



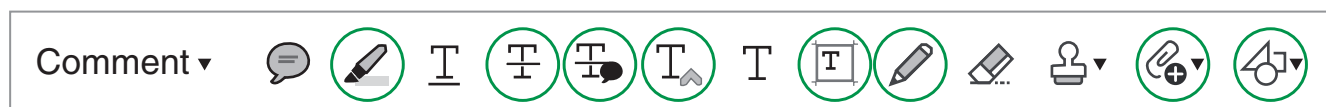
Page Proof Instructions and Queries

Journal Title: Canadian Journal of Nursing Research (CJN)

Article Number: 949426

Thank you for choosing to publish with us. This is your final opportunity to ensure your article will be accurate at publication. Please review your proof carefully and respond to the queries using the circled tools in the image below, which are available in Adobe Reader DC* by clicking **Tools** from the top menu, then clicking **Comment**.

Please use *only* the tools circled in the image, as edits via other tools/methods can be lost during file conversion. For comments, questions, or formatting requests, please use . Please do *not* use comment bubbles/sticky notes .



*If you do not see these tools, please ensure you have opened this file with Adobe Reader DC, available for free at get.adobe.com/reader or by going to Help > Check for Updates within other versions of Reader. For more detailed instructions, please see us at sagepub.com/ReaderXProofs.

No.	Query
	Please note that we cannot add/amend ORCID iDs for any article at the proof stage. Following ORCID's guidelines, the publisher can include only ORCID iDs that the authors have specifically validated for each manuscript prior to official acceptance for publication.
	Please confirm that all author information, including names, affiliations, sequence, and contact details, is correct.
	Please review the entire document for typographical errors, mathematical errors, and any other necessary corrections; check headings, tables, and figures.
	Please confirm that the Funding and Conflict of Interest statements are accurate.
	Please ensure that you have obtained and enclosed all necessary permissions for the reproduction of artistic works, (e.g. illustrations, photographs, charts, maps, other visual material, etc.) not owned by yourself. Please refer to your publishing agreement for further information.
	Please note that this proof represents your final opportunity to review your article prior to publication, so please do send all of your changes now.
AQ: 1	Please update DOI in "Jones et al., 2020."
AQ: 2	Please update page range in "Warlick, 2019."
AQ: 3	Please provide a brief bio of the authors.

Home Care Nursing Visits and Same-Day Emergency Department Use: Which Patients Are Most at Risk?

Canadian Journal of Nursing
Research
0(0) 1–8
© The Author(s) 2020
Article reuse guidelines:
sagepub.com/journals-permissions
DOI: 10.1177/0844562120949426
journals.sagepub.com/home/cjn



Connie Schumacher^{1,2} , Aaron Jones¹  and Andrew P. Costa³

Abstract

Background: Home care patients are a growing group of community-dwelling older adults with complex care needs and high health service use. Adult home care patients are at high risk for emergency department (ED) visits, which is greater on the same day as a nursing visit.

Purpose: The purpose of this study was to examine whether common nursing indicators modified the association between nursing visits and same-day ED visits.

Methods: A case-crossover design within a retrospective cohort of adult home care patients in Ontario.

Results: A total of 11,840 home care nursing patients were analyzed. Home care patients who received a home nursing visit were more likely to go the ED afterhours on the same day with a stronger association for visits not admitted to the hospital. Having a urinary catheter increased the risk of a same-day ED visit (OR: 1.78 (95% CI 1.15–1.60) vs. 1.21 (95% CI 1.15–1.28)). No other clinical indicator modified the association.

Conclusions: The findings of this study can be used to inform care policies and practices for home care nurses in the management of indwelling urinary catheter complications. Further examination of system factors such as capacity and resources available to respond to catheter related complications in the community setting are recommended.

Keywords

Nursing, community care, emergency department, urinary catheter

Introduction

The Canadian health system projects increased demand for health services due to an aging population with increasingly complex health conditions and high rates of transitions across care settings (Aminzadeh & Dalziel, 2002; Jones et al., 2019). For adults aged 19 years and older, home care services are typically for those with functional impairments and complex medical needs, the majority are over the age of 65 (Doran et al., 2009; Jones et al., 2019). Care transitions are a critical point in time where avoidance strategies and interventions can be implemented. Home care patients that present to the emergency department (ED) are often frail, dependent on others, and at risk for functional decline (Gray et al., 2013). Adult home care patients are high users of the ED, with reports of 24.6% of patients having one ED visit in a six month period (Jones et al., 2018a). The ED is fraught with adverse environmental factors including excessive noise, lack of

natural light, and limited physical space that are not conducive to geriatric sensitive needs (Hwang & Morrison, 2007). Visits to the emergency department disrupt continuity of care and come with a higher risk of adverse events for older adults, such as longer hospital stays, return visits to the ED, and higher levels of care during the visit as well as post-discharge (Costa et al., 2014). Hospital readmission and ED avoidance strategies have been predominantly focused on return to ED after a hospitalization (Linertová et al., 2011; Nuckols,

¹DIVERT CARE, McMaster University, Hamilton, Ontario, Canada

²Department of Nursing, Brock University, St. Catharines, Ontario, Canada

³Clinical Epidemiology & Aging, McMaster University, Hamilton, Ontario, Canada

Corresponding Author:

Connie Schumacher, McMaster University, 175 Longwood Rd S, Hamilton, ON L8S 4L8, Canada.

Email: cschumacher@brocku.ca

et al., 2017). However, for the home care patient previous hospital admission and ED visits are driving factors for future ED visits, preventing the first ED visit is therefore important (Costa, et al., 2015). Increased access to home care has been suggested as both a method of reducing admission length of stay and as a way to reduce ED visits (Ministry of Health and Long-Term Care, 2011).

Home care is a collection of professional and supportive health services, including nursing, rehabilitation therapy, social work, dietary, and personal support. Home care services in Ontario are publicly funded under the jurisdiction of the Ministry of Health. Qualifying individuals are eligible for services paid for by the government. The Office of the Auditor General of Ontario (2017) estimates that 760,000 individuals received home care in the fiscal year 2016–2017. In Ontario, home care is delivered through contracted service providers and accessed through one of the 14 Local Health Integration Networks. Nursing services are provided by regulated health professionals with designations of Registered Nurse or Registered Practical Nurse, and the level of care is determined by the contracted service provider. Nursing services are initiated for time limited, specific health issues including; wound care, intravenous medication administration, tube care, tracheostomy care, dialysis, specialized health education, and pain and symptom management (Government of Ontario, 2020). Nursing services can be initiated by physician's order at the time of hospital discharge or from a community based primary care physician. At the time of ordering nursing services, the nursing care provider is linked with a physician or nurse practitioner to coordinate follow up orders and continuity of care. For the years 2014–2016 just over 35% of long stay home care patients were receiving home nursing services (Jones et al., 2019). Increasing home care nursing has been effective in reducing ED visits in palliative populations towards the end of life (Seow et al., 2016), and in heart failure populations (Van Spall et al., 2017). While nurse led health promotion and disease prevention models of care have been associated with improved quality of life (Markle-Reid et al., 2013).

A recent examination of ED visits among home care patients receiving professional services found that patients were more likely to visit the ED after 5 pm on the same day they received a nursing visit (Jones et al., 2018b). The mechanisms by which home care nursing visits are associated with a same-day ED visit after 5 pm are poorly understood and thus require further examination. Our objective was to examine the nature of nursing visits associated with same-day afterhours ED visits in a population of home care patients. Specific aims were to examine whether common nursing indicators modified the association between nursing visits and

same-day ED visits and to examine associated diagnosis codes for the main presenting problem in the ED.

Methods

Setting, study design, and data sources

This paper extends a case-crossover study previously conducted among home care patients receiving nursing services in Ontario, Canada (Jones et al., 2020). We identified a population-based, retrospective cohort of publicly-funded adult home care patients in Ontario, using multiple, linked health administrative databases. Home care patients and nursing services were identified through the Home Care Database, which captures client and service records for publicly-funded home care programs in Ontario. Emergency department visits were extracted from the National Ambulatory Care Reporting System (NACRS), which captures all hospital and community-based ambulatory care in Ontario. These datasets were linked using unique encoded identifiers and analyzed at ICES. ICES is a not for profit research institute which houses the ICES Data repository of health service records for the province of Ontario.

Ethics

This study was granted an exemption from formal ethics review by the Hamilton Integrated Research Ethics Board as the use of data in this project was authorized under section 45 of Ontario's Personal Health Information Protection Act, which does not require review by a research ethics board.

Participants

Publicly-funded home care patients in Ontario who are expected to receive on-going care are periodically assessed with the Resident Assessment Instrument for Home Care (RAI-HC), which is a valid, and reliable assessment (Hirdes et al., 2008; Landi et al., 2000). To identify home care patients for inclusion in the study, we selected the most recent RAI-HC assessment for home care patients 19 years or age and older that were completed in Ontario between October 1, 2014 and September 30, 2016. The study population was restricted to patients who were receiving home nursing services. Home nursing visits were defined as a service provider billed visit by a Registered Nurse or Registered Practical Nurse, at the time of this study all billed visits were in person.

Case-crossover design

A case-crossover study uses a case-only design in which subjects act as their own controls, which eliminates most

confounding biases (Maclure, 1991). The design is appropriate when the objective of a study is to explore whether an event is caused by something that happened immediately before. The event of interest for this study is an ED visit after 5 pm. The methods we used to construct the case-crossover study have been previously described (Jones et al., 2018b; Jones et al., 2020). In brief, the first day that a home care client in our cohort visited the emergency department (ED) after 5 pm within 6 months of the initial RAI-HC assessment was selected as a case day. These case days with ED visits were matched, within the same individual, to control days in the previous week on which the client did not go to the ED. We excluded weekends and holidays, as the availability nursing services and primary care support are not the same as during a weekday. On each case or control day, we recorded whether the client received a home nursing visit. By examining whether home nursing visits were more likely to occur on case or control days, we are able to determine if home nursing visits are associated with a greater risk of a same-day afterhours ED visit.

Clinical effect modifiers

We considered several clinical factors that are indications for home nursing as potential modifiers of the association between home nursing visits and same-day ED visits. Our selected modifiers were based on the top 10 ICD-10-CA codes associated with home nursing visits in our previous study and clinical knowledge of why home care patients receive nursing services (Jones et al., 2018b). These factors included: wound care, intravenous medications, indwelling urinary catheter, congestive heart failure, and chronic obstructive pulmonary disease (COPD). All effect modifiers were measured using the RAI-HC assessment.

Statistical analysis

The association between home nursing and a same-day afterhours ED visit was estimated with conditional logistic regression. Effect modification of this association by the clinical indications for home nursing were examined simultaneously using interaction terms. Results are expressed as the odds ratios and 95% confidence intervals of the association between a home nursing visit and a same-day afterhours ED visit overall and within each category of the nursing indications. Analysis was done using SAS 9.4.

Diagnosis codes

Patients seen in the ED have an International Statistical Classification of Diseases and Related Health Problems (ICD-10-CA) code recorded on the ED record which is

reported in NACRS (Canadian Institute for Health Information, 2018). We examined the top 10 ICD-10-CA diagnosis codes of the main presenting problems for same-day ED visits among patients who had nursing indicators that were associated with a greater likelihood of a same-day ED visit.

Results

Our cohort contained 11,840 home care nursing patients who visited the emergency department after 5 pm. A total of 4,569 visits happened on days with home nursing visits. Patients had a median age of 77 and were balanced between males and females (Table 1). The proportion of patients living alone was 37%. Both functional and cognitive impairments were common among study participants. Over 50% of patients were shown

Table 1. Characteristics of home care patients in the study.

Patient characteristics	no. (%) n = 11,840
Demographics	
Age, yr (Median (Q1, Q3))	77 (65-86)
Sex, female	6048 (51)
Lived Alone	4432 (37)
Health	
ADL impairment^a	
Independent/Supervision	6345 (54)
Limited/Extensive	3624 (31)
Maximal/Dependent	1871 (16)
Cognitive Impairment^b	
Intact/Borderline intact	5438 (46)
Mild/Moderate	5687 (48)
Severe	715 (6)
Frailty Index^c	
Robust (0–0.19)	2420 (20)
Pre-frail (0.2–0.29)	3106 (26)
Frail (≥ 0.3)	6314 (53)
Depressive symptoms	2440 (29)
Aggressive behaviours	1144 (10)
Fall in last 90 days	4823 (41)
Bladder incontinence	4147 (35)
Five or more medications (%)	10399 (88)
Dementia	1832 (15)
Clinical nursing indicators	
Wound care	5338 (45)
Intravenous medications	1116 (9)
Indwelling urinary catheter	2029 (17)
Congestive heart failure	2262 (19)
Chronic obstructive pulmonary disease	3096 (26)

Note: ADL= Activities of daily living, Q1 = Quartile 1, Q3 = Quartile 3
^aADL Hierarchy Scale: Includes personal hygiene, locomotion, eating and toileting.

^bCognitive performance scale.

^cScores on the frailty index range from 0 to 1, where 0 represents no health deficits and 1 represents all possible health deficits.

to have cognitive impairment, 48% with mild to moderate and 6% with severe impairment. Just under half of the patients required some form of physical assistance with activities of daily living, 31% with limited to extensive and 16% requiring maximal to total dependency. Among patients in the study, 45% were receiving wound care, 17% had an indwelling urinary catheter, 9% used intravenous medications, 26% had a diagnosis of COPD, and 19% had a diagnosis of congestive heart failure.

Effect modification by clinical nursing indications

Similar to previous work, home care patients who received a home nursing visit were more likely to go the ED afterhours on the same day (OR: 1.28 (95% CI 1.22–1.25)). This association was slightly stronger when ED visits were restricted to the visits not admitted to hospital (OR: 1.34 (95% 1.26–1.43)) (Figure 1).

Among the clinical nursing indicators, only the presence of an indwelling catheter meaningfully modified the association. For all ED visits, the odds ratio of the association between home nursing visits and same-day after-hours ED visits was 1.78 (95% CI 1.15-1.60) for patients with a catheter and 1.21 (95% CI 1.15-1.28) for patients without a catheter. For the non-admitted ED visits, the odds ratio of the association was 2.06 (95% CI 1.78 – 2.34) for patients with a catheter and 1.22 (95% CI 1.14– 1.31) without a catheter.

Diagnosis codes

The most frequent diagnosis codes for the main presenting problem for same-day afterhours ED visits among patients with catheters are showed in Table 2. The top three diagnosis codes were urinary tract infections, mechanical complications of urinary devices, and retention of urine.

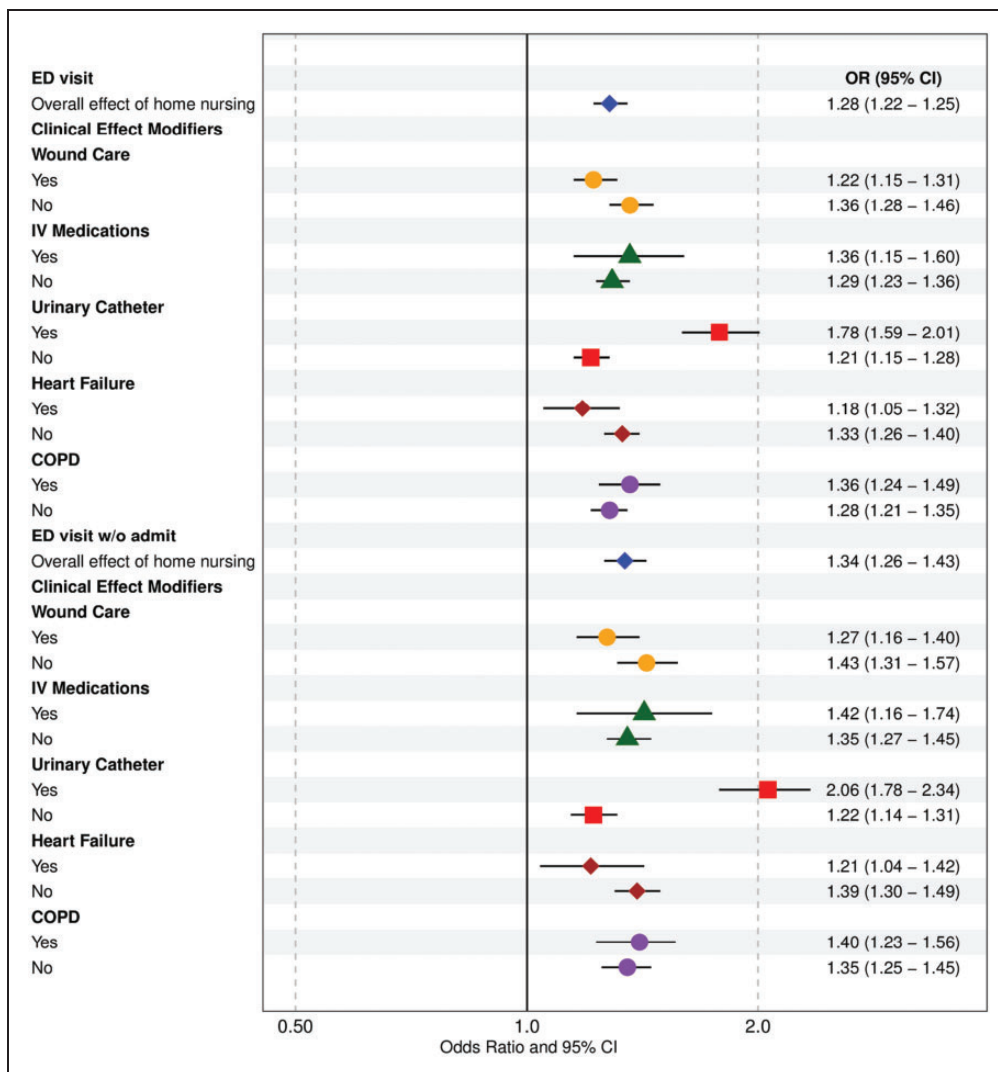


Figure 1. Effect modification by clinical nursing indications.

Table 2. Top ten diagnosis codes of same-day ED visits of patients with catheters.

ICD-10-CA	Main problem	% (n = 2,077)
N390	Urinary tract infection, site not specified	18.5%
T830	Mechanical complication of urinary (indwelling) catheter	4.5%
R33	Retention of urine	4.1%
A419	Sepsis, unspecified	3.8%
Z466	Fitting and adjustment of urinary device	3.7%
J189	Pneumonia, unspecified	2.6%
R318	Other and unspecified hematuria	2.5%
I500	Congestive heart failure	1.9%
K590	Constipation	1.4%
A099	Other and unspecified gastroenteritis and colitis of infectious origin	1.3%

Discussion

Among indications for home nursing, we found that the risk of a same-day ED visit was much higher in patients with urinary catheters. This association was considerably stronger for less urgent emergency department visits, suggesting that if the appropriate supports were in place, many of the same-day visits could have been averted and cared for within the community. Patients with indwelling catheters have been previously shown to experience a variety of complications that contribute to increased health care utilization including trips to the ED (Wilde et al., 2013).

We found for those patients who visited the ED, the most common diagnoses were urinary tract infection (UTI), mechanical complication of urinary catheter, and retention of urine. Other catheter related diagnoses included fitting and adjustment of urinary device and hematuria were also in the top ten. Wilde et al. (2013) similarly reported catheter related infections as the most prevalent complication at 31%, followed by catheter blockage at 24% in patients with long-term urinary catheters. Similarly, catheter associated UTI is a frequently reported adverse event in home care populations (Doran et al., 2013). The relationship between indwelling urinary catheters and urinary tract infections has been well documented (Ashraf et al., 2020; Yong & Khaw, 2016) with recommendations to limit use and remove the catheter as soon as clinically possible (Tenke et al., 2017).

Mechanical complication of urinary catheter according to the ICD-10-CA code can include blocked catheter, burst balloon, obstruction and occlusion of catheter (Canadian Institute for Health Information, 2018). Issues related to mechanical and catheter fitting found in our study may necessitate catheter replacement

(Cravens & Zweig, 2000). It is important to state that there is a lack of evidence to support a specific time interval between catheter changes (Cooper et al., 2016). In the community catheter supplies are ordered according to predetermined guidelines for replacement, typically once every 4–6 weeks depending on type of urinary catheter material (Geng et al., 2012; McGoldrick, 2016). Appropriate, timely management of catheter related complications is further compounded by limited resources in post-acute settings (Ashraf et al., 2020). Catheter-related issues that nurses are unable to resolve in the home may be related to limited availability of catheter supplies and equipment, particularly when unanticipated mechanical issues with the catheter device arise.

Catheter-related issues of retention and hematuria may require diagnostics and treatment of a time-sensitive nature that are currently not available in the community or through primary care. Urinary retention and catheter blockage are clinical problems that require irrigation, troubleshooting with the use of diagnostics, removal and reinsertion of a new catheter (Fitzpatrick & Kirby, 2006; McGoldrick, 2016). The efficacy of routine washout flushes to prevent encrustations have been inconclusive (Dean & Ostaszkiwicz, 2019; Shepherd et al., 2018). There are several etiologies of hematuria that left untreated could lead to anemia and intermittent clotting that blocks the catheter. Management of gross hematuria typically involves consultation with a Urologist and may require ultrasound, bladder irrigation, and an evaluation of blood loss (Warlick, 2019). These procedures are not routinely provided outside acute care settings after hours.

Home care nurses act within their scope of practice in the community, ongoing clinical management depends on communication and integration with primary care or specialist care whereby medical orders and direction are obtained. Factors that impact effective community nursing practice include; difficulties reaching physicians to obtain orders, lack of collaboration with physician practices, inappropriate staff matching for complex patients, and lack of tools to support decision-making authority (Ganann et al., 2019). Our findings can inform the design of future procedures, protocols, and physician support mechanisms for home care patients with urinary catheters. Action plans for prompt investigation and treatment of suspected urinary tract infections and increased availability of supplies to change catheters in the community could reduce catheter-related emergency department visits among home care patients. Consideration should be given to the complexity of the population in this study, any recommendations must be sensitive to the incidence of falls (41%), frailty (53%) and presence of cognitive impairment (54%). Future studies should involve a review of the literature

focusing on the availability and capacity for outpatient diagnostics and interventions to treat urinary catheter complications.

Implications for practice and policy

The characteristics of our cohort punctuate the importance of underlying factors that may contribute to caring for oneself between nursing visits. In particular, we note that 37% of these home care patients were living alone, 54% have some form of cognitive impairment, and 53% were considered frail. Nurses can adjust care plans to address an increased need for monitoring and facilitate informal supports to augment self-care. The association between nursing visits and same-day ED visits also can inform nursing practice. Specifically, ensuring that patients are well informed on the care of their urinary catheter, complications that may arise, and actions to take including arrangements for urgent nursing care and medical consultation. Nurses can verify that the necessary equipment and supplies for trouble shooting catheter related complications are readily accessible. Policy recommendations that support a least use of indwelling urinary catheters for older populations should be adopted. The results of this study can additionally inform home care organizational and health system supports that are needed to provide alternative urgent care in the community setting.

Limitations

This study has several limitations. First, the interRAI-HC assessment is typically completed at least once a year. Characteristics reported represent one point in time and may not capture changes that occurred over the duration of the nursing service. For our study we looked for ED visits between 0 and 182 days from a RAI-HC assessment, with a mean time of RAI-HC to ED of 61 days. Second, this is a case-cross over design, where only patients seen in the ED after 5pm were included in the analysis. These findings cannot be generalized to all emergency department use. We used Ontario data, although the interRAI-HC is used in other provinces, availability and delivery of care in other regions may differ and thus affect generalizability of our results. Lastly, we used retrospective data and cannot comment on patient specific reasons that may have influenced the decision to attend the ED. There are also some notable strengths to this study, it is a large population based study with matched service use data. Additionally, in using the case-crossover design the individual with the event serves as their own control (Maclure, 1991).

Conclusion

We found that the risk for home care patients to visit the ED on the same day as a nursing visit was much higher among patients with a urinary catheter. We recommend improved integration between home care nursing and primary care to reduce emergency department visits for issues such as urinary tract infections that require time-sensitive evaluation and treatment. Increased risk among patients with catheters suggests the need for nursing protocols and procedures that support continuity of care and access to auspicious treatment in the community for catheter-related issues.

Acknowledgements

This study was supported by ICES, which is funded by an annual grant from the Ontario Ministry of Health and Long-Term Care (MOHLTC). The opinions, results and conclusions reported in this paper are those of the authors and are independent from the funding sources. No endorsement by ICES or the Ontario MOHLTC is intended or should be inferred. Parts of this material are based on data and/or information compiled and provided by CIHI. However, the analyses, conclusions, opinions and statements expressed in the material are those of the author(s), and not necessarily those of CIHI.



Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This study was funded by a grant from the Canadian Institutes for Health Research (148933). The opinions and conclusions expressed in this article are those of the authors and do not necessarily reflect the views of the contributing centers or funder.

ORCID iDs

Connie Schumacher  <https://orcid.org/0000-0001-9065-6975>
Aaron Jones  <https://orcid.org/0000-0002-6282-3614>

References

- Aminzadeh, F., & Dalziel, W. B. (2002). Older adults in the emergency department: A systematic review of patterns of use, adverse outcomes, and effectiveness of interventions. *Annals of Emergency Medicine, 39*(3), 238–247.
- Ashraf, M. S., Gaur, S., Bushen, O. Y., Chopra, T., Chung, P., Clifford, K., Hames, E., Hertogh, C. M. P. M., Krishna, A., Mahajan, D., Mehr, D. R., Nalls, V., Rowe, T. A., Schweon, S. J., Sloane, P. D., Trivedi, K. K., van Buul, L. W., Jump, R. L. P., & Infection Advisory SubCommittee for AMDA—The Society of Post-Acute

- and Long-Term Care Medicine. (2020). Diagnosis, treatment, and prevention of urinary tract infections in post-acute and long-term care settings: A consensus statement from AMDA's infection advisory subcommittee. *Journal of the American Medical Directors Association, 21*(1), 12–24.
- Canadian Institute for Health Information. (2018). *Canadian Coding Standards for Version 2018 ICD-10-CA and CCI*. https://secure.cihi.ca/free_products/CodingStandards_v2018_EN.pdf
- Cooper, F. P., Alexander, C. E., Sinha, S., & Omar, M. I. (2016). Policies for replacing long-term indwelling urinary catheters in adults. *Cochrane Database of Systematic Reviews, 7*, CD011115. <https://doi.org/10.1002/14651858.CD011115.pub2>
- Costa, A. P., Hirdes, J. P., Bell, C. M., Bronskill, S. E., Heckman, G. A., Mitchell, L., Poss, J. W., Sinha, S. K., & Stolee, P. (2015). Derivation and validation of the detection of indicators and vulnerabilities for emergency room trips scale for classifying the risk of emergency department use in frail community-dwelling older adults. *Journal of the American Geriatrics Society, 63*(4), 763–769.
- Costa, A. P., Hirdes, J. P., Heckman, G. A., Dey, A. B., Jonsson, P. V., Lakhan, P., Ljunggren, G., Singler, K., Sjostrand, F., Swoboda, W., Wellens, N. I. H., & Gray, L. C. (2014). Geriatric syndromes predict postdischarge outcomes among older emergency department patients: Findings from the interRAI multinational emergency department study. *Academic Emergency Medicine: Official Journal of the Society for Academic Emergency Medicine, 21*(4), 422–433.
- Cravens, D. D., & Zweig, S. (2000). Urinary catheter management. *American Family Physician, 61*(2), 369–376.
- Dean, J., & Ostaszkiwicz, J. (2019). Current evidence about catheter maintenance solutions for management of catheter blockage in long-term urinary catheterisation. *The Australian and New Zealand Continence Journal, 25*(3), 74.
- Doran, D. M., Hirdes, J., Blais, R., Baker, R., Pickard, G., & Jantzi, M. (2009). The nature of safety problems among Canadian home care clients: Evidence from the RAI-HC reporting system. *Journal of Nursing Management, 17*(2), 165–174.
- Doran, D. M., Hirdes, J. P., Blais, R., Baker, G. R., Poss, J. W., Li, X., Dill, D., Gruneir, A., Heckman, G., Lacroix, H., Mitchell, L., O'Beirne, M., White, N., Droppo, L., Foebel, A. D., Qian, G., Nahm, S.-M., Yim, O., McIsaac, C., & Jantzi, M. (2013). Adverse events among Ontario home care clients associated with emergency room visit or hospitalization: A retrospective cohort study. *BMC Health Services Research, 13*(1), 227. <https://doi.org/10.1186/1472-6963-13-227>.
- Fitzpatrick, J. M., & Kirby, R. S. (2006). Management of acute urinary retention. *BJU International, 97*(s2), 16–20.
- Ganann, R., Weeres, A., Lam, A., Chung, H., & Valaitis, R. (2019). Optimization of home care nurses in Canada: A scoping review. *Health & Social Care in the Community, 27*(5), e604–e621. <https://doi.org/10.1111/hsc.12797>
- Geng, V., Cobussen-Boekhorst, H., Farrell, J., Gea Sánchez, M., Pearce, I., Schwennesen, T., . . . Vandewinkel, C. (2012). *Catheterisation. Indwelling catheters in adults. Urethral and suprapubic. Evidence-based guidelines for best practice in urological health care*. https://www.nursing.nl/PageFiles/11870/001_1391694991387.pdf.
- Government of Ontario. (2020). *Home and community care*. <https://www.ontario.ca/page/homecare-seniors>
- Gray, L. C., Peel, N. M., Costa, A. P., Burkett, E., Dey, A. B., Jonsson, P. V., Lakhan, P., Ljunggren, G., Sjostrand, F., Swoboda, W., Wellens, N. I. H., & Hirdes, J. (2013). Profiles of older patients in the emergency department: Findings from the interRAI multinational emergency department study. *Annals of Emergency Medicine, 62*(5), 467–474.
- Hirdes, J. P., Ljunggren, G., Morris, J. N., Frijters, D. H. M., Finne Soveri, H., Gray, L., Björkgren, M., & Gilgen, R. (2008). Reliability of the interRAI suite of assessment instruments: A 12-country study of an integrated health information system. *BMC Health Services Research, 8*(1), 277.
- Hwang, U., & Morrison, R. S. (2007). The geriatric emergency department. *Journal of the American Geriatrics Society, 55*(11), 1873–1876.
- Jones, A., Bronskill, S. E., Agarwal, G., Seow, H., Feeny, D., & Costa, A. P. (2019). The primary care and other health system use of home care patients: A retrospective cohort analysis. *CMAJ Open, 7*(2), E360–E370.
- Jones, A., Bronskill, S. E., Schumacher, C., Seow, H., Feeny, D., & Costa, A. P. (2020). Access to afterhours primary care as an effect modifier of the relationship between same-day emergency visits and home nursing visits. *Annals of Family Medicine. [AQ1]*
- Jones, A., Costa, A. P., Pesevski, A., & McNicholas, P. D. (2018a). Predicting hospital and emergency department utilization among community-dwelling older adults: Statistical and machine learning approaches. *PLoS One, 13*(11), e0206662. <https://doi.org/10.1371/journal.pone.0206662>
- Jones, A., Schumacher, C., Bronskill, S. E., Campitelli, M. A., Poss, J. W., Seow, H., & Costa, A. P. (2018b). The association between home care visits and same-day emergency department use: A case–crossover study. *Canadian Medical Association Journal, 190*(17), E525–E531.
- Landi, F., Tua, E., Onder, G., Carrara, B., Sgadari, A., Rinaldi, C., Gambassi, G., Lattanzio, F., & Bernabei, R. (2000). Minimum data set for home care: A valid instrument to assess frail older people living in the community. *Medical Care, 38*(12), 1184–1190.
- Linertová, R., García-Pérez, L., Vázquez-Díaz, J. R., Lorenzo-Riera, A., & Sarría-Santamera, A. (2011). Interventions to reduce hospital readmissions in the elderly: In-hospital or home care. A systematic review. *Journal of Evaluation in Clinical Practice, 17*(6), 1167–1175.
- Maclure, M. (1991). The case-crossover design: A method for studying transient effects on the risk of acute events. *American Journal of Epidemiology, 133*(2), 144–153.
- Markle-Reid, M., Browne, G., & Gafni, A. (2013). Nurse-led health promotion interventions improve quality of life in frail older home care clients: Lessons learned from three randomized trials in Ontario. *Journal of Evaluation in Clinical Practice, 19*(1), 118–131.
- McGoldrick, M. (2016). Frequency for changing long-term indwelling urethral catheters. *Home Healthcare Now, 34*(2), 105–106.

- Ministry of Health and Long-Term Care. (2011). *Enhancing the continuum of care: Report of the avoidable hospitalization advisory panel*. http://www.health.gov.on.ca/en/common/ministry/publications/reports/baker_2011/baker_2011.pdf.
- Nuckols, T. K., Keeler, E., Morton, S., Anderson, L., Doyle, B. J., Pevnick, J., Booth, M., Shanman, R., Arifkhanova, A., & Shekelle, P. (2017). Economic evaluation of quality improvement interventions designed to prevent hospital readmission: A systematic review and meta-analysis. *JAMA Internal Medicine, 177*(7), 975–985.
- Office of the Auditor General of Ontario. (2017). *Community Care Access Centres – Financial operations and service delivery*. https://www.auditor.on.ca/en/content/annualreports/arreports/en17/v2_201en17.pdf
- Seow, H., Barbera, L., Pataky, R., Lawson, B., O’Leary, E., Fassbender, K., McGrail, K., Burge, F., Brouwers, M., & Sutradhar, R. (2016). Does increasing home care nursing reduce emergency department visits at the end of life? A population-based cohort study of cancer decedents. *Journal of Pain and Symptom Management, 51*(2), 204–212.
- Shepherd, A., Mackay, W. G., & Hagen, S. (2018). Catheter washout solutions for long-term urinary catheterisation in adults: A cochrane review summary. *International Journal of Nursing Studies, 82*, 167–170.
- Tenke, P., Mezei, T., Bóde, I., & Köves, B. (2017). Catheter-associated urinary tract infections. *European Urology Supplements, 16*(4), 138–143. <http://dx.doi.org/10.1016/j.eursup.2016.10.001>
- Van Spall, H. G. C., Rahman, T., Mytton, O., Ramasundarahettige, C., Ibrahim, Q., Kabali, C., Coppens, M., Brian Haynes, R., & Connolly, S. (2017). Comparative effectiveness of transitional care services in patients discharged from the hospital with heart failure: A systematic review and network Meta-analysis. *European Journal of Heart Failure, 19*(11), 1427–1443.
- Warlick, C. A. (2019). 29 Acute gross hematuria: Etiology and management. *Brady Urology Manual, 141*. [AQ2]
- Wilde, M. H., McDonald, M. V., Brasch, J., McMahon, J. M., Fairbanks, E., Shah, S., Tang, W., & Scheid, E. (2013). Long-term urinary catheter users self-care practices and problems. *Journal of Clinical Nursing, 22*(3-4), 356–367.
- Yong, T. Y., & Khoo, K. (2016). Urinary tract infections in older people with long-term indwelling catheters. *Journal of Infectious Disease and Pathology, 1*, e002. <https://doi.org/10.4172/2472-4998.1000e002>

Author Biographies

Connie Schumacher: ■ [AQ3]

Aaron Jones: ■

Andrew P. Costa: ■