

Emergency Department Visit Rates and Patterns in Canada's Vancouver Coastal Health Region*

Margaret J. McGregor,^{1,2,3} Kimberlyn M. McGrail,^{3,4} Riyad B. Abu-Laban,^{2,5} Lisa A. Ronald,² Jennifer Baumbusch,⁶ Douglas Andrusiek,⁷ and Michelle B. Cox²

RÉSUMÉ

Cette étude a utilisé des données sur la santé administratives pour décrire des visites effectuées par les résidents de vie assistée et ceux des foyers de soins infirmiers à domicile au service d'urgence (SU) dans la région de Vancouver Coastal Health, Colombie-Britannique. Nous avons comparé taux de visite SU, la répartition des visites par résident, et les dispositions SU des deux populations—d'aide à la vie autonome ou du foyer de soins infirmiers pendant une période de 3 ans (2005-2008). Il y avait 13 051 personnes dans la population étudiée. Taux de visite (intervalle de confiance de 95 pourcent) étaient de 124,8 (118,1 à 131,7) et 64,1 (62,9 à 65,3) visites par 100 ans résidants dans les logements avec assistance et les foyers de soins infirmier à domicile, respectivement. Une plus faible proportion de visites à l'urgence par les résidents de vie assistée ont entraîné une hospitalisation par rapport aux résidents des foyers de soins (45% vs 48%, $p < 0,01$). Le taux de visite à l'urgence chez les résidents de vie assistée est significativement plus élevée par rapport à celle des résidents des foyers de soins. De nouvelles recherches s'imposent sur les causes sous-jacentes de cette constatation.

ABSTRACT

This study used administrative health data to describe emergency department (ED) visits by residents from assisted living and nursing home facilities in the Vancouver Coastal Health region, British Columbia. We compared ED visit rates, the distribution of visits per resident, and ED dispositions of the assisted living and nursing home populations over a 3-year period (2005–2008). There were 13,051 individuals in our study population. Visit rates (95% confidence interval) were 124.8 (118.1–131.7) and 64.1 (62.9–65.3) visits per 100 resident years in assisted living and nursing home facilities respectively. A smaller proportion of ED visits by assisted living residents resulted in hospital admission compared to nursing home residents (45% vs. 48%, $p < .01$). The ED visit rate among assisted living residents is significantly higher compared to that among nursing home residents. Future research is needed into the underlying causes for this finding.

¹ Department of Family Practice, University of British Columbia, Vancouver, Canada

² Vancouver Coastal Health Research Institute, Centre for Clinical Epidemiology & Evaluation, Vancouver

³ UBC Centre for Health Services and Policy Research, Vancouver

⁴ UBC School of Population and Public Health, Vancouver

⁵ UBC Department of Emergency Medicine, Vancouver

⁶ UBC School of Nursing, Vancouver

⁷ Emergency and Health Services Commission, Vancouver

Conflicts of interest: The authors have no financial or other conflicts of interest to declare.

* This study was supported by an operating grant from the Vancouver Foundation (2008–2011), the University of British Columbia's Department of Family Practice Community Geriatrics and Vancouver General Hospital's Department of Family Practice. Margaret McGregor was supported by a Vancouver Foundation Community-Based Clinician Investigator Award (2007–2011). We gratefully acknowledge the following individuals: Penny Brasher, VCHRI's Centre for Clinical Epidemiology and Evaluation, who contributed to the original data extraction and management; Lisa Kuramoto, VCHRI's Centre for Clinical Epidemiology and Evaluation, and Michael Schulzer, UBC Department of Statistics, who contributed to the data management and analytic approach; Kia Salomons, research assistant who coordinated the data extraction; Susan Sirrett, Patricia Chung, and Colin Sue (VCH Decision Support), Carole Astley and Catherine Barnardo (Fraser Health Decision Support), and Karl Newholm and Areta Wong (Providence Health Care Decision Support), all of whom assisted in data extraction from their respective administrative databases; and the librarians of the BC College of Physicians and Surgeons Library who assisted with literature searches.

Manuscript received: / manuscrit reçu : 05/11/2012

Manuscript accepted: / manuscrit accepté : 30/09/2013

Keywords: aging, assisted living, hospital transfer, nursing home, residential long-term care

Mots clés : vieillissement, aide à la vie autonome, foyer de soins infirmiers, centre d'hébergement et de soins de longue durée

La correspondance et les demandes de tirés-à-part doivent être adressées à: / Correspondence and requests for offprints should be sent to:

Margaret J. McGregor, M.D., M.H.Sc.
University of British Columbia
Department of Family Practice
Room 713, 828 West 10th Avenue
Vancouver, BC V5Z 1L8
(mrgret@mail.ubc.ca)

Introduction

Frailty is a “multidimensional syndrome of loss of reserves (energy, physical, ability, cognition, health) that gives rise to vulnerability” (Rockwood et al., 2005, p. 489) and frequently results in disability (Fried, Ferrucci, Darer, Williamson, & Anderson, 2004). Health systems have developed a number of strategies for caring for frail older adults who are unable to manage independently. One common policy approach deployed by many jurisdictions has been home care. Home care services include personal care (such as assistance with bathing and grooming), nursing care, physiotherapy, and occupational therapy. In any given year, an estimated one million Canadians receive home care (Canadian Institute for Health Information, 2011). Another common approach is the establishment of facility-based, regulated long-term care with 24-hour nursing supervision (henceforth referred to as “nursing home” care).

Over the past decade many Canadian provinces have developed a “middle option” that offers a permanent housing arrangement and some support services (Canadian Institute for Health Information, 2011). In 2004, British Columbia introduced such a third care option for frail older people: assisted living. Assisted living facilities provide a more limited number of support services to older people than those offered by nursing homes. Assisted living facilities in British Columbia must provide at least one, and not more than two, “prescribed services” such as assistance with activities of daily living and central storage of medications; and all facilities are required to provide five hospitality services¹ under the Community Care and Assisted Living Act (BC Ministry of Health, 2011). Residents of assisted living facilities must be able to make their own health care decisions, and individuals who are unable to do this are ineligible to live in assisted living facilities (BC Ministry of Health, 2007). Assisted living facilities typically have a far lower level of nursing and medical support compared to nursing homes.

Frail older people are at significant risk of hospital emergency department (ED) visits and hospital admission for chronic conditions (Hastings, Oddone, Fillenbaum, Sloane, & Schmader, 2008; Hastings, Purser, Johnson, Sloane, & Whitson, 2008). One objective in providing different types of housing arrangements is to mitigate the use of acute care services by stabilizing chronic disease through improved medication management support, and by early detection and intervention of acute illness to prevent deterioration. Apart from one Alberta report (Strain, Maxwell, Wanless, & Gilbert, 2011), there has been little Canadian research comparing acute health services use by assisted living and nursing home populations despite ongoing policy interest in better-organized care offered to frail elders.

This study aims to help fill that gap. It uses administrative data and a retrospective cohort design to describe population rates of ED visits of residents in assisted living and nursing home facilities of one large health region (Vancouver Coastal Health), over a 3-year time period from 2005 to 2008.

We decided to focus on ED visits versus hospital admissions as an outcome for a number of reasons. First, ED visits are less constrained by hospital bed availability, and the rates of the former do not necessarily mirror those of the latter. In fact, Ontario rates of ED visits by older adults have been increasing whereas hospital admissions have decreased over the same time period (Canadian Institute for Health Information, 2010). ED transfer rates are thus an important and distinct outcome (compared to hospital admission rates) requiring further examination. Second, although there is some published research documenting community ED visit rates (Doupe et al., 2008), with the exception of Ontario (Canadian Institute for Health Information, 2010; Gruneir et al., 2010) and one Alberta study from the late 1990s (Wilson & Truman, 2005), there has been little Canadian research on ED transfer rates in assisted living and nursing home populations. Finally, as the population

ages, even if policy becomes more focused on supported home-based options for frail seniors, there will be a growing absolute number of seniors in assisted living and nursing home facilities. A better understanding of the acute health services use in these groups, therefore, is important for planning purposes.

Our research question was whether population ED visitation rates and patterns for assisted living differ from those for nursing home residents. According to Andersen's 2005 health services use framework (Andersen & Newman, 2005), health service use is explained by three groups of characteristics. In the first group are system-level organizational characteristics of health services delivery. These include access to and availability of health services. In the second group are medical technology and social norms for the definition and treatment of illness. People only seek health services for perceived illness based on an expectation of some kind of treatment. In the third group are individual-level characteristics. These include (a) predisposing characteristics, such as health beliefs; (b) enabling characteristics, such as social and family supports; and (c) each person's real and perceived illness level (Andersen & Newman, 2005).

We have proposed two contradictory hypotheses for which Andersen's theory of health services use provides a reasonable framework (Andersen, 1995; Andersen & Newman, 2005). Our first hypothesis was that, since assisted living residents are less frail than nursing home residents, the former group would have less real need to visit hospital EDs and therefore have a lower ED visit rate (Andersen & Newman, 2005). The alternative hypothesis postulated that the lower level of on-site support in assisted living facilities was a system characteristic that would override the effect of assisted living residents being a "healthier population." Faced with less institutional support when acutely ill, assisted living residents would be more likely to seek assistance in a hospital setting (Anderson, 1995), resulting in a higher hospital ED visit rate in assisted living facilities compared to nursing homes.

This study was a descriptive portion of a larger study linking survey-derived nursing home facility characteristics and hospital ED visit rates (McGregor et al., 2014). In that study we gathered administrative data on all ED visits by residents of both assisted living and nursing home facilities, giving us the opportunity to address the research questions in the current study.

Methods

This retrospective cohort study used secondary administrative health data collected by the Vancouver Coastal Health (VCH) region in British Columbia, Canada. The VCH region, one of six health regions in the province, serves approximately 25 per cent of

British Columbia's population (more than 1 million individuals). Within the region are 13 acute care hospitals, approximately 70 publicly funded nursing homes, and approximately 21 assisted living facilities with publicly funded units; the latter two have a main client base of frail elders.

Data Sources and Data Measures

The study population consisted of all individuals residing in a publicly funded bed in a VCH assisted living or nursing home facility at any point between April 1, 2005, and March 31, 2008. These data are captured in the Community Care Information Management System database of the VCH region. Start and end dates for residents admitted to a facility are entered by case managers working out of the health units attached to a given local health area. We extracted the start and end dates for residents' facility stays as well as data on facility name, and residents' sex and birth dates. Resident age was calculated using the resident's facility admission date (truncated to the study start date if they were admitted to the facility before) and the resident's birth date. The data did not include any information on residents' health or functional status.

Excluded from the study population were residents of self-pay beds, representing over one-third of assisted living beds and less than 10 per cent of nursing home beds respectively (see Figure 1) (Canadian Healthcare Association, 2009). These data are not captured by the above-described administrative database. Facilities for the developmentally disabled ($n = 3$), hospice ($n = 4$), facilities for young adults and special populations ($n = 5$), and respite care ($n = 2$) were excluded from the dataset because of the different populations cared for by such facilities compared to nursing home and assisted living residents – the main focus of our study. Facilities in rural communities were also excluded ($n = 13$) because of the different context in these rural communities within the health region. Individuals were included only for the portion of the study period in which they lived in a nursing home or assisted living facility.

The study population dataset was linked to ED visit data. ED visit data are collected by ED unit clerks who enter the data into a patient care information system. Unlike hospital discharge data which are centralized provincially and routinely uploaded to the Canadian Institute of Health Information, British Columbia ED data are collected and managed by each health region. Within VCH at the time of data collection, this was complicated by separate ED data collection systems for the two largest hospitals. Furthermore, in some neighbourhoods within VCH, residents are transferred to the geographically closest acute hospital that is located in another health region and utilizes another ED data

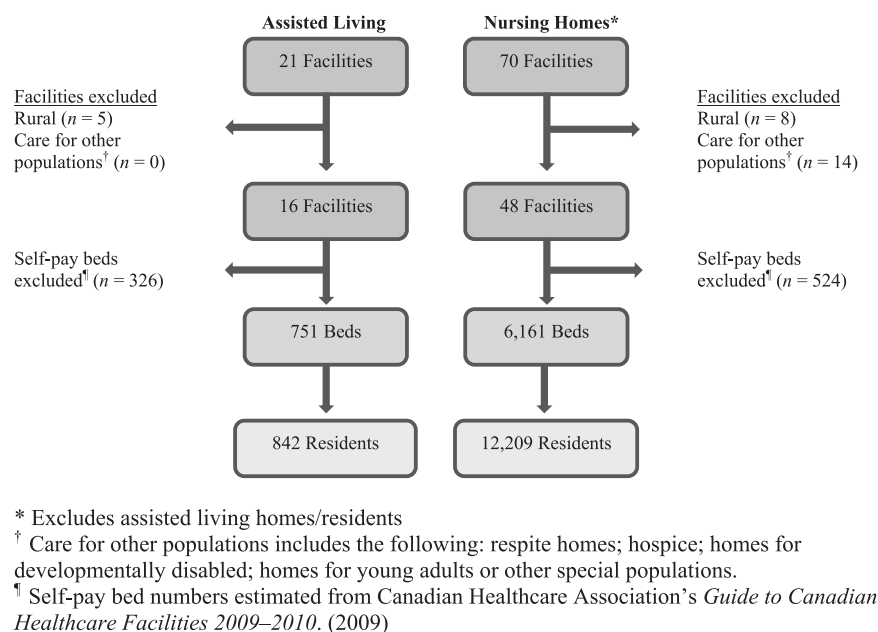


Figure 1: Study exclusions for assisted living and nursing home facilities in Vancouver Coastal Health region, British Columbia, Canada; April 1, 2005, to March 31, 2008

capture system. We had to link the study cohort, therefore, to three separate ED data systems.

This study presents the number of residents, ED visits, and total resident days of observation. Population rates per 1,000 resident days were calculated by dividing the number of ED visits during the time period, by the total number of resident days of observation of the study population over the same time period, and multiplying by 1,000. The rate per 1,000 resident days was converted to a rate per 100 resident years by dividing this value by 2.74 (to account for leap years)² and then multiplying by 100.

We described residents' age, sex, and length of stay within the study period. We examined the distribution of visits per resident and described the disposition of residents following an ED visit. This disposition was categorized into three groups (discharged, admitted to acute care, or death). We further described the distribution patterns of visits by presenting the times of day when visits occurred and the levels of acuity according to Canadian Triage and Acuity Scale [CTAS] status. This classification scale groups patients into five levels of urgency when they present to the ED from I (resuscitation) to V (non urgent) (Beveridge, 1998). For our analysis, the levels of the scale were dichotomized as follows: I-III (emergency or urgent) versus IV-V (less urgent or non-urgent). The analysis of these latter two variables, visit day/time and CTAS, were restricted to a subset of residents transferred to Providence and Burnaby Hospitals due to lack of available data from the other hospitals (subset of 36% of data available for these two variables). All

variables were stratified by assisted living and nursing home resident populations.

We carried out tests of comparison between assisted living residents and nursing home residents on all variables examined. The two independent samples *t*-test was used to compare continuous data except if the standard deviation was greater than the mean, in which case the Wilcoxon–Mann–Whitney non-parametric test was used. For categorical data, the chi-square test was used for most comparisons and the Fisher's exact test employed in instances where any group had fewer than five observations.

All descriptive and statistical analyses were conducted using the SAS Institute's SAS version 9.3 software. Ethics approval was obtained from the University of British Columbia Behavioural Research Ethics Board and the relevant ethics review boards within VCH.

Results

In our study population, there were 842 individuals residing in 16 assisted living facilities, and 12,209 residents residing in 48 nursing home facilities (see Figure 1). The mean age (standard deviation [SD]) of residents was 81.5 (10.5) and 83.1 (10.2) years for assisted living and nursing home residents respectively (see Table 1). A significantly lower proportion of male residents occupied assisted living facilities (28.3%) compared to nursing home facilities (33.2%).

During the 36 months of observation, a total of 1,299 and 10,710 visits were made to the ED for assisted living and nursing home residents respectively (see Table 2).

Table 1: Demographics and emergency department visit patterns of residents in assisted living and nursing home facilities in the Vancouver Coastal Health region, British Columbia, Canada; April 1, 2005, to March 31, 2008

Resident characteristics	Assisted living residents <i>n</i> = 842	Nursing home residents* <i>n</i> = 12,209	<i>p</i> value
Mean age (<i>SD</i>)	81.5 (10.5)	83.1 (10.2)	< .0001†
Missing data, <i>n</i>		5	
Male, <i>n</i> (%)	238 (28.3)	4,058 (33.2)	.0030¶
Resident days per resident			
Mean (<i>SD</i>)	450.9 (332.4)	499.5 (399.9)	
Median (QRANGE)	348.5 (495.0)	418.0 (785.0)	.1484§
ED visits per resident			
Mean (<i>SD</i>)	1.5 (3.2)	0.9 (1.6)	
Median (QRANGE)	1.0 (2.0)	0 (1.0)	< .0001§
Residents with 1 or more ED visits over study period, <i>n</i> (%)	430 (51.1)	5,144 (42.1)	< .0001¶
ED visits per resident, <i>n</i> (%)			
None	412 (48.9)	7,065 (57.9)	< .0001¶
1	176 (20.9)	2,675 (22.0)	
2	97 (11.5)	1,252 (10.3)	
3–5	105 (12.5)	976 (8.0)	
6+	52 (6.2)	241 (2.0)	

ED = emergency department**QRANGE = interquartile range****SD = standard deviation*****Excludes assisted living residents****Test of comparison:****†Two independent samples *t*-test; ¶ χ^2 test; §Wilcoxon–Mann–Whitney test**

Visit rates (95% confidence interval) were 3.4 (3.2–3.6) and 1.8 (1.7–1.8) visits per 1,000 resident days, or 124.8 (118.1–131.7) and 64.1 (62.9–65.3) visits per 100 resident years, in assisted living and nursing home facilities respectively. This comparison was statistically significant as demonstrated by the non-overlap of the confidence intervals for the two rates reported. The mean number of ED visits per assisted living resident was 1.5 (*SD* = 3.2) with a maximum of 45 visits per resident. The mean number of ED visits per nursing home resident was just under one (0.9; *SD* = 1.6) with a

maximum of 26 visits per resident (see Table 1). Respectively, 51 per cent and 42 per cent of assisted living and nursing home residents had one or more ED visits. A lower proportion of assisted living residents had no ED visits, and a greater proportion had multiple ED visits (see Table 1). Hospital admissions resulted from 45 per cent of assisted living and 48 per cent of nursing home resident visits (see Table 3). These differences in visit rates and patterns were all statistically significant on univariate testing (see Tables 1 and 3).

Table 2: Crude emergency department visit rates for residents of assisted living and nursing home facilities in Vancouver Coastal Health region, British Columbia, Canada; April 1, 2005, to March 31, 2008

Resident ED visits	Assisted living residents <i>n</i> = 842	Nursing home residents* <i>n</i> = 12,209
ED visits†, <i>n</i> (%)	1,299 (10.8)	10,710 (89.2)
Resident days of observation, <i>n</i> (%)	379,619 (5.9)	6,098,906 (94.1)
Rate per 1,000 resident days (95% CI)¶	3.4 (3.2–3.6)	1.8 (1.7–1.8)
Rate per 100 resident years (95% CI)¶	124.8 (118.1–131.7)	64.1 (62.9–65.3)

CI = confidence interval**ED = emergency department*****Excludes assisted living residents****† Accounts for multi-visits on the same day for the same resident****¶ Comparison of ED visit rates are statistically significant as demonstrated by the non-overlap of the confidence intervals for the two rates reported.**

Table 3: Characteristics of emergency department visits among assisted living and nursing home residents in Vancouver Coastal Health region, British Columbia, Canada; April 1, 2005, to March 31, 2008

Resident ED visit characteristics	Assisted living visits # visits = 1,299	Nursing home visits* # visits = 10,710	p value
ED disposition, n (%)			
Discharged	708 (54.8)	5,394 (50.9)	.0023†
Admission to ward	582 (45.0)	5,125 (48.3)	
Death	3 (0.2)	88 (0.8)	
Missing data	6	103	
Visit day/time, n (%)§			
Regular hours**	256 (42.0)	2,031 (53.9)	< .0001¶
After hours††	353 (58.0)	1,737 (46.1)	
Data not available (VCH)	690	6,942	
CTAS, n (%)§			
I to III (emergency or urgent)	397 (65.8)	2,502 (67.4)	.4637¶
IV or V (less urgent or non-urgent)	206 (34.2)	1,213 (32.7)	
Missing data	6	53	
Data not available (VCH)	690	6,942	

CTAS = Canadian Triage and Acuity Scale

ED = emergency department

VCH = Vancouver Coastal Health

***Excludes assisted living resident visits**

Test of comparison: †Fisher's exact test; ¶ χ^2 test

§ ED visit data available for Fraser Health and Providence only, no data available for Vancouver Coastal Health

****Regular hours = between 8:00 A.M. and 6:00 P.M., Monday through Friday**

†† After hours = between 6:00 P.M. and 8:00 A.M., Monday through Thursday, and 6:00 P.M. Friday to 8:00 A.M. Monday

Less than one per cent of residents in both groups died in the ED prior to admission (0.2% and 0.8% for assisted living and nursing home residents respectively; see Table 3). Of the subset of visits for which data were available ($n = 4,377$), a significantly greater proportion of ED visits by residents of assisted living occurred after hours and on weekends, and there were no significant differences by visit acuity (acuity measured by CTAS).

Discussion

Our study reported an ED visit rate of 124.8 per 100 resident years for assisted living residents and 64.1 per 100 resident years for nursing home residents. The significantly higher frequency of ED visits by residents in assisted living facilities compared to nursing homes is similar to a recently published Alberta report (Strain et al., 2011). These authors, using a provincial sampling approach and different data sources, reported that 16 per cent of assisted living residents compared to 6 per cent of nursing home residents had experienced one or more ED visits in the 90 days prior to a comprehensive baseline assessment (Strain et al., 2011).

The higher use of acute service by assisted living compared to nursing home residents is particularly interesting since the former population is both younger and higher functioning, and thus a priori might be expected to visit the ED less often. The original rationale

for the construction of assisted living facilities was to accommodate those who required more assistance than community-based home care can offer, but less than the 24-hour nursing care provided by nursing homes. Indeed, to qualify for publicly funded assisted living, residents must be assessed as requiring no more than two prescribed services (BC Ministry of Health, 2009; BC Ministry of Health, 2007). However, the findings from our study suggest that this group accounts for disproportionately more ED visits compared to the nursing home population.

A number of possible reasons exist for the observed difference. First, in nursing home settings the facility staff and/or attending physician usually makes the decision to send a resident to the ED, with or without input from the family. In contrast, assisted living residents (with or without the family) are far more likely to make their own decision to go to a hospital ED without any involvement of facility staff. Interestingly, while there is a twofold difference in ED visit rates, there is only a very small difference (3%) in the proportion of ED visits that result in a hospital admission. This suggests that assisted living residents, when they present to the hospital, are unlikely to be seeking services for minor problems for which they can be seen and discharged. If this were the case, then one would expect a high rate of ED visits to be associated with fewer of those converting to an acute care stay. It is also

possible that because assisted living residents are less mentally and physically frail, there is an expectation of and system response to more-aggressive acute care provision compared to that for nursing home residents. Finally, there is less medical and nursing support in assisted living facilities and, therefore, less capacity for treatment in place when a resident falls ill. This reality may result in a lower threshold on the part of the resident to seek help in the emergency department, and on the part of the hospital to admit for treatment.

Regardless of the reasons for the observed difference, the “middle option” of assisted living facilities appearing to cost less than nursing home care due to this lower level of support provision may be a false economy. Given that policy over the past decade in British Columbia has been to construct assisted living facilities while decreasing the number of nursing home beds and offering fewer long-term home support services (Cohen, Tate, & Baumbush, 2009; McGrail et al., 2008), assisted living should be further evaluated. Future research should include a cost comparison of health services of both cohorts including care provided in the ED and acute settings.

The greater frequency of ED visits occurring after hours and on weekends for assisted living residents further suggests that at least some of these visits may be avoided with improved access to after-hours care and/or increased medical/nursing services on site. Interestingly, prior research in British Columbia on the trajectory of assisted living residents before and after admission found that individuals entering assisted living had significantly higher rates of hospital admission in the year prior to entering assisted living compared to the subsequent time period (McGrail et al., 2010). It is likely, therefore, that the subset of residents who qualify for publicly funded assisted living, while less functionally disabled, have complex medical conditions. Increased medical and nursing support may be a useful strategy to reduce ED visits in this population. Models of integrated community and primary care with 24/7 access may be particularly well suited for assisted living residents, and where such services are provided to assisted living residents, research suggests decreased acute services utilization (Rosenberg, 2012; Vedel, Monette, Beland, Monette, & Bergman, 2011).

Although there are no comparative ED visit rates from other jurisdictions among assisted living residents, the ED visit rate for nursing home residents in our study is somewhat lower than the rate of 77.2 per 100 resident years reported by Gruneir et al. in Ontario (Gruneir et al., 2010). Furthermore, our study found that a substantial proportion of both populations (51.1% and 42.1% of assisted living and nursing home residents

respectively) experienced one or more ED visits over the study time period. ED visits by residents from both these settings comprise a relatively small proportion of total ED service volumes. However, these individuals are often medically complex, may not be easily evaluated in the “fast track” of emergency departments, and are more likely to contribute to the problem of ED “crowding” despite their relatively small numbers (Schull, Kiss, & Szalai, 2007). More importantly, both assisted living and nursing home residents comprise frail and disabled elder populations that are less likely to benefit from acute care and are at high risk of experiencing iatrogenesis (Gillick, Serrell, & Gillick, 1982).

Our study also found that almost one out of every two ED visits (45% and 48.3% in assisted living facilities and nursing homes respectively) resulted in a hospital admission. This rate is only slightly higher than the rate of 43.8 per cent reported by Gruneir et al. in Ontario in 2005 (Grunier et al., 2010), and far higher than admission rates for community-dwelling seniors reported in Ontario in 2008–2009, where only one in four individuals were admitted following an ED visit (Canadian Institute for Health Information, 2011). Over the study period, 0.8 per cent of all visits resulted in death in the ED, equivalent to 91 individuals, which is similar to rates reported elsewhere (Grunier et al., 2010). The proportion of over 60 per cent of visits in both groups classified as emergency or urgent (according to CTAS) is also comparable to those reported for nursing home residents in Ontario (Grunier et al., 2010).

While this study did not examine the major causes for ED visits, Ontario research found that the most common cause of nursing home ED visits included falls, pneumonia, urinary tract infections, and heart failure (Grunier et al., 2010). Previous British Columbia research has identified hip fracture and pneumonia as the top two causes for hospital admission among the nursing home population (Ronald, McGregor, McGrail, Tate, & Broemeling, 2008). Research further suggests that tertiary prevention programs in these populations may decrease the incident rates of these events. Scaled-up efforts to implement and evaluate the effect of falls prevention programs (Vu, Weintraub, & Rubenstein, 2006), early detection and intervention within the facility for pneumonia (Loeb et al., 2006), and decompensation of chronic obstructive pulmonary disease (COPD) and heart failure, would be an important policy direction in both assisted living and nursing home populations (Vu et al., 2006). Similarly, there needs to be further work to implement and evaluate improved capacity to provide care in place for those who develop acute illness despite prevention efforts.

This study has a number of limitations. First, it is restricted to one large health region in British Columbia,

and results are likely generalizable only to other urban regions within the province. Since there is considerable inter-provincial variation in assisted living policies, the results may not be generalizable to urban regions in other provinces. Results are also not generalizable to rural regions. Second, we were unable to censor the time period of observation during which admitted residents remained in hospital from our denominator. Given the size of the denominator, this limitation is unlikely to influence the results, and when we ran a sensitivity analysis, assuming one-half of ED visits resulted in a hospital admission of 10 days, there was virtually no change in the calculated rates. Third, for some variables there was a substantial amount of missing data. Although there is no reason to suspect the introduction of bias due to missing observations, the conclusions drawn on these variables are nonetheless limited. Finally, due to lack of available data, we were unable to evaluate the reasons for these ED visits, to describe the case mix of the transferred population, or to examine differences in the intensity and skill mix of facility staffing.

Our study found that although nursing home residents had fewer ED visits than assisted living residents, they were more likely to be admitted to hospital and had higher mortality rates. Although we were unable to compare differences in case mix due to the limitations of the available data, the findings are consistent with the nursing home population being frailer and closer to the end of life. Despite these non-modifiable limitations, there are relatively few studies on the topic of ED visit rates of assisted living and nursing home populations. The results are likely to be of interest to those considering the development of a publicly funded assisted living sector or other residential services as a “middle option” between community-based and nursing home care.

Conclusion

The ED visit rate of assisted living residents is significantly higher compared to nursing home residents. Future research should investigate the reasons for higher utilization of EDs by residents of assisted living. In particular, the reasons for ED visits, and the facility characteristics associated with ED use, would help policy makers as they continue to modify the structure of care for frail elders.

End Notes

1. These include the following: one to three meals a day plus snacks; light housekeeping once a week; laundering of flat linens once a week; and social and recreational opportunities (leisure pursuits, social interaction, and community involvement).
2. The formula for converting resident days to resident years is to multiply by $(1/365.25) \times 10^3$.

References

- Andersen, R. M. (1995). Revisiting the behavioral model and access to medical care: Does it matter? *Journal of Health and Social Behaviour*, 36(1), 1–10.
- Andersen, R. M., & Newman, J. M. (2005). Societal and individual determinants of medical care utilization in the United States. *Milbank Quarterly*, 83(4). Retrieved 11 September 2011 from <http://www.milbank.org/uploads/documents/QuarterlyCentennialEdition/Societal%20and%20Indv.pdf>.
- BC Ministry of Health. (2007). *Office of the Assisted Living Registrar. Registrant Handbook. Policy 5: Registrant Entry and Exit*. Retrieved 22 September 2011 from http://www.health.gov.bc.ca/library/publications/year/2007/handbook_Entry_and_Exit.pdf.
- BC Ministry of Health. (2009). *Community Care and Assisted Living Act*. Retrieved 22 June 2011 from http://www.bclaws.ca/EPLibraries/bclaws_new/document/ID/freeside/96_2009.
- BC Ministry of Health. (2011). *Home and Community Care Policy Manual*. Retrieved 22 September 2011 from <http://www2.gov.bc.ca/gov/topic.page?id=8F569BDA913540DCAB75145DBB6070CE>.
- Canadian Healthcare Association. (2009). *Guide to Canadian Healthcare Facilities 2009-2010*. Ottawa, ON: Author.
- Beveridge, R. (1998). CAEP issues. The Canadian Triage and Acuity Scale: A new and critical element in health care reform. *Canadian Association of Emergency Physicians. Journal of Emergency Medicine* 16(3), 507–511.
- Canadian Institute for Health Information. (2011). *Healthcare in Canada, 2011: A focus on seniors and aging*. Retrieved 22 September 2011 from http://secure.cihi.ca/free_products/HCIC_2011_seniors_report_en.pdf.
- Canadian Institute for Health Information. (2010). *Seniors' use of emergency departments in Ontario, 2004-2005 to 2008-2009*. Retrieved 22 September 2011 from http://secure.cihi.ca/free_products/seniors_ed_e.pdf.
- Cohen, M., Tate, J., & Baumbush, J. (2009). *An uncertain future for seniors: BC's restructuring of home and community health care, 2001-2008*. Vancouver, BC, Canadian Centre for Policy Alternatives.
- Doupe, M., Kozyrskyj, A., Soodeen, R. A., Derksen, S., Burchill, C., & Huq, S. (2008). *An initial analysis of emergency department and urgent care in Winnipeg*. Winnipeg, MN: Manitoba Centre For Health Policy.
- Fried, L. P., Ferrucci, L., Darer, J., Williamson, J. D., & Anderson, G. (2004). Untangling the concepts of disability, frailty, and comorbidity: Implications for improved targeting and care. *Journal of Gerontology Series A: Biological Sciences and Medical Sciences*, 59(3), 255–263.
- Gillick, M. R., Serrell, N. A., & Gillick, L. S. (1982). Adverse consequences of hospitalization in the elderly. *Social Science and Medicine*, 16(10), 1033–1038.

- Gruneir, A., Bell, C. M., Bronskill, S. E., Schull, M., Anderson, G. M., & Rochon, P. A. (2010). Frequency and pattern of emergency department visits by long-term care residents: A population-based study. *Journal of the American Geriatrics Society*, 58(3), 510–517.
- Hastings, S. N., Oddone, E. Z., Fillenbaum, G., Sloane, R. J., & Schmader, K. E. (2008). Frequency and predictors of adverse health outcomes in older Medicare beneficiaries discharged from the emergency department. *Medical Care*, 46(8), 771–777.
- Hastings, S. N., Purser, J. L., Johnson, K. S., Sloane, R. J., & Whitson, H. E. (2008). Frailty predicts some but not all adverse outcomes in older adults discharged from the emergency department. *Journal of the American Geriatrics Society*, 56(9), 1651–1657.
- Loeb, M., Carusone, S. C., Goeree, R., Walter, S. D., Brazil, K., Krueger, P., et al. (2006). Effect of a clinical pathway to reduce hospitalizations in nursing home residents with pneumonia: A randomized controlled trial. *Journal of the American Medical Association*, 295(21), 2503–2510.
- McGrail, K. M., Broemeling, A. M., McGregor, M., Salomons, K., Ronald, L. A., & McKendry, R. (2008). *Home health services in British Columbia: A portrait of users and trends over time*. Vancouver, BC, UBC Centre for Health Services and Policy Research.
- McGrail, K. M., Meredith, L., McGregor, M. J., Broemeling, A. M., Salomons, K., & Peterson, S. (2010). *Who uses assisted living in British Columbia?: An initial exploration*. Vancouver, BC, UBC Centre for Health Services and Policy Research.
- McGregor, M. J., Abu-Laban, R. B., Ronald, L. A., McGrail, K. M., Andrusiek, D., Baumbusch, J., et al. (2014). Nursing home characteristics associated with resident transfers to emergency departments. *Canadian Journal on Aging / La Revue canadienne du vieillissement*, 33(1), 38–48.
- Rockwood, K., Song, X., MacKnight, C., Bergman, H., Hogan, D. B., McDowell, I., et al. (2005). A global clinical measure of fitness and frailty in elderly people. *Canadian Medical Association Journal*, 173(5), 489–495.
- Ronald, L. A., McGregor, M. J., McGrail, K. M., Tate, R. B., & Broemeling, A. M. (2008). Hospitalization rates of nursing home residents and community-dwelling seniors in British Columbia. *Canadian Journal of Aging*, 27(1), 109–115.
- Rosenberg, T. (2012). Acute hospital use, nursing home placement, and mortality in a frail community-dwelling cohort managed with Primary Integrated Interdisciplinary Elder Care at Home. *Journal of the American Geriatric Society*, 60(7), 1340–1346.
- Schull, M. J., Kiss, A., & Szalai, J. P. (2007). The effect of low-complexity patients on emergency department waiting times. *Annals of Emergency Medicine*, 49(3), 257–264.
- Strain, L. A., Maxwell, C. J., Wanless, D., & Gilbert, E. (2011). *Designated assisted living (DAL) and long-term care (LTC) in Alberta: Selected highlights from the Alberta Continuing Care Epidemiological Studies (ACCES)*. Retrieved 13 October 2012 from <http://www.ab-cca.ca/uploads/files/Documents/ACCES%20Final%20Report%202011.pdf>.
- Vedel, I., Monette, M., Beland, F., Monette, J., & Bergman, H. (2011). Ten years of integrated care: Backwards and forwards. The case of the province of Quebec, Canada. *International Journal of Integrated Care*, 11, e004.
- Vu, M. Q., Weintraub, N., & Rubenstein, L. Z. (2006). Falls in the nursing home: Are they preventable? *Journal of the American Medical Directors Association*, 7(3), S53–S58.
- Wilson, D., & Truman, C. (2005). Comparing the health services utilization of long-term-care residents, home-care recipients, and the well elderly. *Canadian Journal of Nursing Research*, 37(4), 139–154.