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We are interested in improving pharmacogeriatric care in Canada by addressing the educational needs of pharmacists with regards to polypharmacy in seniors.

Nous souhaitons améliorer les soins pharmacogériatriques au Canada en répondant aux besoins des pharmaciens en matière de formation relativement à la polypharmacie chez les personnes âgées.

Educational needs, practice patterns and quality indicators to improve geriatric pharmacy care

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ABSTRACT

Background: As the population ages and pressure increases to reduce adverse drug reactions and drug-related hospitalizations in the elderly, there will be a growing demand for pharmacists to competently take on shared responsibility for effective and safe prescribing in older adults.

Methods: A cross-sectional postal survey was distributed to 3927 hospital and community pharmacists across Québec about their educational needs and practice patterns in geriatric care. Perceptions of different quality performance indicators were sought. Modifiable factors associated with higher performance were determined using univariate logistic regression.

Results: Seven hundred six pharmacists (18%) completed the survey. Less than 50% were aware of the prevalence of polypharmacy, inappropriate prescribing, drug-related hospitalizations or falls

in the geriatric population. Forty-one percent of community pharmacists and 74% of hospital pharmacists acknowledged familiarity with the Beers criteria of drugs to avoid in the elderly. The likelihood of screening for inappropriate prescriptions was 2.96 (95% confidence interval = 1.97-4.47) among pharmacists familiar with the Beers criteria and 2.24 (95% confidence interval = 1.50-3.34) among those who received continuing geriatric education in the workplace. On average, pharmacists reported having time to conduct detailed medication reviews in 30% of their older patients. The 2 quality indicators of geriatric care that were ranked most pertinent were being able to track the number of patients requiring hospitalization for drug-related problems and monitoring rates of inappropriate prescriptions. Ninety-six percent of respondents desired continuing education about geriatric care.

Conclusion: Exposure to continuing education in geriatric pharmacotherapy in the workplace is the most consistent determinant of professional performance to improve drug outcomes in the elderly. *Can Pharm J (Ott)* 2014;147:110-117.

Introduction

As baby boomers pass the 65-year age threshold, the proportion of Canadian seniors will swell from 15% of the total population in 2012 to an expected 28% in the next quarter century.^{1,2} The effect on pharmacy practice will be substantial. One obvious consequence is the increase in pharmacists' workload. National statistics suggest that Canadian pharmacists currently dispense an average of 35 prescriptions per patient per year to

persons aged 60 to 79 years and 74 prescriptions per patient per year to persons aged 80 years and older.³ Perhaps less well appreciated is the anticipated rise in demand for pharmacy expertise to reduce drug-related problems in the elderly. Polypharmacy (the use of ≥ 5 drugs), adverse drug reactions, drug-drug interactions, drug-induced falls and confusion and inappropriate prescriptions are frequent among older adults and increase the risk of drug-related emergency

hospitalizations.³⁻¹³ As the scope of pharmacists' activities expands, physicians will come to rely on pharmacists' care to optimize medication management for their older patients.¹⁴

Education and continuing professional development are critical components of the vision fostered by the Canadian Blueprint for Pharmacy initiative to better prepare pharmacists to competently take on shared responsibility for effective and safe prescribing.¹⁵ Innovative continuing education programs are being developed to assist pharmacists to elevate their practice, but a curriculum for geriatric pharmacotherapy to improve drug outcomes for the aged population has yet to be established. Furthermore, with the 2012 change by the federal government to recognize pharmacists as health care "practitioners," pharmacists may increasingly be held accountable for drug-related safety, not only for dispensing errors but also for the overall appropriateness of medication prescribing.^{14,15} The National Association of Pharmacy Regulatory Authorities seeks to standardize oversight for pharmacists' activities across the country and is revising its quality assurance programs to focus on regular evaluations of practitioner performance.¹⁶ Monitoring pharmacists' quality of care for older and more complex patients may reasonably fall under this mandate. Such an eventuality motivates reflection on the pertinence and acceptability of different quality care indicators for geriatric prescribing.

This report describes the educational needs and challenges confronting community and hospital pharmacists to deliver better geriatric care. The primary aim was to determine hospital and community pharmacists' self-identified knowledge gaps and practice patterns in geriatric prescribing as well as modifiable factors associated with better performance. A second objective was to obtain pharmacists' input on the pertinence and acceptability of different quality indicators to monitor and track the delivery of optimal pharmaceutical services for the aging population.

Methods

Study design

A cross-sectional postal survey was conducted among Québec pharmacists in July 2013. The survey was mailed once without reminders for nonrespondents. Pharmacists were given 25 days to respond. A cover letter, ethics agreement,

KNOWLEDGE INTO PRACTICE

- Less than 50% of pharmacists are aware of the high prevalence of drug-related problems among older adults, including unnecessary hospitalizations and falls.
- Forty-one percent of community pharmacists and 74% of hospital pharmacists report familiarity with the Beers criteria of drugs to avoid in the elderly.
- Only 5.6% of pharmacists recognize that short-acting benzodiazepines should never be prescribed to older adults according to the updated 2012 Beers criteria.
- Receipt of continuing professional development on appropriate prescribing for the elderly, delivered in the workplace, is associated with a 2- to 3-fold higher likelihood of delivering better geriatric care.

1 copy of the survey and a stamped, addressed return envelope were included in each mailing. No incentives were offered for completion of the survey. The project was endorsed by the Ordre des Pharmaciens du Québec and approved by the Ethics Review Board of the Institut Universitaire de Gériatrie de Montréal.

Sampling procedure

The target population was all community and hospital pharmacists actively practising in the province of Québec ($n = 8178$). The sampling population comprised 4279 pharmacists who had previously informed the Ordre des Pharmaciens du Québec of their willingness to participate in surveys (52% of all Québec pharmacists). Of these, 352 potential participants practised in industry, government, military or school settings and were excluded based on the addresses provided by the Ordre. A total of 3927 surveys were distributed. Five addresses were invalid, 2 respondents indicated that they were retired and 8 indicated that they practised outside the community or hospital setting.

Survey

The survey queried demographic characteristics such as the number of years of practice, sex and practice setting. An additional 23 items assessed 4 themes (7 pages total). The first theme (8 items) assessed respondents' awareness and knowledge of issues of concern in geriatric pharmacotherapy. Respondents were asked to indicate whether statements about the prevalence of drug-related problems in the elderly, polypharmacy, drug-drug interactions, inappropriate prescriptions,

MISE EN PRATIQUE DES CONNAISSANCES

- Moins de la moitié des pharmaciens sont au courant de la forte prévalence des problèmes liés aux médicaments chez les personnes âgées, y compris les hospitalisations inutiles et les chutes.
- En outre, 41 p. 100 des pharmaciens communautaires et 74 p. 100 des pharmaciens d'hôpitaux disent connaître les critères de Beers énonçant les médicaments que l'on devrait éviter de donner aux personnes âgées.
- Seuls 5,6 p. 100 des pharmaciens reconnaissent que les benzodiazépines à action brève ne devraient jamais être prescrites à des personnes âgées, conformément aux critères de Beers mis à jour en 2012.
- La prestation d'une formation professionnelle continue en milieu de travail portant sur la prescription appropriée des médicaments aux personnes âgées accroît de deux à trois fois la probabilité que des soins gériatriques de meilleure qualité soient offerts.

drug-induced hospitalizations and falls were correct or not (yes/no). Familiarity with the Beers criteria for inappropriate prescribing and indications for benzodiazepine use were also queried.¹⁰ The second theme (11 items) evaluated pharmacists' current practice patterns for identifying and addressing drug-related problems in the elderly. Pharmacists' perceptions of the frequency of geriatric drug-related problems in their practice were sought on a scale of 0 to 10, with 10 being extremely frequent. The third theme (3 items) queried specific needs and barriers to performing regular medication reviews and other interventions to improve drug safety in the elderly (scale of significance ranging from 0-10, with 10 being extremely significant). The last section (1 item) gauged respondents' views of the pertinence and acceptability of various quality indicators for geriatric prescribing.

Data analysis

Respondent data were denormalized, entered into an Excel document (Microsoft Corp., Redmond, WA, USA) and then analyzed using SPSS version 20.0 (SPSS Inc., Chicago, IL, USA). Independent verification of 10% of the data revealed a data entry error rate of less than 0.35%. Descriptive statistics using means $\pm$ standard deviations for continuous variables and frequencies for discrete variables were used to summarize the findings. χ^2 analyses were used to determine the significance (set at $p < 0.05$) of subgroup comparisons between community and hospital pharmacists and those

with ≤ 10 or > 10 years of practice experience. Participants who practised in both community and hospital settings were excluded from subgroup analyses based on practice setting. To investigate associations between better geriatric practice patterns and modifiable determinants of care, univariate logistic regression was used, with estimates expressed as odds ratios (95% confidence intervals). Pharmacists who screened patients or intervened in more than 75% of cases were designated as having high performance. Missing data were rare ($< 0.03\%$) and were not imputed.

For calculations using the complete population of respondents, proportions of 50% are estimated within $\pm 3.5\%$, 95 times out of 100. For subgroup comparisons with sample sizes as low as 135, proportions of 50% have precision of $\pm 8.4\%$. This is a conservative approach because the probability of 50% is associated with the largest possible margin of error.

Results

The response rate was 18% ($n = 706$). Thirty-four percent of respondents were male, and 66% were female. Three quarters of the respondents practised in the community, 22% practised in the hospital setting and 3% practised in both. The mean number of years of practice was 16.2 ± 11.4 years (range = 3 months to 55 years). The characteristics of nonrespondents were not available; however, the characteristics and geographic distribution of the respondents were fairly representative of the general pharmacist population in Québec (65% female; 70.4% practise in community settings).¹⁷

Knowledge gap

In general, less than 50% of pharmacists were aware of the prevalence of polypharmacy, inappropriate prescribing, drug-related hospitalizations or falls in the geriatric population. Familiarity with the Beers list of drugs to avoid in the elderly was 48%. Only 5.6% of pharmacists recognized that benzodiazepines should never be prescribed to older adults.¹⁰ In contrast, 85% appreciated the high risk of drug-drug interactions in patients with polypharmacy. Table 1 illustrates subgroup comparisons by practice setting and years of practice. Hospital pharmacists were significantly more likely than community pharmacists to correctly identify the prevalence of polypharmacy, inappropriate prescribing and falls in the elderly. More experienced pharmacists had better recognition of the high prevalence of

TABLE 1 Educational needs in geriatric pharmacotherapy

	Proportion of respondents indicating "yes" to each item, %						
	Total	Practice setting			Years of practice		
		Community (<i>n</i> = 527, 77.7%)	Hospital (acute and long term) (<i>n</i> = 151, 22.3%)	<i>p</i> -value for difference*	≤10 (<i>n</i> = 269, 39.3%)	>10 (<i>n</i> = 415, 60.7%)	<i>p</i> -value for difference*
Are you aware that 30% of adults aged ≥65 years consume at least 1 potentially inappropriate drug? ²²	47.3	43.0	59.6	0.001	44.6	48.8	0.29
Are you aware that among community-dwelling adults aged ≥65 years, at least 23% of women and 19% of men consume >5 medications per day? ²³	37.3	34.7	43.7	0.04	30.5	40.5	0.01
Are you aware that 12% of community-dwelling older adults consume ≥10 prescriptions or over-the-counter medications per day? ²³	26.7	24.9	31.1	0.12	20.8	30.4	0.01
Are you aware that patients taking >8 concomitant medications are likely to have at least 1 potential drug-drug interaction? ²³	85.3	84.8	86.8	0.55	82.8	86.5	0.18
Are you aware that in Canada, 1 in every 200 elderly patients has a medication-related hospitalization compared to 1 in 1000 for the population aged <65 years? ¹³	43.9	41.6	48.7	0.12	38.3	47.3	0.02
Are you aware that one third of community-dwelling individuals aged ≥65 years fall at least once per year? ²⁴	42.0	39.0	49.0	0.028	41.3	41.8	0.88
Are you familiar with explicit criteria for inappropriate prescribing such as the Beers criteria?	48.4	41.1	73.5	0.001	61.3	41.5	0.001
Benzodiazepines should be used in the elderly in the following circumstances:							
Never	5.6	5.2	4.4	0.85	2.9	6.8	0.05
Depends on the indication	56.2	56.8	59.3		61.7	54.2	
Only if short acting and for ≤4 weeks' duration	38.2	38.0	36.3		35.4	39.0	
Does your workplace offer continuing education in geriatric pharmacotherapy?	27.1	17.8	58.3	0.001	24.3	28.8	0.19
Would you be interested in receiving continuing education in geriatric pharmacotherapy?	96.4	97.1	93.2	0.027	97.8	95.4	0.11

**p*-values calculated using χ^2 analysis.

TABLE 2 Prevalence of geriatric practice patterns and modifiable determinants of better performance

Practice pattern	Proportion of elderly patients for whom the activity is practised,* mean $\pm$ standard deviation	Determinant of practice pattern for at least 75% of older patients		
		Familiarity with Beers criteria, odds ratio (95% confidence interval)	Knowledge that one third of community-dwelling elderly patients fall once per year, odds ratio (95% confidence interval)	Continuing education in geriatric pharmacotherapy offered in the workplace, odds ratio (95% confidence interval)
Conduct medication reviews to identify potentially inappropriate prescriptions	30.0 $\pm$ 33.0	2.96 (1.97-4.47)	1.48 (1.01-2.17)	2.24 (1.50-3.34)
Provide education about inappropriate prescriptions	33.0 $\pm$ 29.5	2.60 (1.67-4.05)	2.27 (1.48-3.47)	2.00 (1.29-3.09)
Interventions for inappropriate prescriptions	79.8 $\pm$ 27.6	1.38 (0.97-1.97)	1.65 (1.14-2.38)	1.56 (1.03-2.38)
Conduct drug-induced fall assessment and prevention	25.3 $\pm$ 28.4	3.37 (2.02-5.62)	2.63 (1.64-4.22)	3.31 (2.07-5.29)
Interventions for medication consumption that can cause confusion	38.8 $\pm$ 32.6	2.19 (1.51-3.16)	1.78 (1.24-2.54)	2.32 (1.59-3.38)
Interventions for clinically significant drug-drug interactions	67.1 $\pm$ 32.5	1.64 (1.21-2.23)	0.97 (0.72-1.32)	1.43 (1.01-2.02)

*Values expressed as percentages.

polypharmacy and drug-related hospitalizations. Hospital pharmacists and those with fewer years of practice were most familiar with the Beers criteria. Less than 20% of community pharmacists were offered training in geriatric pharmacotherapy in their workplace. Ninety-six percent of all respondents expressed interest in receiving additional education about geriatric care.

Practice patterns: Prevalence and modifiable determinants of performance

Respondents indicated that, on average, 53% of their patient population was aged 65 years or older. Due to competing work tasks, only 28% of service time per week could be dedicated to older adults' pharmacy needs. Table 2 shows self-reported practice patterns for care of the elderly. Pharmacists reported screening for inappropriate prescriptions and medications that increased the risk of falls and confusion in approximately one third of the target population. However, rates of intervention for drug-drug interactions and inappropriate prescriptions, if and when they were detected, were much higher (67%

and 80%, respectively). Despite this, pharmacists estimated that 50% of community and 55% of hospital patients still receive benzodiazepine prescriptions for more than 4 weeks, which is now considered inappropriate.

Pharmacists familiar with the Beers criteria were 3 times more likely to screen for and educate older patients about inappropriate prescriptions and falls and twice as likely to intervene to reduce the risk of drug-induced confusion and potential drug-drug interactions than pharmacists who reported unfamiliarity with the criteria. Awareness of the high prevalence of falls among older adults predicted better practice patterns in all areas of care except for drug-drug interaction interventions. Exposure to continuing education in geriatric pharmacotherapy in the workplace emerged as the most consistent determinant of appropriate geriatric care.

Barriers

Both community and hospital pharmacists ranked polypharmacy and adverse drug reactions as the most frequently encountered drug-

TABLE 3 Rank order of preferred quality indicators for geriatric pharmacy care

Quality indicator	Pertinence and acceptability on a scale of 0-10,* mean $\pm$ standard deviation
Number of patients with drug-related hospitalizations over a set period of time	8.3 $\pm$ 1.94
Number of inappropriate medications per patient	8.1 $\pm$ 1.92
Number of patients with clinically significant interactions	8.0 $\pm$ 1.84
Number of patients with drug-induced falls over a set period of time	7.8 $\pm$ 2.07
Number of patients with medication nonadherence	7.7 $\pm$ 2.01
Satisfaction of the patient with his/her pharmacy care	7.6 $\pm$ 2.00
Number of patients with adverse drug reactions	7.6 $\pm$ 2.05
Patients' knowledge about their medication	7.2 $\pm$ 2.03
Number of medications taken per patient	5.3 $\pm$ 2.78

*0 = not pertinent or acceptable at all; 10 = extremely pertinent and acceptable.

related problems in older patients. The top barrier to optimizing care in both settings was lack of time. Community pharmacists additionally expressed frustration about not having access to a common patient record with information about medical diagnoses and laboratory test results. Hospital pharmacists were more concerned about the lack of safer substitutions for many inappropriate prescriptions. Difficulty reaching the physician was not perceived as a significantly important barrier. Overall, respondents reported that, on average, 72% of their recommendations to physicians to stop or substitute a medication are accepted (68.7% for community pharmacists and 81.3% for hospital pharmacists). Financial compensation for geriatric care was accorded the least importance as a barrier to treating older patients.

Quality care indicators

Table 3 shows the indicators that pharmacists judged to be most pertinent and acceptable for monitoring the quality of geriatric care in their practice. Tracking the number of patients with emergency room visits or hospitalizations attributable to drug-related problems achieved the highest rating as a potential performance indicator. The number of patients taking inappropriate prescriptions was the second contender. Rates of polypharmacy were ranked last on the list.

Discussion

Results of this survey suggest that an important prerequisite for pharmacists to deliver optimal geriatric care is improved awareness of the high prevalence of drug-related hospitalizations, falls and confusion in the elderly population. Medication reviews are conducted in only 30% of geriatric patients, on average, to detect inappropriate medications that increase the risk of these drug-related problems. Only 41% of community pharmacists and 42% of those with more than 10 years of practice reported knowledge of the Beers criteria. Greater familiarity with the Beers list of inappropriate prescriptions was associated with a 2- to 3-fold higher likelihood of screening and intervening to deprescribe or substitute these high-risk medications. Access to continuing medical education about geriatric pharmacotherapy at work also predicated better geriatric care practices. Pharmacists indicated that lack of time was the greatest impediment to improving performance. Tracking the number of patients who required hospitalizations for drug-related problems and monitoring rates of inappropriate prescriptions were thought to be the most pertinent and acceptable quality indicators of geriatric care.

Pharmacists reported that they currently intervene in 80% of cases in which inappropriate medications are identified. The most important contribution to improve drug safety is therefore

enhancing knowledge of which medications are considered inappropriate. Ninety-six percent of the pharmacists who were surveyed desired additional education in geriatric pharmacotherapy. The majority did not know that in the updated 2012 Beers criteria, short-acting benzodiazepines were added to the list of drugs that were never to be used in the elderly population because of new evidence that all benzodiazepines, as well as all benzodiazepine-related hypnotics (e.g., zopiclone), increase the risk of falls, hip fractures and cognitive impairment.^{7,8,10,18} Zint et al.¹⁸ provide compelling evidence that hip fracture rates double in patients taking alprazolam, lorazepam or zolpidem concomitantly with other central nervous system medications. Additionally, the highest fracture rates occur in patients who initiate benzodiazepines within 2 weeks prior to sustaining a fracture, suggesting that new, intermittent or infrequent use of benzodiazepines may be just as, if not more, dangerous than long-term consumption.^{18,19} Pharmacists estimated that in their practice, up to 50% and 55% of community and hospitalized older adults, respectively, receive prescriptions for benzodiazepines. Although this may only be a perception, lack of knowledge that all benzodiazepines are inappropriate will lead to persistent prescribing. Any curriculum in geriatric pharmacotherapy that aims to improve drug outcomes for the aged population will need to provide detailed guidance on all drugs that should be discontinued as well as recommended therapeutic substitutions.

Discordance between the number of older adults whom pharmacists are expected to manage and the amount of time that they are able to invest to conduct drug reviews and intervene for this population merits comment.²⁰ Shifting tasks from pharmacists to pharmacist technicians for dispensing activities may free up time for pharmacists to address complex medication management problems in the elderly. More pharmacists who are well trained in the care of the elderly are required. The new entry-to-practice doctor of pharmacy (PharmD) programs that are available in some provinces and the push for graduate students to complete pharmacy residency may be one solution to the problem. Continuing medical education in the workplace is another option that

needs to be explored, as it was a consistent factor associated with higher performance in all aspects of geriatric care.

Several limitations in the interpretation and generalizability of this survey apply. First, the response rate of 18% is significantly lower than those of other surveys involving pharmacists in Canada.^{20,21} Possible reasons include the fact that this survey was conducted over the summer when many pharmacists are on vacation. No reminders were sent out to nonrespondents due to the limited time available to execute the project. The study sample comprised pharmacists who indicated prior willingness to participate in surveys, so a selection bias is likely, although difficult to quantify. Similarly, it is probable that only pharmacists with a vested interest in geriatrics or who have a large geriatric clientele responded to the survey. The values obtained in the analysis therefore likely underestimate the knowledge gaps and appropriateness of existing geriatric practice patterns because interested respondents may be better informed. The geographic, sex and practice setting distributions of the respondents were comparable to those of the entire population of Québec pharmacists, thus supporting internal validity. However, whether knowledge gaps and practice patterns in geriatric pharmacy care differ in Québec from other provinces remains unknown. The fact that Québec was a leader in implementing the entry-level PharmD program in Canada suggests that training requirements are at least on par with other provinces and territories. Finally, estimates of practice patterns were subjective and may not reflect objectively measured practice performance.

Conclusion

The majority of community and hospital pharmacists recognize a need for improved pharmacy education around drug-related problems in the elderly. Delivery of continuing professional development in the workplace is a first step towards meeting this goal. The use of quality indicators to monitor and track quality care in geriatric prescribing and improved valuation of the potential benefits of pharmacists' interventions will be required to improve drug outcomes for the aging population. ■

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Financial acknowledgement: This project was funded by the Michel Saucier Endowed Chair in Geriatric Pharmacology, Health and Aging, Faculty of Pharmacy, Université de Montréal.

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