

# Evaluating the Effectiveness of a Nurse Practitioner-Led Outreach Program for Long-Term-Care Homes

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An observational prospective cohort study was conducted on 1,353 observations from a convenience sample of 311 long-term-care (LTC) residents to evaluate the effectiveness of a nurse practitioner-led outreach program on the health outcomes, emergency department (ED) transfers, and hospital admissions of LTC residents. The results show that ED transfers by the NPs were 27% less likely to be non-urgent than transfers made by MDs (OR = .73; 95% CI .54–.97) and that ED transfers by the NPs were 3.23 times more likely to be admitted to hospital than transfers by MDs (OR = 3.23; 95% CI 1.17–8.90). These findings highlight the potential benefits of the NP-led outreach program for LTC residents and for the health-care system.

**Keywords:** nurse practitioner, outreach program, long-term care, ED transfer, acuity level, hospital admission

## Évaluation de l'efficacité d'un programme d'extension des services dirigé par des infirmières praticiennes pour les maisons de soins de longue durée

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Dans le cadre d'une étude de cohorte prospective observationnelle, 1 353 observations provenant d'un échantillon de commodité composé de 311 bénéficiaires de soins de longue durée ont été soumises à un examen visant à évaluer l'efficacité d'un programme d'extension des services dirigé par des infirmières praticiennes en ce qui a trait aux résultats sur la santé, aux transferts vers le service des urgences et à l'hospitalisation des bénéficiaires de soins de longue durée. Les résultats indiquent que les patients transférés au service des urgences par des infirmières praticiennes étaient dans une proportion de 27 % moins susceptibles d'être non urgents que ceux transférés par des médecins (rapport de cotes = 0,73; intervalle de confiance à 95 % de 0,54 à 0,97), et 3,23 fois plus susceptibles d'être admis à l'hôpital que ceux transférés par des médecins (rapport de cotes = 3,23; intervalle de confiance à 95 % de 1,17 à 8,90). Ces constatations ont permis de mettre en évidence les avantages possibles d'un programme d'extension des services dirigé par des infirmières praticiennes pour les bénéficiaires de soins de longue durée et le système de soins de santé.

**Mots-clés :** infirmière praticienne, programme d'extension des services, soins de longue durée, transfert vers le service des urgences, évaluation de l'efficacité, admission à l'hôpital

While older adults with urgent health problems must receive appropriate emergency and hospital care, the transfer of those with non-urgent health problems from long-care-care (LTC) homes to emergency departments (EDs) may contribute to overcrowding and unwarranted use of EDs (Canadian Association of Emergency Physicians, 2013). Statistics show that over 50% ( $n = 573$ ) of LTC residents who presented to EDs in Windsor, Ontario, between January and November 2007 had semi-urgent or non-urgent case presentations, indicating that they could have been successfully treated in their LTC homes if adequate services had been available (Ontario Ministry of Health and Long-Term Care, 2008, 2009). The data also show that only 44% of these LTC residents were admitted to hospital. Lack of access to LTC-based assessment and treatment services often necessitates the transfer of residents to hospital EDs (Jensen, Fraser, Shankardass, Epstein, & Khera, 2009). The availability of such services is expected not only to save residents from the undue physical and emotional ramifications of avoidable transfers and hospital admissions, but also to decrease the costs associated with ambulance transfer to EDs and subsequent long waits there, while possibly easing the burden of overcrowding and long wait times (Ontario Ministry of Health, 2008, 2009).

The transfer of LTC residents to the ED is a potential source of stress, posing added health risks to this frail population (Bandurchin, McNally, & Ferguson-Paré, 2011). Hospitalized older patients also incur risk of a number of adverse outcomes (e.g., confusion/delirium, decline in functional abilities, falls, infections, pressure sores, and death) unrelated to their admitting diagnoses (Boockvar et al., 2005; Creditor, 1993; Dosa, 2005; Murtaugh & Freeman, 1995; Taylor & Oppenheim, 1998). Such outcomes pose a significant health challenge to LTC patients and a financial burden on an already strained health-care system due to increased length of stay for treatment of these complications (Canadian Patient Safety Institute, 2012; Valiquette, Abou Chakra, & Laupland, 2014). Further, the development of the complications and their treatment may lead to care requirements that exceed the resources of LTC homes, making it difficult to return the patients to their LTC homes.

Reducing the transfer of older people with non-urgent health problems from LTC homes to hospital EDs is an issue of intense interest in health care and a priority for the Ontario Ministry of Health and Long-Term Care (Carter & Porell, 2005; Jensen et al., 2009; Physician Hospital Care Committee, 2006; Ronald, McGregor, McGrail, Tate, & Broemling, 2008; Walker, Teare, Hogan, Lewis, & Maxwell, 2009). In response to evidence of (a) adverse health outcomes (Boockvar et al., 2005; Dosa, 2005; Murtaugh & Freeman, 1995), and (b) the costly and avoidable use of health-care resources associated with hospital transfers and admissions

(Canadian Institute for Health Information, 2011), the Ministry has provided funding through its Local Health Integration Networks (LHINs) for a model of care designed to improve access to primary health care for LTC residents through 14 LTC Mobile Teams led by nurse practitioners (NPs) (Ontario Ministry of Health, 2014). The goal of this model of care is to provide consultation and/or timely onsite assessment and treatment (Erie St. Clair Local Health Integration Network, 2009). This study evaluated one of these teams, which was dispatched out of a Windsor-area hospital to two local LTC homes.

Although several Canadian studies have examined the role of NPs and other advanced practice nurses in LTC homes, very little research has explored the impact of ED-based NP outreach programs on the health outcomes and costs associated with their implementation. American studies (Carter & Porel, 2005; Intrator, Castle, & Mor, 1999; Kane, Flood, Bershady, & Keckhafer, 2004) have found the presence of an onsite NP at LTC homes to be associated with decreased hospital admissions. However, the majority of studies that have examined the role of NPs (Eisch, Brozovic, Colling, & Wold, 2000; Klaasen, Lamont, & Preetha, 2009; McAiney et al., 2008; Rosenfeld, Kobayashi, Barber, & Mezey, 2004) and other advanced practice nurses in LTC homes (Bakerjian, 2008; Ryden et al., 2000) have been almost exclusively descriptive in nature (Martin-Misener et al., 2014; McAiney et al., 2008) and/or have focused on satisfaction with and/or perceptions about the model of care (Martin-Misener et al., 2014; Klaasen et al., 2009; Rosenfeld et al., 2004; Stolee, Hillier, Esbaugh, Griffiths, & Borrie, 2006). Further, our study examined a unique model of care in which the NPs were members of the ED staff who served at the LTC homes as part of an outreach approach. The general aim of the study was to evaluate the effectiveness of implementing an NP-led outreach program on health outcomes, ED transfers, and hospital admissions of LTC residents. Specifically, the study was designed to (a) compare the rate of case resolution among non-hospitalized/non-transferred LTC residents across NPs, MDs, and RNs; (b) compare the rate of ED transfer of LTC residents across NPs, MDs, and RNs; and (c) compare LTC residents who are transferred to the ED with regard to their (i) acuity level; (ii) rate of hospital admission; and (iii) ED wait time across NPs, MDs, and RNs.

### **Description of the NP-Led Outreach Program**

The mandate of the Erie St. Clair LHIN outreach program, which was instituted in the fall of 2009, was to decrease the frequency of avoidable ED visits by residents of LTC homes across Windsor and Essex County. The program was initially staffed by two NPs (1.5 full-time equivalency).

The role of the outreach NPs was to assist LTC staff with assessment and management of health problems experienced by residents. Although employed by the hospital as members of the ED staff, the NPs worked out of the LTC homes as members of the LTC staff. They worked collaboratively with the LTC nursing and medical staff as members of a health-care team, but had full, independent diagnostic and treatment authority as per their scope of practice. They also did regular follow-up rounds on cases that were under their care and made decisions to transfer patients. RNs worked under the direction of the NPs and MDs but were able to request patient transfers for cases that they saw as requiring immediate medical attention when neither the MDs nor the NPs were on site.

During the course of the study, a third part-time NP was added to the program. Working in collaboration with LTC physicians and staff, the program was to supply outreach NPs who would (a) provide or suggest onsite treatment for case presentations that were non-urgent but had the potential to become urgent, and (b) suggest and facilitate transfer of urgent cases to hospital. The outreach NPs also advocated for residents and families with regard to advanced directives and resuscitation options, which may have helped to prevent unnecessary hospital visits. Lastly, they acted as liaisons between the hospital and the LTC home to streamline necessary hospital admissions and to ensure that returning residents were stable and had appropriate discharge information. As liaisons, the outreach NPs could also arrange for direct services (i.e., diagnostic imaging) without sending the resident through the ED.

## **Method**

### ***Design***

An observational prospective cohort design was developed between 2011 and 2014 to explore the impact of implementing an NP-led outreach program on the health outcomes of LTC residents. Following ethical clearance from the respective institutional Research Ethics Boards, staff members in the participating LTC homes and EDs were oriented to the study by the investigating team through oral presentations and written materials. Prior to commencement of data collection, the study was piloted for 2 weeks on a small number of case presentations to examine the feasibility of data-collection tools and procedures and to ensure that all four research assistants had a similar understanding of the data-collection process. Modifications to data-collection procedures or tools were made when appropriate and a final data-collection protocol was developed based on the pilot feedback, which was qualitatively assessed through meetings with the research assistants.

As part of data-collection procedures, the research assistants collected initial baseline data on all consenting residents, which included their demographic characteristics, prognostic and/or confounding factors, comorbidities, and baseline Barthel scores. New case presentations were identified primarily by the research assistants, who screened the medical records of the LTC residents every 48 hours. Nursing staff at the LTC homes and the NPs assisted with the identification of new cases by flagging them to the research assistants. Once a resident presented with a case presentation or complaint that required NP or medical attention, the research assistants collected data pertaining to the case every 48 hours. To measure and control for overall health status at the time of the case presentation, the research assistants calculated the Barthel score from data that they extracted on the 10 items of the Barthel Index from the resident's medical records. Data collection on a case presentation was closed when an endpoint was reached either by (a) documented resolution of the problem, (b) transfer or death of the resident, or (c) reaching the maximum 21-day follow-up time without a resolution of the case presentation. For those who were transferred to the ED, data abstracted from the hospital medical records included (a) level of acuity as indicated by Canadian Triage Acuity Scale (CTAS) scores, (b) wait time at the ED, and (c) admission status.

### ***Measurement and Variable Definitions***

A “case presentation” was defined as an LTC resident presenting with an acute health complaint or exacerbation of an existing chronic condition that required medical or advanced nursing attention but was within the NP's scope of practice. Given that a case presentation, as opposed to the individual participant, was the unit of analysis, a single resident could contribute more than one case presentation to the analysis. The “case resolution” of a case presentation was defined in terms of the endpoint of the presenting health problem measured on a nominal scale indicating whether it was resolved or unresolved. The endpoint of a resolved case was ascertained via written or oral communication by the managing health-care provider indicating that the presenting problem was resolved or required no further attention. The endpoint for an unresolved case was established if the problem persisted after 21 days of follow-up. The outcome of an unresolved problem was further defined to specifically capture its nature (e.g., transferred to hospital, death, or other). An “ED visit” was defined as the transfer of an LTC resident to the ED for a specific case presentation. A “hospital admission” was defined as the admission of an LTC resident to a hospital floor/unit for at least 24 hours. The rates of ED visits and hospital admissions were each measured on a binary scale (i.e., occurred/did not occur). For LTC residents who were

transferred to the ED, the CTAS mandated for use in all Canadian EDs (Bullard, Unger, Spence, & Grafstein, 2008; Murray, Bullard, & Grafstein, 2004) was used to measure the “level of acuity.” While the CTAS classifies acuity into five categories (i.e., non-urgent, less urgent, urgent, emergent, and resuscitation), in this study we collapsed these categories into either urgent (urgent, emergent, and resuscitation) or non-urgent (less urgent and non-urgent). “Overall health status” was measured using the Barthel Activity of Daily Living Index, a 10-item functional ability scale with established reliability and validity (Collin, Wade, Davies & Horne, 1988; Mahoney & Barthel, 1965; Oveisgharan et al., 2006). The Barthel score ranges from 0 to 100, with 0 indicating complete dependence and 100 indicating complete independence. Each of the 10 items on the Barthel Index measures a specific functional ability (feeding, bowels, bladder, etc.) that can be used to assess the overall health of older individuals.

### ***Sample and Setting***

The study was conducted within a regional community-based hospital system comprising two campuses and four LTC homes in the Erie St. Clair LHIN region of southwestern Ontario. The hospitals had a combined total of approximately 350 beds and a combined ED capacity of approximately 80 patients. The LTC homes had a combined total of 287 beds (ranging from 42 to 96 per home). Two of the homes were participating in the outreach program (159 beds), while two were not (128 beds). However, not all residents in the participating LTC homes were always seen by the outreach NPs. The study was implemented with a convenience sample of 311 eligible residents, who provided a total of 1,353 case presentations. These numbers exceeded our power analysis estimates, which suggested that a minimum of 848 observations were needed to provide 80% power using an alpha of .05 to yield an odds ratio of 1.5 for the primary outcome of ED transfer.

Residents were recruited by the research assistants, who provided them or their substitute decision-makers with an oral explanation and a letter describing the study and the data-collection procedures. Letters were mailed to the substitute decision-makers of residents who were deemed by the LTC management to be cognitively impaired. A person was eligible for enrolment if he/she was at least 60 years of age and living in one of the four participating LTC homes. Residents were excluded if they were deemed terminal and/or in a critical health state at the time of recruitment. A resident could contribute more than one case presentation to the study. A case presentation for which the resident had been transferred to a hospital other than one of the participating local hospitals was excluded. A case presentation was subject to exclusion if its manage-

ment was deemed to be beyond the scope of NP practice (no such presentation was reported in the study).

### ***Data Analysis***

All data-analysis procedures were performed using SPSS statistical software (Version 22.0). Prior to the analyses, data were explored to ensure that all bivariate and multivariate statistical assumptions of the proposed analyses were met. Basic descriptive statistics such as general frequencies of categorical variables and means and standard deviations of continuous variables were performed to describe the demographic and other prognostic factors of participants. A series of chi-square and one-way analysis of variance analyses were performed to compare the unadjusted outcomes of the findings across NPs, MDs, and RNs. Given that a participant could contribute more than one case presentation during the course of the study, a series of generalized estimating equation models were performed to account for the clustered nature of the data when examining each of the study outcomes. A 95% confidence interval or a two-tailed alpha of 0.05 was used as the criterion for statistical significance (Hosmer & Lemshow, 2001).

## **Results**

### ***Sample Characteristics***

Only 32 (9.6%) of the 333 residents who were screened for eligibility during the data-collection phase were deemed ineligible, yielding a sample size of 311. The average number of case presentations per resident was 4.3 ( $SD \pm 3.3$ ), with only 19% ( $n = 60$ ) contributing a single case presentation and 44.4% ( $n = 138$ ) contributing two to four. Only 17.1% ( $n = 232$ ) of all case presentations were subject to ED transfer; of these, 55.6% ( $n = 129$ ) were single ED transfers and the remaining 44.4% ( $n = 103$ ) were repeat ED transfers.

The mean age of participants was 84.2 years ( $SD \pm 9.37$ ). The majority were Caucasian (97.8%) and female (70.1%). Only 17% of participants were married or in a relationship at the time of data collection. The participants were living with a wide range of chronic illnesses, including hypertension (72.7%), dementia (61.7%), arthritis (39.5%), diabetes mellitus (32.8%), stroke (27.3%), chronic obstructive pulmonary disease (23.2%), coronary artery diseases (23.2%), and congestive heart failure (16.1%).

### ***Unadjusted Bivariate Comparisons***

Table 1 presents the unadjusted comparisons of case presentations and each of the study outcomes compared across NPs, MDs, and RNs. While



**Table 1 Unadjusted Comparisons of Case Presentations and Patient Outcomes Across NPs, MDs, and RNs**

Outcome	Health-Care Provider			Total (N = 1,353)	$\chi^2/F$	P
	NP (n = 374)	MD (n = 636)	RN (n = 343)			
<b>Case presentation: n (%)</b>						
Acute	286 (76.5)	554 (87.1)	330 (96.2)	1,170 (86.5)	60.01	<.001
Chronic	88 (23.5)	82 (12.9)	13 (3.8)	183 (13.5)		
<b>Case resolution: n (%)</b>						
No	151 (40.4)	199 (31.3)	209 (60.9)	559 (41.3)	80.95	<.001
Yes	223 (59.6)	437 (68.7)	134 (39.1)	794 (58.7)		
<b>ED transfer: n (%)</b>						
No	349 (93.3)	597 (93.9)	175 (51.0)	1,121 (82.9)	327.78	<.001
Yes	25 (6.7)	39 (6.1)	168 (49.0)	232 (17.1)		
	<b>Subsample of ED Transfers</b>			<b>(N = 232)</b>		
	<b>(n = 25)</b>	<b>(n = 39)</b>	<b>(n = 168)</b>			
ED wait time M $\pm$ SD	1.16 $\pm$ 1.07	1.64 $\pm$ 1.77	1.45 $\pm$ 1.33	1.45 $\pm$ 1.39	0.91	0.40
<b>Acuity level: n (%)</b>						
Non-urgent	0 (0.0)	1 (2.6)	14 (8.3)	15 (6.5)	3.68	0.16
Urgent	25 (100.0)	38 (97.4)	154 (91.7)	217 (93.5)		
<b>Hospital admission: n (%)</b>						
No	8 (32.0)	23 (59.0)	103 (61.3)	134 (57.8)	7.69	0.02
Yes	17 (68.0)	16 (41.0)	65 (38.7)	98 (42.2)		

F = F-ratio for one-way analysis of variance.

the results indicate that a larger proportion of cases managed by MDs (68.7%) experienced a positive resolution compared to NPs (59.6%) and RNs (39.1%;  $\chi^2 = 80.95, p < .001$ ), it is important to note that, overall, NPs were more likely to treat chronic or exacerbated chronic conditions than MDs and RNs ( $\chi^2 = 61.13, p < .001$ ). Specifically, 52.5% of chronic case presentations and 46.9% of exacerbated chronic conditions were managed by an outreach NP. Further, 96.2% of cases that were managed by an RN were acute, as compared to 87.1% of those managed by an MD and 76.5% of those managed by an outreach NP.

Of the 232 case presentations that were transferred to the ED, 10.8% ( $n = 25$ ) were transferred by NPs, 16.8% ( $n = 39$ ) by MDs, and 72.4% ( $n = 343$ ) by RNs. ED transfer comparisons across NPs, MDs, and RNs show that while 49% of case presentations managed by RNs were transferred to the ED, only 6.1% of those managed by MDs and 6.7% of those managed by outreach NPs were transferred to the ED ( $\chi^2 = 327.78; p < .001$ ). One-way analysis of variance results indicate that the mean ED wait times ( $F = 2.09; p = .129$ ) were not different across residents based on their transferring health-care provider.

The results show that only 42.2% of all ED transfers from LTC homes were admitted to hospital. Of all ED transfers made by NPs, 68% were admitted to hospital, compared to 41% of transfers made by MDs and 38.7% of transfers made by RNs ( $\chi^2 = 7.69, p = .02$ ).

No difference was found in the acuity level of residents who were transferred to the ED across transferring health-care providers ( $\chi^2 = 9.01, p 0.34$ ). It is interesting to note, however, that all those who were transferred to the ED by an outreach NP were classified as urgent.

### ***Adjusted Multivariate Comparisons***

Table 2 displays the results of GEE analyses comparing each of the study outcomes across NPs, MDs, and RNs while adjusting for confounding effects and the clustered nature of the data. Results of these analyses indicate no differences in case resolution among NPs, MDs, and RNs. Interestingly, variables independently associated with case resolution are age (OR = .99; 95% CI .96–.99), type of case (i.e., acute vs. chronic) (OR = .32; 95% CI .21–.46), and number of comorbidities (OR = 1.10; 95% CI 1.01–1.21).

Table 2 shows that NPs are not different from MDs with regard to their rate of ED transfer after adjusting for gender, case presentation, age, Barthel score, and number of co-morbidities. However, an RN was almost 20 times more likely than an NP or an MD to transfer a resident to the ED (OR = 19.93; 95% CI 12.37–32.11). Age (OR = .96; 95% CI .94–.99), Barthel score (OR = 1.03; 95% CI 1.02–1.04), and number of

Table 2 GEE Analysis: Impact of Health-Care Provider on Study Outcomes									
Variables	Case Resolution		ED Transfers		Acuity Status		Hospital Admission		
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	
<b>Gender</b>									
Male	0.78	0.58–1.05	0.92	0.53, 1.58	0.89	0.74–1.07	0.84	0.40–1.74	
<b>Health-care provider</b>									
RN	0.99	.64–1.55	19.93	12.37–32.11	0.97	0.83–1.22	0.87	0.43–1.8	
NP	0.75	[0.53, 1.05]	1.04	0.55–1.99	0.73	0.54–0.98	3.23	1.17–8.9	
MD (reference)	–	–	–	–	–	–	–	–	–
<b>Case presentation</b>									
Chronic	0.32	0.21–0.46	1.17	0.54–2.51	1.05	0.84–1.31	0.61	0.21–1.78	
Acute (reference)	–	–	–	–	–	–	–	–	–
Age	0.98	0.96–0.99	0.96	0.94–0.99	1.00	0.10–1.01	1.01	0.99–1.04	
Barthel Index	0.10	0.99–1.01	1.03	1.02–1.04	1.00	0.10–1.01	0.98	0.97–1.00	
Number of co-morbidities	1.10	1.01–1.21	1.16	1.00–1.35	0.99	0.94–1.04	1.14	0.94–1.38	

co-morbidities (OR = 1.16; 95% CI 1.00–1.35) were also independent predictors of ED transfer.

The results also show that transfers by NPs were 27% less likely to be non-urgent than transfers by physicians (OR = .73; 95% CI .54–.97), while RNs and MDs had no difference in the acuity of their transfers. Interestingly, none of the other variables in the model were significantly associated with the acuity status of ED transfers. The results also show that ED transfers made by NPs were 3.23 times more likely to be admitted to hospital than transfers made by MDs (OR 3.23; 95% CI 1.17–8.90), whose admission rates were not different from those of RNs. Interestingly, the transferring health-care provider was the only significant predictor of hospital admission.

## **Discussion**

Although the concept of outreach programs in LTC homes is not a new one, the outreach model that we evaluated is unique with regard to the mandate and scope of practice of the NPs who worked as outreach care providers out of the ED to the LTC home. Further, outreach NPs in our study made regular visits to the LTC homes, as opposed to being called in when a situation that required special attention arose. These features make our outreach NP-led program unique and enabled us to compare the role of the outreach NPs with the roles of RNs and MDs who were stationed at the LTC homes as their primary place of practice.

Our findings suggest no association between the implementation of an outreach NP program in LTC facilities and the rate of health outcomes or case resolution of the presenting case or health complaints. That is, the adjusted rate of case resolution was not different based on whether the presenting case was managed by an MD, an RN, or an outreach NP. Although other research has reported an association between implementation of NP models at LTC homes and enhanced health outcomes (Willging, 2004), our study is the first to inferentially compare the health outcomes of NP-provided care with those of RN- and MD-provided care.

It is interesting to note that NPs were more likely than MDs and RNs to manage chronic conditions or exacerbated chronic conditions ( $p < .001$ ). This result suggests that although the rate of case resolution did not differ among outreach NPs, MDs, and RNs, cases treated by NPs tended to be more chronic and challenging than those managed by RNs and, to some extent, by MDs. In fact, our adjusted analysis shows that chronic conditions were less likely to be resolved than acute conditions, further indicating that the utilization of an outreach NPs is beneficial in

terms of providing an efficient resource for managing exacerbated chronic conditions on site.

Our findings suggest that having an outreach NP at the LTC facility is associated with better judgement with regard to ED transfer. NPs were not only less likely to transfer residents to the ED, but also less likely to transfer non-urgent cases. For example, our frequency data show that while the outreach NPs transferred only 10.8% of the cases they managed, all of these cases were classified as at least urgent based on the CTAS score. RNs and MDs transferred 72% and 16.8%, respectively, of the residents they managed, and 93.3% and 6.7%, respectively, of all non-urgent ED transfers. A possible explanation for this finding is that RNs may not be equipped with the assessment and treatment skills or practice jurisdiction necessary to independently treat certain health conditions, and thus opt to transfer them to the ED. While our findings support the argument that the use of NPs in LTC homes reduces the need for acute care and ED services (Kane, Keckhafer, Flood, Bershadsky, & Siadaty, 2003; Klaasen et al., 2009), we believe that our study is unique in that it is likely the first to compare ED transfer across NPs, MDs, and RNs using adjusted GEE analyses.

Interestingly, our adjusted findings suggest that while RNs were about 20 times more likely than MDs to transfer an LTC resident to the ED, no difference was found between MDs and NPs for the rate of ED transfer. However, the adjusted odds ratios of our acuity findings indicate that while ED transfers made by RNs and MDs were not statistically different in acuity level, transfers made by outreach NPs were 27% less likely to be non-urgent than those by MDs. These findings suggest that NPs are more likely than RNs and MDs to exercise sound clinical judgement with regard to the ED transfer decision. It is important to keep in mind, however, that this finding may have been confounded by the fact that outreach NPs were dispatched from the ED with the specific mandate of reducing the rate of unnecessary ED visits; thus, it is possible that they were more sensitized than MDs and RNs to the issue of unwarranted ED transfers.

Although no difference was found in ED wait time across ED transfers made by outreach NPs, MDs, and RNs, our findings indicate that ED transfers made by an outreach NP were three times more likely to be admitted to hospital than transfers made by MDs or RNs. This finding is consistent with that reported by McAiney et al. (2008) and is not at all surprising given that ED transfers made by the outreach NPs were more likely to be at least urgent in terms of acuity level than transfers made by MDs or RNs. This finding highlights the positive impact that outreach NPs can have not only on ED transfers but also on hospital admissions. It is anticipated that reduction of unwarranted ED transfers and hospital

admissions will be associated with a reduction in costs related to the management of such unwarranted situations.

It is important to note that our study was conducted in the context of an observational design, and therefore the potential for bias and confounding cannot be ruled out. Of special note is the fact that the NPs in our study were aware that their role was being evaluated. They also were dispatched to the LTC homes with the specific mandate of reducing unwarranted or non-urgent ED transfers. These limitations ought to be kept in mind when interpreting or generalizing our findings. Further, although NPs were posted to two of the four sites in our study, not every case presentation at these two sites was managed by the NP. Thus, it is not possible to meaningfully compare LTC homes that were part of the NP outreach program and those that were not with regard to the study outcomes. That said, we adjusted for the LTC site in our adjusted analysis, and thus it is unlikely that the LTC site differences affected our results.

In conclusion, the findings of this study support the need for outreach NP-led programs to improve the care of LTC residents and reduce the burden on the health-care system through unwarranted ED transfers and hospital admissions. The fact that none of the ED transfers made by the NPs were non-urgent and the vast majority were legitimate candidates for hospital admission indicates that the program is meeting its goal. Thus, we recommend that the NP-led outreach program be further developed and expanded as a model of care at LTC facilities. We were not able to directly measure the financial impact of the program, but it is possible that the difference between NPs and their MD and RN counterparts in terms of the rate of unnecessary ED visits and hospital admissions will ultimately translate into reduced health-care costs associated with ambulance transport, ED care, and unwarranted inpatient hospital care.

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