03	0.86	0.98	0.77	1.24
MAPLe score	<.0001	0.34	0.09	15.44	<.0001	1.41	1.19	1.67

	p-value for group	Estimate	Standard Error	Wald Chi- Square	P value	Odds Ratio	95% Confidence Limits	
Caregiver Need								
Caregiver unable to continue care	0.40	0.14	0.17	0.69	0.40	1.15	0.83	1.61
Caregiver distress	0.90	0.02	0.17	0.01	0.90	1.02	0.73	1.43
Client Enabling								
Lives alone	0.59	-0.09	0.17	0.29	0.59	0.91	0.65	1.27
Caregiver provides IADL care	0.37	0.17	0.19	0.81	0.37	1.19	0.82	1.74
Caregiver provides ADL care	0.87	0.02	0.14	0.03	0.87	1.02	0.78	1.35
Caregiver lives with client	0.88	0.03	0.17	0.02	0.88	1.03	0.74	1.42
Non-spouse caregiver	0.002	0.73	0.21	12.05	0.002	2.07	1.37	3.12
Informal care hours per week > 15	0.0006	0.47	0.14	12.28	0.0006	1.61	1.23	2.09
Client Predisposing								
Age 75-84	0.54	0.10	0.15	0.38	0.54	1.10	0.81	1.49
Age 85+		-0.03	0.17	0.03	0.86	0.97	0.70	1.35
Male	0.10	-0.21	0.13	2.66	0.10	0.81	0.63	1.04
Married	0.37	0.03	0.19	0.02	0.89	1.03	0.70	1.51
Not married		-0.26	0.19	1.79	0.18	0.77	0.53	1.13
Grade 8 or less	0.06	-0.25	0.16	2.37	0.12	0.78	0.56	1.07
Grade 9-11		-0.02	0.16	0.02	0.89	0.98	0.72	1.33
High school		-0.17	0.18	0.86	0.35	0.85	0.60	1.20
Education level unknown		0.28	0.20	1.91	0.17	1.32	0.89	1.96
Service Episode Length								
31-60 days in service episode	0.81	0.06	0.21	0.09	0.76	1.07	0.71	1.60
61-99 days in service episode		-0.02	0.18	0.02	0.89	0.98	0.69	1.39

Table D3: Full Model for High Nursing Users

Characteristic	p-value for group	Estimate	Standard Error	Wald Chi-Square	P value	Odds Ratio	95% Confidence Limits	
Intercept		-4.84	0.49	95.74	<.0001			
Health Care System								
Home care office (other)	0.17	0.33	0.22	2.13	0.14	1.39	0.89	2.18
Home care office 1		-0.12	0.18	0.49	0.48	0.88	0.61	1.25
Home care office 2		0.20	0.20	0.96	0.32	1.22	0.81	1.84
Home care office 3		0.06	0.20	0.11	0.73	1.07	0.71	1.60
Home care office 4		-0.28	0.25	1.22	0.26	0.75	0.45	1.24
Home care office 5		-0.23	0.18	1.50	0.22	0.79	0.54	1.14
Home care office 6		-0.19	0.25	0.59	0.44	0.82	0.49	1.35
Home care office 7		0.23	0.18	1.68	0.19	1.27	0.88	1.82
Home care office 9		-0.009	0.21	0.001	0.96	0.99	0.64	1.51
Home care office 10		-0.29	0.18	2.55	0.10	0.74	0.52	1.06
Home care office 11		-0.11	0.20	0.34	0.55	0.88	0.59	1.32
Home care office 12		-0.15	0.41	0.14	0.70	0.85	0.37	1.94
Client Need								
Poor self-reported health	0.02	0.25	0.11	4.79	0.02	1.28	1.02	1.61
Bowel incontinence present	0.62	0.07	0.14	0.24	0.62	1.07	0.80	1.43
Skin ulcer present	<.0001	1.82	0.14	149.11	<.0001	6.21	4.63	8.32
Fell in past 90 days	0.24	-0.12	0.10	1.33	0.24	0.88	0.71	1.09
Overnight hospital stay in last 90 days	0.0003	0.36	0.10	11.88	0.0003	1.44	1.17	1.77
ER use in last 90 days	0.26	0.18	0.16	1.26	0.26	1.19	0.87	1.64
Supervision to extensive assistance with ADLs	0.03	0.19	0.11	2.85	0.09	1.21	0.96	1.53
Extensive to total dependence in ADLs		0.59	0.25	5.49	0.01	1.81	1.10	2.99
ADL decline in last 90 days	0.72	-0.04	0.12	0.12	0.72	0.95	0.74	1.23
Some difficulty in 1-3 IADLs	0.85	-0.14	0.37	0.16	0.68	0.86	0.41	1.77
Great difficulty in 1-3 IADLs		-0.08	0.3626	0.05	0.8068	0.91	0.45	1.86

Characteristic	p-value for group	Estimate	Standard Error	Wald Chi-Square	P value	Odds Ratio	95% Confidence Limits	
Borderline/mild cognitive impairment	0.65	-0.003	0.12	0.0009	0.97	0.99	0.77	1.27
Moderate to very severe cognitive impairment		0.14	0.18	0.57	0.44	1.15	0.79	1.67
Decline in decision-making in past 90 days	0.85	0.03	0.18	0.03	0.85	1.03	0.72	1.47
Depression score = 1,2	0.53	0.03	0.11	0.07	0.78	1.03	0.82	1.29
Depression score = 3+		-0.17	0.18	0.88	0.34	0.83	0.58	1.21
Mood decline in past 90 days	0.10	0.27	0.16	2.64	0.10	1.31	0.94	1.81
CHESS score	0.37	0.05	0.06	0.78	0.37	1.06	0.93	1.21
Conditions make health unstable	0.97	0.003	0.11	0.001	0.97	1.00	0.80	1.25
Heart failure	0.71	0.04	0.11	0.13	0.71	1.04	0.82	1.32
Coronary artery disease	0.91	-0.01	0.11	0.01	0.91	0.98	0.78	1.24
Peripheral vascular disease	0.0001	0.61	0.16	13.43	0.0001	1.84	1.33	2.56
Any dementia	0.80	0.03	0.15	0.05	0.80	1.03	0.76	1.41
Arthritis	0.002	-0.30	0.09	9.39	0.002	0.73	0.60	0.89
Glaucoma	<.0001	0.91	0.12	54.03	<.0001	2.48	1.95	3.16
Cancer	0.004	0.38	0.13	8.14	0.004	1.46	1.12	1.90
Diabetes	<.0001	0.67	0.10	39.24	<.0001	1.97	1.59	2.44
Asthma	0.77	-0.03	0.12	0.07	0.77	0.96	0.75	1.23
2-5 disease diagnoses	0.33	0.10	0.20	0.28	0.59	1.11	0.74	1.66
6-13 disease diagnoses		-0.08	0.25	0.09	0.75	0.92	0.55	1.52
Receipt of special treatment	<.0001	0.59	0.14	17.19	<.0001	1.81	1.37	2.41
Uses 5-8 medications	<.0001	0.20	0.13	2.23	0.13	1.22	0.93	1.59
Uses 9+ medications		0.56	0.14	15.49	<.0001	1.75	1.32	2.32
MAPLe score	<.0001	0.24	0.05	17.07	<.0001	1.27	1.13	1.43
Caregiver Need								
Caregiver distress	0.56	0.10	0.18	0.33	0.56	1.11	0.77	1.58

Characteristic	P-value for group	Estimate	Standard Error	Wald Chi-Square	P value	Odds Ratio	95% Confidence Limits	
Client Enabling								
Lives alone	0.003	0.42	0.14	8.50	0.003	1.53	1.15	2.03
Caregiver provides ADL care	0.003	0.39	0.13	8.81	0.003	1.48	1.14	1.91
8-14 informal care hours per week	0.02	0.16	0.11	1.86	0.17	1.17	0.93	1.47
15+ informal care hours per week		-0.23	0.1461	2.64	0.10	0.78	0.59	1.05
Client Predisposing								
Age 75-84	0.0002	-0.01	0.13	0.01	0.89	0.98	0.74	1.29
Age 85+		0.40	0.14	7.42	0.006	1.49	1.12	1.99
Male	0.91	-0.01	0.11	0.01	0.91	0.98	0.79	1.23
Married	0.61	0.01	0.15	0.01	0.91	1.01	0.74	1.37
Not married		0.13	0.14	0.95	0.32	1.14	0.87	1.51
Service Episode Length								
31-60 days in service episode	0.29	0.17	0.19	0.84	0.35	1.19	0.81	1.74
61-99 days in service episode		0.25	0.16	2.32	0.12	1.28	0.93	1.77