Résumé

Perceptions des infirmières et degré de satisfaction à l'égard du système d'administration des médicaments dans les maisons de soins de longue durée

Sharon Kaasalainen, Gina Agarwal, Lisa Dolovich, Alexandra Papaioannou, Kevin Brazil, Noori Akhtar-Danesh

Notre étude visait à explorer les perceptions des infirmières ainsi que leur degré de satisfaction à l'égard du système d'administration des médicaments dans les maisons de soins de longue durée (SLD). Notre enquête transversale renfermait à la fois des questions quantitatives et ouvertes. Les données ont été recueillies auprès d'infirmières autorisées (IA) et d'infirmières auxiliaires autorisées (IAA) actives dans neuf maisons de SLD du sud de l'Ontario au Canada. Après avoir effectué des tests *t* pour échantillon indépendant, nous avons découvert que le degré de satisfaction à l'égard du système d'administration des médicaments était sensiblement moins élevé chez les IA que chez les IAA, notamment en ce qui concerne les questions de sécurité. Les IA ont relevé un certain nombre d'obstacles : contraintes de temps; problèmes relatifs à l'emballage; information insuffisante sur les médicaments; modifications des ordonnances; lacunes en matière de compétences; chariots de médicaments difficiles à manier. Les implications découlant de ces observations sont présentées en conclusion et assorties de recommandations destinées à améliorer les pratiques en matière d'administration des médicaments et à faciliter le travail des infirmières en SLD.

Mots clés : administration des médicaments, soins de longue durée, infirmières autorisées

Nurses' Perceptions of and Satisfaction With the Medication Administration System in Long-Term-Care Homes

**Sharon Kaasalainen, Gina Agarwal, Lisa Dolovich,
Alexandra Papaioannou, Kevin Brazil, Noori Akhtar-Danesh**

The purpose of this study was to explore nurses' perceptions of and level of satisfaction with the medication administration system in long-term care (LTC). The cross-sectional survey design included both quantitative and open-ended questions. Data were collected from licensed registered nurses (RNs) and registered practical nurses (RPNs) at 9 LTC residences in southwestern Ontario, Canada. Using independent sample *t* tests, the researchers found that RNs were significantly less satisfied than RPNs with their medication administration system, particularly with respect to safety issues. RNs identified a number of related barriers, including time constraints, poor packaging, insufficient drug information, prescription changes, lack of staff competency, and unwieldy medication carts. Implications for practice and policy are discussed, including recommendations for improving medication administration practices and for addressing the workload demands of LTC nurses.

Keywords: medication management, long-term care, licensed nurses

Background

Nursing in long-term–care (LTC) homes is becoming more complex given the growing resident acuity. One facet that is increasing in complexity is medication administration, because more medications are available for use and seniors who live in LTC homes are prescribed significantly more medications than those who live independently (Cheek, Gilbert, Ballantyne, & Penhall, 2004). However, the numbers of regulated nursing staff in LTC have not increased to meet the growing complexity, which has resulted in a nursing shortage in the sector, higher demands and workloads for nurses working in LTC, and compromised care for residents, particularly related to medication management (Cheek et al., 2004).

The purpose of this study was to explore LTC nurses' perceptions of and level of satisfaction with the medication administration system in their LTC facility, as well as to promote awareness about current issues for nurses in the way they manage medications for seniors in LTC.

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Given the challenging medication regimens of LTC residents, it is important to explore nurses' perceptions of their current medication administration system. In fact, almost 40% of LTC residents have four to five active diagnoses at any given time (Hughes, 2008) and one third of residents have drug regimens of nine or more medications per day (Doshi, Shaffer, & Briesacher, 2005). Moreover, the high prevalence of antipsychotic therapy, often irrespective of the clinical indication for it, creates additional challenges to safe medication practices (Rochon, Stukel, Bronskill, Gomes, & Sykora, 2007). Because of these factors, LTC nurses are left to manage progressively more challenging medication regimens.

Complex medication regimens can increase the risk for medication error. Pepper and Towsley (2007) report that at least half of nursing-home residents have an adverse medication event every year and that 80% of such events are due to medical error. Furthermore, more than 45% of residents receive at least one inappropriate prescription every year (Perri et al., 2005). Some of the most common errors, in order of frequency, tend to be dose omissions, overdose, underdose, wrong patient, wrong product, and wrong strength (Barker, Flynn, Pepper, Bates, & Mikael, 2002; Pierson et al., 2007). Therefore, access to safe and effective medication systems in LTC homes is crucial for nurses' ability to provide therapeutic care.

Benner et al. (2002) attempted to determine the cause of medication errors by nurses. They analyzed 21 cases and found the prevalent causes to be inattentiveness, inappropriate judgement, and mistaken or missed physician's orders. Interestingly, several studies found that, when asked, nurses gave different reasons for medication error. Ulanimo, O'Leary-Kelley, and Connolly (2007) surveyed 61 medical-surgical nurses on their perceptions of medication errors and the effects of physician order entry and barcode medication administration. They found that the leading perceived cause of medication error was failure to match the patient's medication administration record (MAR) with the patient's name band (45.8%). A larger, randomized study by Mayo and Duncan (2004) found similar results, but in that study the most prevalent cause of medication error cited by nurses was illegible physician handwriting.

Despite the growing interest in determining the cause of medication errors, less than half of all errors go largely unnoticed as long as the patient remains unharmed (Armitage & Knapman, 2003; Low & Beltcher, 2002; Mayo & Duncan, 2004; Osborne, Blais, & Hayes, 1999). Handler et al. (2007) found that errors are not reported due to (1) lack of a readily available medication error reporting system or lack of forms for reporting errors, (2) lack of information on how to report an error,

and (3) lack of feedback to the reporter or the rest of the facility about errors that have been reported. Moreover, nurses may be reluctant to report for fear of the reaction of either their manager or their co-workers (Osborne et al., 1999; Ulanimo et al., 2007) or because they believe the error is not serious enough to warrant reporting (Mayo & Duncan, 2004).

Although information is available on causes of medication error and barriers to reporting errors, there seems to be little information on the challenges that nurses confront when trying to manage medications safely. Yet LTC nurses play an important role in medication management. With their growing workload, LTC nurses have little time to manage medications safely and therapeutically, and this increases the risk for error. Ulanimo et al. (2007) found that 33% of medication errors occurred when nurses were fatigued and exhausted.

In addition to increased work demands, nurses are confronted with changing staff-mix models in LTC — that is, the ratio of registered nurses (RNs) to registered practical nurses (RPNs) is decreasing. This change in nurse staffing may create additional challenges to the management of medications for residents and its influence on patient outcomes. Scott-Cawiezell et al. (2007) used unobtrusive observation methods to examine differences in medication error rates by level of staff credentials in five LTC homes. In a sample of 39 health professionals, the authors found no differences in error rates by level of credentials for RNs, RPNs, and certified medication technicians. However, they found that RNs were interrupted more frequently than the other health professionals.

Differences between RNs and RPNs with regard to medication management are important, for a number of reasons. In terms of patient safety, the Canadian Nurses Association (CNA) (2003) argues that higher levels of both RN staffing and regulated staff mixing improves patient outcomes and that an inappropriate staff mix can lead to clinical errors with adverse patient outcomes. Moreover, the Institute of Medicine (2003) report *Patient Safety: Transforming the Work Environment of Nurses* suggests that increasing the proportion of RNs in the staff mix improves resident survival rates in LTC. Hence, it is important to explore nurses' perceptions of and level of satisfaction with how medications are administered, especially in light of the growing acuity of LTC residents and their complex medication regimens.

This study was guided by two research questions: *Are there differences between RNs and RPNs with regard to their satisfaction with the current medication administration system and their perceptions the efficacy, safety, and accessibility of the system? What are the barriers to and facilitators of nurses' medication management practices in LTC?*

Table 1 Demographics of Sample

		RPN (n = 88) No.	%	RN (n = 77) No.	%	Total (n = 165) No.	%
Gender	Male	6	6.8	2	2.6	8	4.9
	Female	80	90.9	74	96.1	154	93.3
	Missing	2	2.3	1	1.3	3	1.8
Highest nursing credential	Diploma	88	100.0	65	84.4	153	92.7
	Degree	0	0.0	12	15.6	12	7.3
Typical shift rotation	All shifts	11	12.5	14	18.2	25	15.2
	Evenings	8	9.1	8	10.4	16	9.7
	Nights	9	10.2	16	20.8	25	15.2
	Days/evenings	44	50.0	20	26.0	64	38.8
	Days/nights	3	3.4	1	1.3	4	2.4
	Evenings/nights	0	0.0	1	1.3	1	0.6
	Days	13	14.8	16	20.8	29	17.6
	Missing	0	0.0	1	1.3	1	0.6
Age	*Mean*	44.1		46.8		45.3	
	SD	12.9		10.0		11.7	
	Missing	10		10		20	
Years employed as a nurse	*Mean*	14.6		20.3		17.3	
	SD	12.5		11.0		12.1	
	Missing	3		0		3	
Years employed in LTC home	*Mean*	8.1		6.7		7.4	
	SD	9.3		6.3		8.1	
	Missing	2		0		2	
Hours worked in a typical week	*Mean*	37.6		34.3		36.1	
	SD	9.6		13.8		11.8	
	Missing	0		2		2	

Methods

Design

The study used a cross–sectional survey design that included both quantitative and open-ended questions. The study was approved by a university-affiliated research ethics board.

Setting and Medication Administration System

Data were collected from licensed nurses at nine LTC homes in southwestern Ontario, Canada, in 2007–08. The facilities were purposively chosen to represent a set of diverse conditions in LTC (e.g., for-profit/not–for profit status; large/small in size). All of the homes used a "strip packaging" medication administration system whereby medications are grouped together for specific periods, separately for each resident. All of the medications were listed on the MAR and nurses were required to check the strip or pouch of medications against those listed on the MAR before administering them. Six of the LTC homes used computer-generated MARs, two used handwritten MARs, and one used a complete electronic medication administration system, called an E-Pen system.

In all nine homes, RPNs were responsible for administering medications, assisted by RNs as needed. The average RN-to-RPN ratio was 1 RN for every 1.39 RPNs. All but one of the homes had more RPNs than RNs.

Sample

A total of 301 licensed nurses (130 RNs and 171 RPNs) were asked to complete the survey. Of the surveys distributed, 21 were returned to the investigator uncompleted (nurse currently on leave of absence or no longer employed at the LTC home). Therefore, the final sample comprised 280 nurses, of whom 165 (77 RNs and 88 RPNs) responded to the survey, for a response rate of 59%.

Nurses were primarily female (93.3%) with a mean age of 45.3 years (SD = 11.7). The majority of nurses held diplomas, while 15.6% of RNs held degrees. The participants had a mean of 17.3 (SD = 12.1) years' experience working as a nurse. More specifically, RNs had been employed as nurses for an average of 20.3 years (SD = 11.0), RPNs for an average of 14.6 years (SD = 12.5). The participants had been employed at their current LTC facility for a mean of 7.4 (SD = 8.1) years and worked a mean of 36.1 (SD = 11.8) hours per week. RNs worked only days (20.8%) or only nights (20.8%), while 50% of RPNs rotated from days to evenings (see Table 1).

Measurement

The survey was based on the Medication Administration System–Nurses Assessment of Satisfaction (MAS-NAS) scale (Hurley et al., 2006), originally developed to assist hospital leaders in gauging nurses' satisfaction with their current medication administration system. The 18-item survey has strong internal consistency (α = .86) and includes items relating to (a) support for team communication, (b) efficient use of time, (c) ease of observing the five rights of medication administration, and (d) documentation procedures. Each item is scored on a six-point Likert scale ranging from 1 (strongly disagree) to 6 (strongly agree), with higher values indicating a more positive result.

The survey was revised by its developers based on content validity and pilot testing in previous research, and three major subscales were identified using factor analysis: efficacy, safety, and access to both information and the medications (Hurley et al., 2006). The efficacy subscale consists of five items assessing the dependability and effectiveness of the system (efficiency, user-friendliness, ready availability of supplies, error prevention or reduction, and turnaround time). Safety consists of seven items assessing the system components that assure the nurse it is safe to administer the medication (pharmacist check, physician–pharmacist agreement, ease of checking, drug-alert feature, message about drug interaction, and observing the five-rights communication). The access subscale consists of six items assessing whether the necessary information and medications are immediately at hand (ease of finding information about drugs, managing medication reactions and knowledge about expected side effects, access to needed systems, knowledge about where to find medications, and no need to keep stashes of medications). Each of the subscales had adequate internal consistency (.71–.77) and non-significant *t* tests among the subscales (*t* = .27–.88; *p* = .38–.79). A final question measures overall satisfaction of the medication administration system using a 10-point Likert scale (1 = completely dissatisfied; 10 = completely satisfied).

The survey also included two open-ended questions inviting additional comments related to (a) the degree to which components of the current system supported the nurses' ability to administer medications safely and professionally, and (b) what the nurses would change in their current medication system.

The survey took approximately 10 to 15 minutes to complete.

Procedure

Since the survey had not been used in LTC settings, it was first piloted with a group of 25 LTC nurses (both RNs and RPNs) for assessment of

its feasibility and relevance to LTC. All 25 nurses reported that it was applicable to the LTC sector, that it was clear and easy to complete, and that it reflected the primary nursing domains of medication management in LTC.

The survey was then distributed, along with a $5 gift certificate, to all RNs and RPNs at the participating LTC homes. Nurses completed the survey and returned it by mail in an envelope addressed to the study investigator. A modified Dillman's approach was used to increase response rate: A second distribution followed 2 weeks after the first, with a reminder issued 1 week after the second distribution (Dillman, 1978).

Analysis and Evaluation

Demographic data were summarized using means and standard deviations for continuous variables and frequencies and percentages for categorical variables. Means and standard deviations were calculated for the entire MAS–NAS as well as for the individual subscales (i.e., efficacy, safety, and access). To adjust for a potential cluster effect (because participants were employed at nine separate LTC homes), intraclass correlation coefficients (ICCs) were estimated for the scale and for the subscales. Since there were no statistically significant ICCs for the MAS–NAS scores among the nine LTC homes, independent two–sample *t* tests were conducted to examine differences between RNs and RPNs for the total score and for each subscale of the MAS–NAS survey.

Content analysis was used to examine the data obtained from the open–ended questions (Sandelowski, 2000). Words, terms, and semantic units of meaning that emerged from the data were labelled. Once the basic units of analysis were identified, they were sorted into categories (Crabtree & Miller, 1999).

Results

Satisfaction With the Medication Administration System

The participants were moderately satisfied with the current system (*mean* = 7.0; *SD* = 2.2) as measured on a scale of 1 (completely dissatisfied) to 10 (completely satisfied). RNs reported less satisfaction (*mean* = 6.60; *SD* = 2.42) than RPNs (*mean* = 7.37; *SD* = 1.93), and this difference was statistically significant ($t = 2.38$; $p < 0.02$) (see Table 2).

Perceptions of Efficacy, Safety, and Access

The mean total MAS–NAS score for RNs and RPNs combined was 85.0 (*SD* = 13.44). RNs scored lower (*mean* = 82.99; *SD* = 15.24) than RPNs (*mean* = 86.82; *SD* = 11.41), with this difference approaching significance ($p = 0.06$).

Table 2 Nurses' Perceptions of and Satisfaction With the Current Medication Administration System

	All Nurses (N = 165)		RNs (n = 77)		RPNs (n = 88)		t	p value
	Mean	(SD)	Mean	(SD)	Mean	(SD)		
Access (Range = 6–36)	28.7	5.4	28.0	6.1	29.3	4.8	1.59	0.11
Safety (Range = 7–42)	32.1	5.7	31.1	6.4	33.0	5.0	2.11	0.04
Efficacy (Range = 5–30)	24.2	4.3	23.9	4.9	24.5	3.8	0.91	0.37
TOTAL (Range = 18–108)	85.0	13.4	83.0	15.2	86.8	11.4	1.83	0.06[a]
Satisfaction (Range = 1–10)	7.0	2.2	6.6	2.4	7.4	2.2	2.28	0.02

[a] Marginally significant ($p \leq 0.10$).

An independent sample *t* test was also conducted in order to determine if there were any differences between RNs and RPNs for the individual subscale scores and the individual items on the MAS–NAS. The results revealed a statistically significant difference ($p = 0.04$) between RNs and RPNs for the safety subscale. There were no significant differences for the access and efficacy subscales nor for any of the individual items (see Tables 2 and 3).

Facilitators of Safe Medication Administration

Participants identified a number of factors in their current practice that supported their ability to administer medications safely and professionally. These facilitators included packaging of the medications, access to resources, and support from other staff members.

With respect to packaging, many participants explained that the medication pouches made administration safer and more efficient: "The pre-packed pouches enable med administration safely and professionally" (RPN). Access to resources, such as the *Compendium of Pharmaceuticals and Specialties* (CPS) and the Internet, were described as facilitators of medication administration. The availability of the pharmacist as a resource was described by one RN as essential to safe medication administration:

> With pharmacy alerts re: interactions, we [RNs, RPNs] usually communicate with the doctor . . . pharmacy will tell us if interactions are too severe [and] new med must be substituted [and] we call MD.

Another RN wrote that support from other staff members contributed to safe administration:

> We have other staff to assist with paperwork, [and] even do assessments if we are already extra busy. This helps with medication safety i.e. less rushed.

Barriers to Safe Medication Administration

The participants also described several factors that impeded their ability to administer medications safely and professionally. These barriers included time constraints, workload demands, single-dose packaging, insufficient information provided by the drug manufacturer and/or the pharmacy, prescription changes, limited access to pharmacists and physicians, lack of competency of some nurses related to medications, and difficult-to-manoeuvre medication carts.

Lack of time and workload demands were described as major challenges. These barriers were commonly reported by both RNs and RPNs:

Table 3 *MAS–NAS Results: Comparison of RNs and RPNs*

Questions	RNs (n = 77)		RPNs (n = 88)		t	p value
	Mean	(SD)	Mean	(SD)		
1. Because of information available through the current medication administration system I know both the intended actions and side effects of medications I administer.	2.84	1.55	2.65	1.52	0.81	0.42
2. I find the drug alert feature (drug/drug and drug/food interaction) of the current medication administration system helpful.	2.22	1.51	2.15	1.35	0.32	0.75
3. The current medication administration system makes it easy to check active medication orders before administering medications.	2.11	1.35	1.86	1.05	1.30	0.20
4. The current medication administration system provides me with information to know that a medication order has been checked by a pharmacist before I administer the medication.	2.14	1.62	1.98	1.33	0.72	0.47
5. The current medication administration system promotes 2-way communication between clinicians (MD, pharmacist, RN) about medication orders.	2.14	1.27	1.81	1.11	1.80	0.08

6. I have access to the systems that support medication administration (physician's orders, drug information) when I need them.	1.69	1.00	1.52	0.78	1.23	0.22
7. The drug information available through the current medication administration system is easy to get when I need that information.	2.42	1.50	2.05	1.07	1.84	0.07
8. When I see a message that acknowledges and accepts a known drug/drug interaction, I know that both physician and pharmacist communicated and agreed on the order.	2.97	1.75	2.62	1.44	1.42	0.16
9. I know where all the medications I need are stored (either on the unit or if they need to be procured from the pharmacy).	1.60	0.92	1.47	0.92	0.92	0.36
10. The current medication administration system helps me to be efficient at medication administration.	1.85	1.01	1.79	1.12	0.36	0.72
11. The current medication administration system makes it easy to check that I am following the "5 rights" when I administer medications.	1.92	1.40	1.53	0.85	2.16	0.32
12. The turnaround time for receiving medications needed "stat" or for patients newly admitted to the unit is adequate.	2.72	1.44	2.66	1.33	0.32	0.75

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Table 3 *(cont'd)*

Questions	RNs (n = 77)		RPNs (n = 88)		t	p value
	Mean	(SD)	Mean	(SD)		
13. The current medication administration system is effective in reducing and preventing medication errors.	2.36	1.30	2.29	1.06	0.42	0.68
14. The current medication administration system is user-friendly to the nurses who administer medications.	2.08	1.18	1.86	0.92	1.32	0.19
15. The equipment and/or supplies needed to administer medications are readily available to me.	2.03	1.11	1.89	1.10	0.81	0.42
16. Information available through the current medication administration system helps me to know what to do should my patient have any bad reactions from a medication.	3.19	1.66	3.06	1.52	0.55	0.58
17. I have to keep stashes of medications to be sure I have medications I need when I need them.	4.38	1.97	4.92	1.69	-1.87	0.06
18. When I see a message that acknowledges and accepts a known drug/drug interaction, I believe it is appropriate to give them medication.	3.79	2.00	3.90	1.72	-0.38	0.70

We administer [medications] to 38–40 resident[s] — a very heavy load — and on day shift when other problems occur. (RN)

[There are] too many medications to give at each med pass which [is] time consuming and leaves no time to be with the client. (RN)

The ratio between a nurse and residents is too high. One nurse gives 52 residents meds in one med pass. Principles of medication administration are in brain not in hand — no wonder there are med errors. (RPN)

Additionally, the volume of medications, number of residents, time needed to identify residents, and RPNs' scope of practice (e.g., RPNs are unable to give subcutaneous morphine or Dilaudid and must call an RN to administer these medications) were described by the nurses as exacerbated by the severe time constraints.

Nurses also commented that single-dose packaging was sometimes a barrier. They reported that medication pouches are difficult to open and that often the pouches rip, causing medications to fall out:

My comment is that [the pharmacy] only send what residents need and if tablets are dropped, we have to wait for new ones and meds may not be given on time. Also [some] residents will spit meds out and you have no meds to re-try resident or attempt again. (RPN)

I would like the packaging of the medications — the plastic pouches [—] to be stronger. The packets get torn from another time slot and pills drop into the bottom of the resident's medication box. (RPN)

Other barriers included limited after-hours access to medications and/or the pharmacist and lag times after medications have been ordered:

I feel that if new medication[s] are ordered or if there is a new admission I should be able to obtain [them] in a more timely fashion to be able to administer it to [the resident] without doing a lot of writing to replace it in the survey box and less calling to the pharmacy to ensure delivery is prompt. (RN)

RPNs explained that prescription changes also created challenges:

When a medication is [discontinued] or changed there may be mistakes/errors made if sticker is not placed on the package to indicate.

Another RPN described concerns about nurses' competency related to medication administration, especially when "staff administering drugs do not follow the 5 rights" of medication administration.

Many participants described poor access, such as to the pharmacy, the physician, and "stat" or stock drugs, as other shortcomings of the current system:

Need better accessibility to a pharmacist on weekend. (RN)

When there are MD order changes in medications — time consuming to remove med from pouches and the chances of drug error much increased — e.g. giving discontinued med. (RN)

Finally, one RN described the design of the medication carts as a barrier to effective administration:

Design of the med carts needs a review. Currently they do not allow for all the items that are needed to complete a med pass in LTC (cups, straws . . . utensils, etc.). Tops are often cluttered with frequent spills onto MARS and difficult to manipulate/manage when residents are grabbing at items on the [cart].

Nurses stated that lighter medication carts would be easier to manoeuvre.

Suggestions for Improving the Medication Administration System

When participants were asked about changes they would like to see in the medication administration system, responses included better access to resources, more education to improve their knowledge base, better timing of medication administration, fewer distractions, and less waste.

Better access to resources included sources of information about medications:

I would want readily accessible information about all medication i.e. current text book for immediate reference. Not CPS – CPS gives far too much information and is difficult and time consuming. (RN)

Access to the internet and reliable sources to look up meds quick. More info on drug/drug interactions. More info on 1x/wk meds, or Didrocal (meds with specific instructions). (RPN)

One RPN recommended that in-services and ongoing education be provided for staff administering medications in order to improve their knowledge base in this area. She stated:

I feel the system works but as far as knowing your meds, why, what it does, side effects, there is [no] time to look up, so in-services would greatly help.

Another RPN recommended that nursing staff receive ongoing education (upgrade courses):

Upgrade — that all nursing staff should receive paid, ongoing med courses compulsory at least every two years.

An RN wrote:

I would like to have more nursing user friendly resources available for med-ications, on each unit.

Participants said that the timing of medication administration was something they would like to see changed. For example, they said that administration should not be too late in the evening or conflict with meals. One RPN wrote that distractions such as interruptions by staff, family, and residents contributed to medication errors and that such distractions and the resultant errors would be minimized if medications were prepared in the medication room:

I feel [that] pouring medications in patient rooms or hallways leads to errors as there are so many distractions. I would prefer to pour meds in the med room.

Another concern about the current system was the amount of waste produced:

To develop a system to reduce a lot of waste e.g. if a drug is discontinued the whole blister pack is discarded which contains a lot of other medication that the patient is still receiving. It adds to the waste in the environment not to mention toxic effects as well as bulk. (RN)

Discussion

The results of this study highlight the perceptions of licensed nurses, both RNs and RPNs, about their medication administration system in LTC as well as their level of satisfaction with it. RNs appeared to be less satisfied with the system than RPNs, and to perceive it as less safe. Both RNs and RPNs identified a number of challenges (e.g., time constraints; knowledge deficits) in the management of medications for LTC residents. Strategies that nurses suggested for improving their practices included better access to resources, more education to improve their knowledge base, better timing of medication administration, fewer distractions, and reduced waste.

One of the most salient findings of the study is that RNs were significantly less satisfied with their medication administration system than RPNs, particularly with regard to safety issues. Since it is mainly RPNs who administer medications in LTC homes, as was the case in the homes covered in the present study, this finding could be simply reflective of the different roles and tasks of RNs and RPNs in medication management. Or it could be that RNs, given their more extensive education and training, are more aware of the safety risks inherent in the administration of medications to LTC residents. Scott-Cawiezell et al. (2007) report that more integration of clinical data is entailed when medications are admin-

istered by RNs as opposed to RPNs. Interestingly, these authors also found that, although RNs administered fewer medications than RPNs, they recorded the larger proportion of errors. Scott-Cawiezell et al. argue that this is likely due to the fact that RNs had a higher rate of interruptions, which was directly associated with the number of medication errors. Similarly, Pelletier (2001) reports that performance deficits, often related to fatigue, interruptions such as call bells, and/or failure to observe the five rights of medication administration are common causes of medication error. These deficits and barriers are consistent with the present findings. It is important to determine the sources of errors before developing strategies for improving medication administration practices for LTC nurses.

Although both RNs and RPNs were generally satisfied with the current medication administration system in LTC, they identified some barriers to optimal practice. For example, time constraints were a key barrier to engaging in safe practices. In their study, Browers, Lauring, and Jacobson (2001) found that time was the factor that most affected how nurses in LTC facilities worked, how they felt about their work, and resident outcomes. Nurses stated that time constraints made it difficult for them to complete such tasks as administering medications and monitoring patient status. In fact, Ellis (2008) conceptualizes the medication management process for LTC nurses as a "race" with three phases: preparing to race, running the race, and finishing the race. Within these phases, nurses need to know the medications; collaborate with other members of the health-care team; administer medications while prioritizing and strategizing; and assess, evaluate, and document whether the medications have been given. Lack of time is clearly a major impediment to safe medication practices and warrants attention at both the practice level and the policy level.

Other barriers to the therapeutic management of medications described by nurses in this study are supported by the literature. For example, Cheek et al. (2004) found that the large amount of documentation, inflexible work practices, lack of standard procedures, and lack of trained or qualified staff were factors affecting the quality of medication therapy in LTC facilities. Innovative strategies are needed for overcoming these barriers in order to improve safety and quality of life for LTC residents.

A number of the participants' proposed strategies for improving medication management practices are also reported in the literature. Some of these are intended to address barriers for the purpose of reducing medication errors by nurses. For example, a key method for reducing medication errors is to develop or improve error reporting systems so that errors can be monitored and tracked in a non-punitive manner (Cafeiro,

2003). This would facilitate the identification of key problem areas and redesign of the medication administration system (Cafeiro, 2003). A technological innovation beneficial to nurses is patient–care–based dispensers — computerized bar coding matches the medication, the dose, and the patient, signalling any discrepancies; the computerized bar coding system is reported to reduce medication errors by up to 80% (Cafeiro, 2003).

The findings from this study shed light on the impact of the changing staff-mix patterns in LTC, given the decreasing RN participation in managing medications. RNs in LTC are responsible for coordinating resident care while juggling multiple demands and are positioned to ensure that all aspects of care, including medication management, are safe and therapeutic. Despite the growing complexity of residential care, the number of RNs working in LTC has decreased over the years, resulting in lower RN-to-resident ratios (Pelletier, 2001). Conversely, RPNs are becoming more predominant in the LTC setting. RPNs' scope of practice in LTC has expanded as they assume responsibility for administering medications and making important drug-related decisions in patient care, even though they have less training and education than RNs. Participants suggested ongoing courses or in-services for licensed nurses, particularly RPNs, regarding medications and other issues as a way to improve medication management in LTC. In fact, Finnick, Crosby, and Ventura (1992) found that directors of nursing in LTC recommended that quality improvement programs incorporate more content related to medication management, such as the appropriateness and potential interactions of drugs. This recommendation is supported by the findings of the present study, as nurses reported an apparent knowledge deficit related to drug interactions, contraindications, and side effects.

Limitations

There are some limitations to the study. The results may not be generalizable to all LTC settings due to the use of convenience sampling. Only nine LTC homes were included, most located in urban southern Ontario. Future studies should use larger sample sizes within a randomized sampling approach covering a larger geographical area. Moreover, the limitations of survey design should be acknowledged, in particular the superficial nature of the data elicited. The use of rigorous qualitative methods that employ more in-depth data-collection and analysis strategies would produce richer data on nurses' perceptions and experiences with regard to medication management in LTC.

Implications for Policy and Practice

The results of this study can contribute to the development of interventions or changes to the medication administration system in LTC, with the goal of making improvements at both the practice and the policy level. At the practice level, a number of changes to the current system are recommended, including better packaging of medications, increased access to resources (e.g., access to the pharmacist after hours and on weekends; text/Internet information on medications and their side effects).

The workload demands of LTC nurses was a predominant issue identified by study participants, severely limiting their ability to provide safe and effective care related to the management of medications. The workload demands of LTC nurses and other staff need to be addressed by decision-makers at all levels in order to ensure safe medication management and to promote positive outcomes for both nurses and residents.

Work in this area has begun. For example, the CNA's (2005) *Evaluation Framework to Determine the Impact of Nursing Staff Mix Decisions* was developed to help employers determine how effectively they are using nursing resources while recognizing and respecting the contribution of each regulated nursing group (i.e., RNs, RPNs). This framework assesses the structures and processes of three groups or domains: the nursing staff, the system/environment, and the client or patient. The goal is to achieve effective matching across all three groups to promote positive outcomes for all. Although applying this framework to LTC settings does present challenges (e.g., variable patient acuity, mixed skill set of staff, and heavy workload required to meet the needs of LTC residents), it does represent a first attempt to address the issue of the excessive workload demands of LTC nurses (McGillis Hall et al., 2006). Future research could examine interventions to ease staff workload in LTC, based on the CNA framework, and the impact of these interventions on both nursing and resident outcomes.

Another unique aspect of LTC is that nurses in this setting, as compared to those working in acute care, assume more responsibility for the coordination, decision-making, and administration of drug-related interventions, partly due to the absence of on-site medical staff. However, the short supply of RNs in LTC settings and the low ratio of RNs to other nursing staff (Finnick et al., 1992) pose a risk to the quality of care provided. An appropriate mix of RNs, RPNs, and unregulated care providers is essential to ensure quality of care, particularly with respect to safe medication management. Since an inappropriate mix of nursing staff can lead to clinical errors and poor patient outcomes, consideration of

the core competencies of RNs and RPNs is recommended (CNA, 2003; McGillis Hall, 2003).

Nurses in this study reported that they relied heavily on other health professionals, most notably physicians and pharmacists, to ensure that the medications that had been prescribed were safe and appropriate for residents. However, the fragmentation of health care in LTC settings has lowered the likelihood of seniors having well-coordinated management of their medications (Johnson, 2003). Medication management in LTC is a multidisciplinary matter requiring strategies for improving collaboration and communication within the health-care team.

In summary, the findings advance our understanding of LTC nurses' perceptions of their medication administration system. The participating RNs and RPNs were relatively satisfied with their medication management practices, but RNs appeared less satisfied than RPNs and perceived the system as less safe. Both RNs and RPNs face a number of barriers to safe medication administration practices, most notably time constraints, heavy workload, and knowledge deficits. However, the nurses found the packaging of medications, access to resources, and support from other staff members to be beneficial in their management of medications. Such issues as workload demands, staff-mix ratios, and knowledge deficits need to be addressed in order to ensure that LTC residents receive safe and effective care.

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Acknowledgements

Sharon Kaasalainen, RN, PhD, is Associate Professor, School of Nursing and Department of Family Medicine, McMaster University, Hamilton, Ontario, Canada. Gina Agarwal, MBBS, MRCGP, CCFP, is Assistant Professor, Department of Family Medicine, McMaster University. Lisa Dolovich, BScPhm, PharmD, MSc, is Associate Professor, Department of Family Medicine, Department of Clinical Epidemiology and Biostatistics, and Department of Medicine, McMaster University; and Scientist, Centre for Evaluation of Medicine, St. Joseph's Healthcare, Hamilton. Alexandra Papaioannou, MD, FRCPC, FACP, is Professor, Department of Medicine, McMaster University. Kevin Brazil, PhD, is Professor, Department of Family Medicine and Department of Clinical Epidemiology and Biostatistics, McMaster University; and Director, St. Joseph's Health System Research Network, Hamilton. Noori Akhtar-Danesh, PhD, is Associate Professor, School of Nursing and Department of Clinical Epidemiology and Biostatistics, McMaster University.