



Pharmacist-led interventions during transitions of care of older adults admitted to short term geriatric units: Current practices and perceived barriers



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ABSTRACT

Background: During transitions of care, older adults are at risk of adverse drug events which could lead to avoidable hospital visits. Pharmacists are increasingly involved in care teams at various stages of the continuum of care. The types and frequency of clinical interventions performed by pharmacists in the geriatric practice setting remain poorly documented.

Objectives: This study aimed to describe the current integration of pharmacist interventions during transitions of care of older adults admitted in short-term geriatric units (STGUs) and to explore barriers and facilitators to their implementation in clinical practice. The secondary objective was to explore associations between certain patient characteristics and pharmacist-led interventions during transitional care.

Methods: A mixed methods study was conducted with pharmacists practicing in STGUs in the Montreal area, Canada. The application of 8 pharmaceutical interventions was assessed using a self-administered questionnaire, along with a retrospective chart review. Four semi-structured group interviews were conducted in order to identify perceived barriers and facilitators.

Results: Thirteen pharmacists participated in the study. In the questionnaire, medication reconciliation on admission and at discharge was reported as being performed at least half the time by 12 (92%) and 7 (54%) pharmacists, respectively. The retrospective chart review revealed that these interventions were documented in 95 (98%) and 25 (26%) files, respectively. While 35% of patients had a documented pharmaceutical care plan on admission, none was documented at discharge. Several barriers to implementing clinical interventions were identified such as lack of time, technical support, communication and standardization.

Conclusions: Pharmacists are involved at different periods of transitional care; however, certain barriers should be addressed in order to expand their role in discharge planning. Providing guidelines on what is expected at discharge and post-discharge, and having a practice focused on delegation and collaboration would help pharmacists increase their role throughout the transition of care of older adults.

1. Introduction

An adverse drug event (ADE) is defined as an injury resulting from medical interventions related to a drug.¹ Older adults are particularly vulnerable to ADEs due to their increased incidence of chronic diseases and

polypharmacy, and frequency of hospital admission.^{2,3} Moreover, the geriatric population is more frequently admitted to the hospital.⁴ Transitions of care after hospitalization increases even more the risk of ADEs in this population.^{3,5,6} A recent study showed that post-discharge ADEs occur in up to 37% of the elderly.⁷ Many factors, such as lack of counseling

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regarding changes in medication regimen, poor communication among healthcare providers and lack of post-discharge follow-up can contribute to the risk of ADEs during this critical period.^{8,9}

Pharmacist-led interventions are of great importance during transitions of care and integration of clinical pharmacists in geriatric care teams is emerging in order to prevent medication discrepancies, ADEs and drug-related readmissions.¹⁰ There is a growing body of evidence suggesting that pharmacists contribute to reducing readmission by performing medication reconciliation.¹¹ Aside from medication reconciliation, best practices in transitional care management are currently not fully defined. Furthermore, the clinical outcomes of certain pharmaceutical interventions remain controversial due to the lack of quality evidence. Despite this knowledge gap, current data suggests that the best patient outcomes are achieved when pharmacists perform medication reconciliation, interventions focused on discharge planning combined with post-hospitalization follow-up.^{12,13}

Our previous work described the impact of pharmaceutical interventions during transitions of care for older adults on healthcare usage.¹⁴ As demonstrated, pharmacists should diversify their interventions throughout transitions of care among the 8 pharmacist-led interventions identified on admission or during stay, at discharge and post-discharge. As described in Fig. 1, interventions consisted of: 1) Medication reconciliation on admission; 2) Pharmaceutical care plan on admission or during stay; 3) Patient education on admission and/or during stay; 4) Interprofessional patient care rounds during stay; 5) Pharmaceutical care plan at discharge; 6) Medication reconciliation at discharge; 7) Patient education at discharge; and 8) Post-discharge follow-up with patient. By implementing

these interventions during transitions of care, pharmacists can reduce the use of healthcare services by older adults.¹⁴ However, the actual integration of these pharmacist-led interventions in clinical practice remains unknown. Furthermore, the challenges related to the application of these interventions in the real-world setting are unclear as previous work mostly describe barriers encountered in other care settings or are not specific to the care of the older adult population.^{15,16}

2. Objectives

This study aimed to describe how often 8 evidence-based pharmacist-led interventions were accomplished and documented during transitions of care of older adults and to explore perceived barriers and facilitators to performing these interventions. The secondary objective was to explore associations between patient characteristics and the realization of pharmacist-led interventions during transitional care.

3. Methods

3.1. Research design

A mixed methods study was conducted in short-term geriatric care units (STGUs) in the Greater Montreal area, Quebec, Canada, consisting of a self-administered questionnaire to pharmacists combined with a retrospective, multicentre, observational study and followed by qualitative semi-structured group interviews with the participating pharmacists. This explanatory sequential design allowed for a subjective and objective

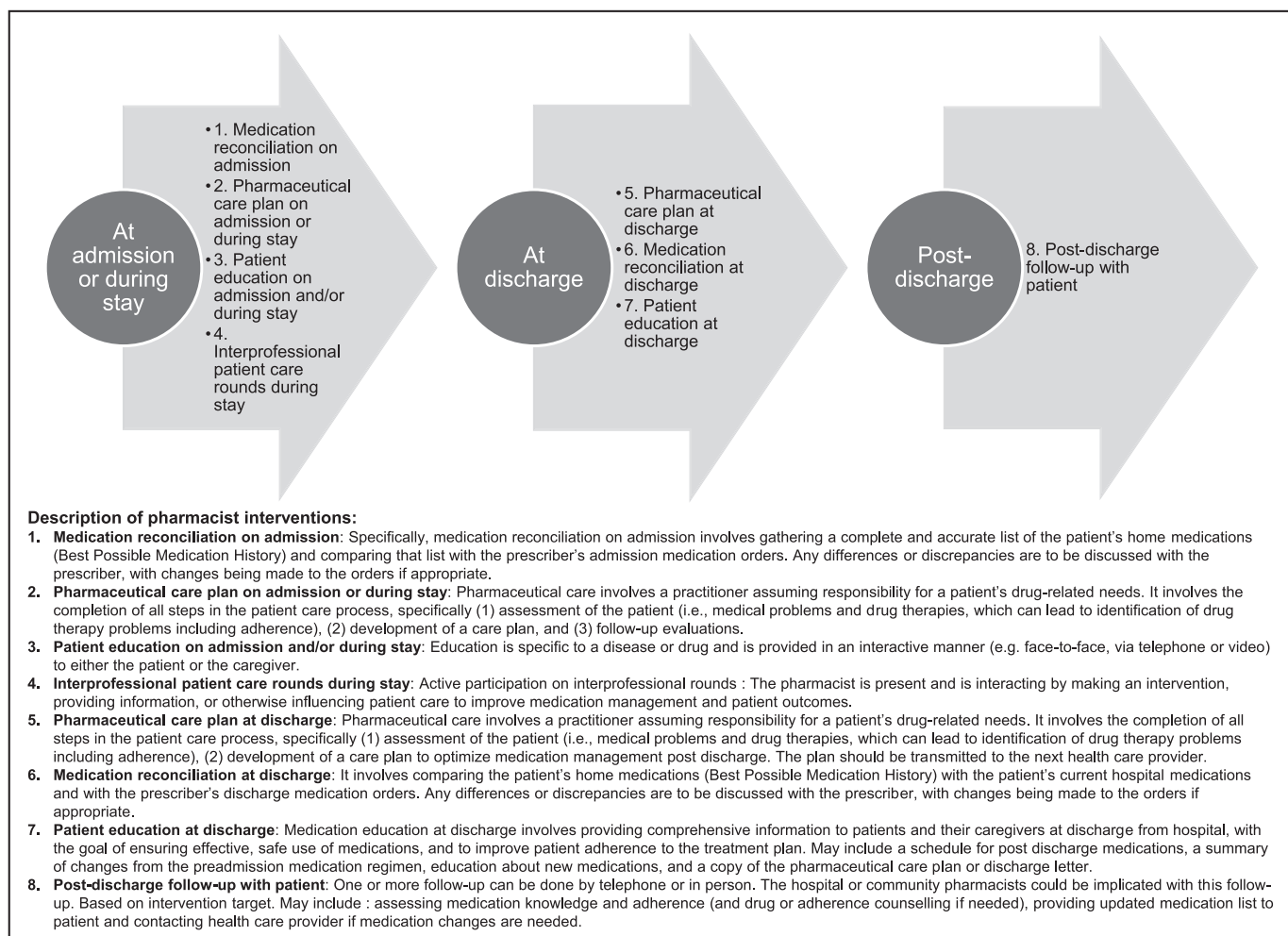


Fig. 1. Pharmaceutical model in transitions of care. Reproduced with permission from Villeneuve et al.¹⁴ Adapted from the Canadian cpKPI Collaborative.¹⁷

quantification of pharmaceutical interventions performed during transitions of care of older adults while gaining an in-depth understanding of perceived barriers and facilitators.

3.2. Study participants

Pharmacists practicing in STGUs in the Greater Montreal area, Quebec, Canada, were eligible to participate in the study. A list of eligible pharmacists was obtained and STGU characteristics were compiled through the *Regroupement des unités de courte durée gériatriques et des services hospitaliers de gériatrie du Québec* (RUSHGQ) and unit coordinators of each STGU member of the RUSHGQ. Invitations to participate were sent by email between June and August 2019. Centers in which all pharmacists responded and agreed to participate were purposively included in the study.

3.3. Quantitative component of the study

3.3.1. Data collection

In the first phase of the study, eligible participants were invited to complete a self-administered questionnaire consisting of 16 questions. The questionnaire was developed in French, based on information obtained from a previous study.¹⁴ It was sent out by email between May and August 2020. Questions aimed to assess how often the 8 evidence-based pharmacist-led interventions were completed and documented throughout transitions of care. Participants were also provided with a complete description of all the interventions. All questions used a 4-point scale (*always* [100% of the time], *often* [50–99% of the time], *occasionally* [1–49% of the time] and *never* [0% of the time]).

Concurrently, a retrospective chart analysis of patients admitted to 2 of the included STGUs between September 1st and October 19th, 2019 was conducted to overcome possible limitations related to the questionnaire. The patients were excluded if they were readmitted, deceased or admitted off service of the geriatric ward during the study period. Patient's paper and electronic charts were identified and retrieved through Medical Record Department of each hospital. Medication histories, admission and discharge prescriptions, discharge summaries, medical and pharmacist progress notes, and consultant assessments were thoroughly reviewed for data collection. Analyzing all available documentation, the 8 aforementioned pharmacists' interventions were measured as complete or not for each patient admission according to the prespecified definition of each intervention (Fig. 1). The intervention was considered complete if its execution was documented in the chart. Additionally, the person who performed the intervention was also noted (pharmacist, pharmacy resident, pharmacy student or pharmacy technician). Patient characteristics were also collected.

3.3.2. Data and statistical analysis

Patient, pharmacist and STGU demographics were described using absolute and relative frequencies for categorical variables and mean and standard deviations for continuous variables. Responses from the questionnaire were analyzed based on the frequency of answers in each category and were presented for all 4 STGUs. The proportion of responses in the categories *always* and *often* were also combined in order to assess the proportion of pharmacists completing each intervention at least half of the time.

As some of the interventions may not be systematically documented in patients' charts, the results from the retrospective chart review were compared with the documentation practices reported in the questionnaires. Pharmaceutical interventions documented through the chart review were presented as a proportion of activities performed per patient. Chi-square tests for categorical variables and student *t*-tests for continuous variables were performed to explore the association between prespecified patient characteristics and the completion of pharmaceutical interventions. Effect size was measured using the Cramer's *V* coefficient for categorical variables and the Cohen's *d* coefficient for continuous variables. Level of statistical significance was set at 0.05. Data were analyzed using Statistical Package for the Social Sciences (SPSS) version 25.0 (SPSS Inc., Chicago, IL, USA).

3.4. Qualitative component of the study

3.4.1. Semi-structured group interviews

In order to gain a deeper understanding of the quantitative results, qualitative interviews were conducted in the second phase. These qualitative interviews used a semi-structured interview guide inspired by existing literature^{16,18–20} to explore perceived barriers and facilitators to the completion of pharmaceutical interventions during transitions of care of older adults. Each group consisted of pharmacists working in the same institution. Quantitative data collected in the first phase guided the interviews, allowing for result expansion using a building approach. The interview guide was used to facilitate the discussions and its relevance was tested beforehand with 2 pharmacists working in a geriatric setting.

The interviews were an iterative process and were conducted between June and August 2020. As new ideas emerged, questions were refined to include new topics in subsequent discussions. Interviews were conducted via Zoom (Zoom Video Communications Inc., San Jose, CA, USA) or Microsoft Teams (Microsoft corporation, Redmond, WA, USA) due to social distancing requirements in the context of COVID-19 and lasted a maximum of 60 min or until saturation. In this study, saturation was defined as the point during the interview where no new ideas emerged, and the same topics were repeated.

3.4.2. Data processing and analysis

All interviews were audio-recorded, and transcribed verbatim. The transcripts were coded and analyzed using QDA miner 5.0.32 software (Provalis Research, Montreal, Quebec, Canada). Data analysis followed the 4 steps described by Green et al.: data immersion, coding, creating categories and finally identifying themes.²¹ Coding was performed using an inductive methodology. Codes were generated using a data-driven approach in an iterative process. Analysis was carried out by VCL and revised by AD. Both researchers individually analyzed the transcripts and coded text elements. Codes were then mapped into categories, sub-themes and final themes. Disagreements were resolved through discussion. All authors reviewed and agreed with the final themes.

3.5. Ethical considerations

This multicentric study was approved by the Research Ethics Board of the Comité d'éthique de la recherche vieillissement neuroimagerie du CIUSSS du Centre-Sud-de-l'Île-de-Montréal. Ethics approval was obtained from all participating centers and all participants signed an informed consent form before enrollment in the study.

4. Results

4.1. Study participants

In total, 14 STGUs were eligible to participate in this study. Thirteen pharmacists working in 4 different STGUs provided consent and were enrolled. The excluded STGUs either declined invitation ($n = 4$), did not respond ($n = 1$), did not receive consent from all pharmacists working in STGU ($n = 1$) or did not have a clinical pharmacist as part of their care teams ($n = 4$).

Demographics and practice setting characteristics are summarized in Table 1. Participants were mostly female ($n = 12$, 92%) and almost all ($n = 10$, 77%) had completed residency training. Overall, the pharmacists had a mean working experience as a hospital pharmacist of 15.5 years (Range: 2–32, SD 11.2). While all STGUs included in this study had similar care profiles, their characteristics differed in terms of practice setting, number of beds and number of admissions per year. Each STGU had a team of 3 or 4 trained clinical pharmacists; however, only one pharmacist was available on the ward at a time. In all STGUs, except in STGU 1, the pharmacist was present full-time on the ward for pharmaceutical care.

Table 1
Characteristics of participating pharmacists ($n = 13$) and STGUs ($n = 4$).

	STGU 1	STGU 2	STGU 3	STGU 4
STGU characteristics				
Practice setting	Community Hospital	Teaching Hospital	Community Hospital	Teaching Hospital
Care profile	Acute care	Acute care	Acute care	Acute care
Number of beds	62	18	37	25
Number of admissions per year	2100	368	203	500
Average length of stay (days)	13.6	23.0	25.0	16.5
Number of pharmacist full-time equivalent	0.875	1	1	1
Pharmacy technician on ward	No	No	No	No
Internships offered on the ward to pharmacy students or residents	No	Yes	Yes	Yes
Pharmacists' characteristics				
	$n = 3$	$n = 3$	$n = 4$	$n = 3$
Female, n (%)	3 (100)	2 (66)	4 (100)	3 (100)
Age in years, mean \pm SD	43.0 \pm 11.1	43.6 \pm 7.6	44.3 \pm 13.7	39.7 \pm 6.6
Education, n (%)				
B. Pharm	2 (66)	3 (100)	2 (50)	3 (100)
Pharm.D.	1 (33)	–	2 (50)	–
M.Sc. in Advanced pharmacotherapy ^a	2 (66)	2 (66)	3 (75)	3 (100)
Other post-graduate qualifications	1 (33)	2 (66)	–	1 (33)
Years of practice as a Hospital Pharmacist (mean \pm SD)	13.7 \pm 15.0	16.7 \pm 7.6	17.5 \pm 15.7	13.3 \pm 5.8
Years of practice in a STGU setting (mean \pm SD)	2.7 \pm 3.1	12.7 \pm 13.6	10.9 \pm 9.2	9.5 \pm 0.5

^a In Quebec, a master's degree in advanced pharmacotherapy is equivalent to postgraduate year 1 pharmacy residency.

4.2. Self-administered questionnaire

All 13 pharmacists completed the self-administered questionnaire. As shown in Fig. 2, pharmaceutical interventions undertaken by pharmacists are completed at various levels. Among all pharmaceutical interventions, medication reconciliation on admission was reported as being the most commonly performed, with 12 (92%) pharmacists reporting completing it at least half of the time. In contrast, 7 (54%) pharmacists reported completing medication reconciliation at discharge at least half of the time.

Similarly, 10 (77%) pharmacists reported completing a pharmaceutical care plan on admission and 5 (38%) stated completing a pharmaceutical care plan at discharge at least half of the time. Exceptionally, all pharmacists in STGU 2 reported completing a pharmaceutical care plan at discharge at least half of the time. Most pharmacists ($n = 10$, 77%) reported taking part in interdisciplinary patient care rounds at least *occasionally*, although the frequency of participation in these meetings is not consistent among pharmacists. Patient education seemed to be lacking across all institutions with only 3 (23%) and 4 (31%) pharmacists respectively performing this intervention at least half of the time on admission and at discharge. Furthermore, post-hospitalization follow-up was limited with 11 (85%) participants reporting *never* completing this intervention.

Medication reconciliation on admission and patient education on admission and/or during stay were most commonly reported as being *always* documented, with 6 (46%) pharmacists reporting *always* documenting the intervention when it is completed. All pharmacists (100%) reported documenting medication reconciliation on admission at least half of the time. In contrast, medication reconciliation at discharge and patient education at discharge were less systematically recorded in patient files, with only 4 (40%) pharmacists reporting documenting them at least half of the time. Of the pharmacists that reported completing a pharmaceutical care plan at least *occasionally* on admission and at discharge, 10 (83%) and 6 (60%) of them reported documenting it at least half of the time, respectively. Participation in multidisciplinary rounds were also not regularly documented, with 80% of the pharmacists ($n = 8$) who participated at least *occasionally* that reported documenting it less than half of the time.

The scope of interventions undertaken by pharmacists varied between STGUs. Pharmacists working in STGU 2 and 4 completed respectively 5 and 4 of the 8 pharmaceutical interventions at least half of the time, whereas pharmacists of STGU 1 and 3 completed 1 and 3 of the 8 pharmaceutical interventions, respectively at least half of the time.

4.3. Retrospective observational study

Data from STGU 1 and 2 were collected for the retrospective chart review. From September 1st to October 19th 2019, 233 records were identified for STGU 1 and 41 for STGU 2. A sample of 60 eligible charts were randomly selected for STGU 1. In STGU 2 all 35 eligible charts were selected.

Patients followed by clinical pharmacists were mainly women with a mean age of 84.9 years (SD = 6.9). Baseline characteristics of patients admitted to the STGUs are summarized in Table 2. Compared to STGU 1, patients in STGU 2, which is part of a teaching hospital, had more comorbidities on average (8.6 vs 6.1, $p < 0.001$), were more frail, less independent, reported more falls in the last year and were less likely to live alone and manage their own medication post-discharge. Patient turnover in STGU 1 was higher as patients in STGU 2 had longer length of stay (17.6 vs 26.0 days on average, $p = 0.059$).

Data from the retrospective chart review is presented in Table 3. Medication reconciliation was performed for almost all patients in both centers, as 97% of patients in STGU 1 and 100% of patients in STGU 2 received medication reconciliation on admission. For STGU 1, this activity was always performed in collaboration with pharmacy technicians working remotely from the main pharmacy, while pharmacy students participated in this activity in STGU 2 for 23 of 35 admissions. No pharmacy students or residents were present in STGU 1.

A greater variety and higher frequency of pharmaceutical interventions were documented in charts of patients in STGU 2 compared to STGU 1. Pharmaceutical care plans on admission were completed for 94% of patients in STGU 2 compared to none in STGU 1. Medication reconciliation at discharge was documented for 63% of patients in STGU 2 compared to 5% of patients in STGU 1. No pharmaceutical care plans at discharge were documented in either STGU. Among the charted interventions for STGU 2, patient education at discharge appeared to be carried out less frequently than other interventions with only 31% of the admitted patients receiving counseling before discharge. A few patient characteristics were explored to identify which patients were more susceptible to receive counseling at discharge. As presented in Table 4, patients receiving pharmaceutical counseling were generally less cognitively impaired; however, this did not reach statistical significance. A strong statistically significant correlation was found between patients who received counseling and those who managed their own medication post-discharge. No association was found with the number of medications at discharge nor with patients being discharged to their own home.

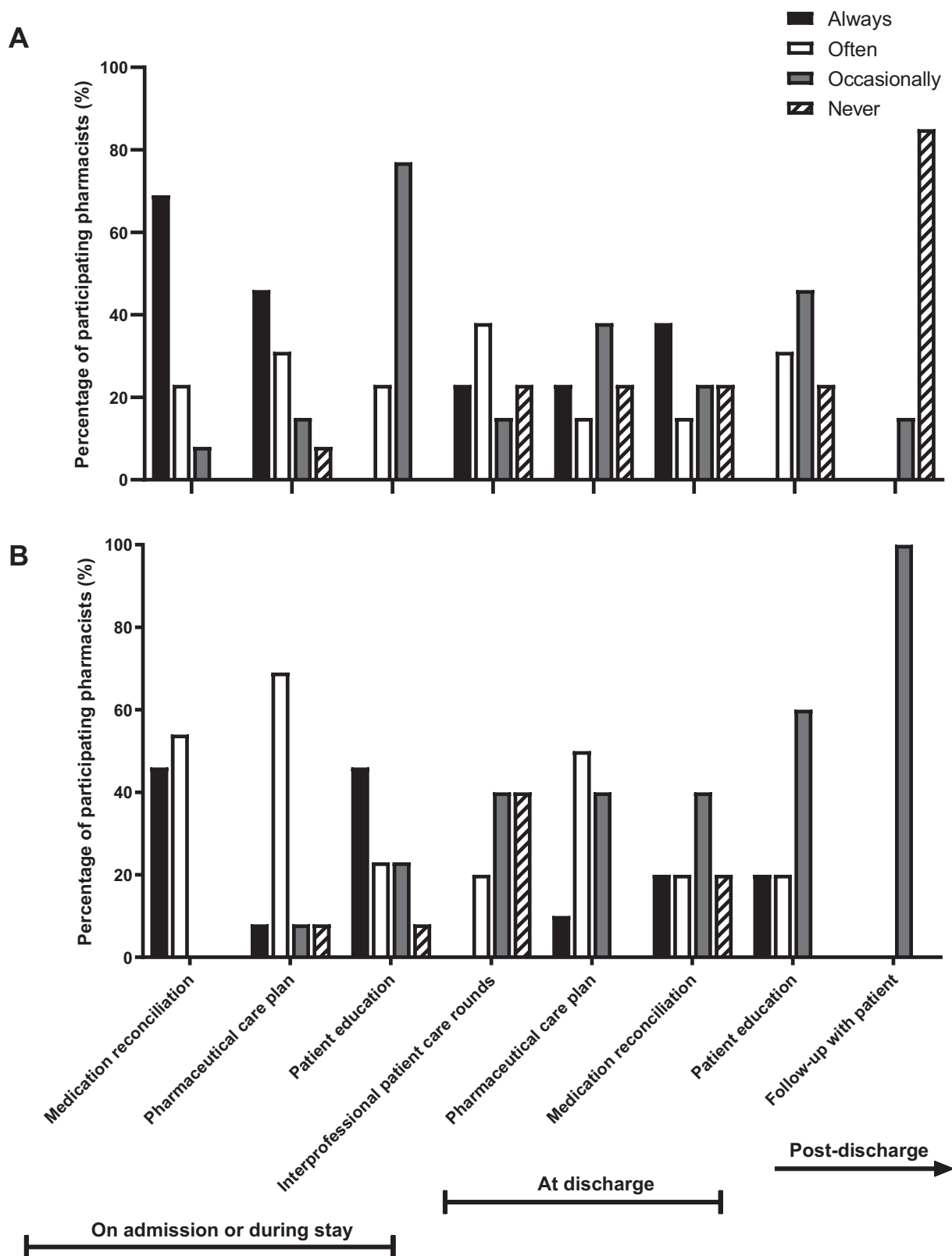


Fig. 2. Self-reported frequency of completion (A) and documentation (B) of pharmaceutical interventions during all stages of transitions of care in all 4 short-term geriatric units (STGUs). *Always* indicates 100% of the time; *often* indicates 50 to 99% of the time; *occasionally* indicates 1 to 49% of the time and *never* indicates 0% of the time. Data are presented as proportions of participating pharmacists in each category.

Table 2
Patient characteristics.

Characteristics	STGU 1 (n = 60)	STGU 2 (n = 35)	P value
Female, n (%)	45 (75)	18 (51)	0.017
Age (years), mean ± SD	84.3 ± 6.4	86.0 ± 7.0	0.284
Number of comorbidities, mean ± SD	6.1 ± 2.6	8.6 ± 3.4	< 0.001
Charlson comorbidities index, mean ± SD	1.7 ± 1.4	1.9 ± 1.7	0.486
Number of medications prior to admission	9.8 ± 4.6	9.8 ± 4.2	0.971
Major neurocognitive disorder or mild cognitive impairment, n (%)	23 (38)	16 (46)	0.444
Falls, n (%)			
1 fall in the last 12 months	15 (25)	9 (26)	0.914
> 1 fall in the last 12 months	12 (20)	14 (40)	0.035
Functional independence as per Edmonton Frail Scale, n (%)			
0–1 activity	11 (18)	9 (26)	0.355
2–4 activities	27 (45)	10 (29)	0.123
5–8 activities	22 (37)	21 (60)	0.030
Number of medications at discharge, mean ± SD	10.7 ± 4.7	11.2 ± 3.9	0.597
Length of stay (days), mean ± SD	17.6 ± 17.6	26.0 ± 19.8	0.059
Disposition			
Own home	41 (68)	14 (60)	0.430
Institutionalization	9 (15)	13 (37)	0.014
Assisted senior's residence	5 (8)	1 (3)	0.328
Rehabilitation, palliative care, other	5 (8)	6 (17)	0.182
Living alone post-discharge	27 (45)	7 (20)	0.014
Management of medication post discharge			
Patient	38 (63)	12 (34)	0.006
Nurse	17 (28)	18 (51)	0.025
Caregiver	5 (8)	4 (11)	0.624

4.4. Qualitative interviews

Nine of the 13 pharmacists were selected based on availability for the semi-structured group interviews. Four semi-structured group interviews, with 1 to 4 pharmacists per group, were conducted and lasted 60 min on average. Categories of barriers and facilitators identified through these interviews could be classified at three levels: outer context and resources, inpatient care setting and individual level. A complete description of themes is provided in the supplementary appendix (S1).

4.4.1. Outer context and resources

4.4.1.1. Lack of interconnectivity between institutions. Apart from prescription medication dispensed in community pharmacies, laboratory test results and results of medical imaging examinations which are available through the *Québec Health Record*,²² health information across care units in Quebec is

Table 3

Frequency of completion of pharmaceutical interventions during all stages of transitions of care.

Intervention, n (%)	STGU 1 (n = 60)	STGU 2 (n = 35)	Overall (n = 95)
Medication reconciliation on admission	58 (97)	35 (100)	93 (98)
Pharmaceutical care plan on admission or during stay	–	33 (94)	33 (35)
Patient education on admission and/or during stay	–	–	–
Interprofessional patient care rounds during stay	–	–	–
Pharmaceutical care plan at discharge	–	–	–
Medication reconciliation at discharge	3 (5)	22 (63)	25 (26)
Patient education at discharge	–	11 (31)	11 (12)
Post-discharge follow-up with patient	–	–	–

–: no documentation was available for this intervention.

Table 4

Association of certain patient characteristics and patient education at discharge in STGU 2.

Patient characteristic (n = 35)	Patient education at discharge		P value ^a	Effect size ^b
	Yes	No		
Major neurocognitive disorder or mild cognitive impairment, n, (%)	Yes 3 (27) No 8 (72)	12 (52) 11 (48)	0.271	0.235
Living at home post-discharge, n, (%)	Yes 6 (55) No 5 (45)	8 (35) 15 (65)	0.458	0.188
Patient managing his own medication post-discharge, n, (%)	Yes 7 (64) No 4 (36)	5 (22) 18 (78)	0.026	0.417
Number of medications at discharge, mean ± SD	(11) 11.6 ± 4.3	(22) 10.9 ± 3.8	0.690	0.147

^a Chi square tests were performed for comparison between categorical variables. Two-tailed *t*-tests were performed to explore the association with continuous variable and patient education at discharge.

^b Effect size is presented as per Cramer's V for categorical variables and Cohen's *d* coefficients for continuous variables.

not interconnected, leading to important challenges in accessing valuable information about past medical history.

“When the patient is not known to this hospital, often it's more complicated. History is not always easy to perform.”

4.4.1.2. Information technology. Electronic health information is starting to emerge in Quebec and this was commonly perceived as a facilitator in accessing valuable clinical data such as laboratory test results and previous medication history.

“I would not be able to work without the Quebec Electronic Health Record.”

4.4.1.3. Lack of standardization. While policies and procedures are well established for medication reconciliation on admission, most centers did not have clear procedures for medication reconciliation or pharmaceutical care plans at discharge and post-discharge follow ups. Furthermore, there seemed to be some discrepancies among pharmacists on how a pharmaceutical care plan at discharge should be formatted and transmitted to the next healthcare provider.

“I would say I would not be comfortable preparing a transfer summary for the family physician. I would prepare a transfer summary for the community pharmacist if there's a specific [medical] issue with the patient. If there's no [medical] issue with the patient I would not do it.”

Pharmacists' perception of a pharmaceutical care plan at discharge mostly focused on handing off information rather than focusing on unresolved issues and planning follow-ups.

4.4.1.4. Policies and procedures. Guidelines and regulations were perceived as facilitators to the integration of pharmaceutical interventions in clinical practice. This was mostly noted for medication reconciliation on admission. Furthermore, one center had a documentation policy within the hospital center and perceived it as a facilitator to insure productivity.

“Given that Accreditation Canada mandates performing medication reconciliation on admission as one of the required organisational practices, our institution focused on it being done for 100% of patients admitted. That's why we prioritize medication reconciliation on admission.”

4.4.2. Inpatient care setting

4.4.2.1. Case complexity. The geriatric population is often polymedicated and is affected by multiple comorbidities adding to the complexity of each case.

"You know it's not a medication review with a 30-year-old adult..." "Who takes 3 medications!"

4.4.2.2. Lack of communication with other healthcare workers. A common challenge faced by pharmacists was not knowing when a patient will be discharged. Patients can sometimes leave the hospital before the pharmacist reviews discharge prescriptions or provides patient education simply because discharge information is not communicated to the pharmacists.

"We're not necessarily told when there is a discharge. It's not easy because sometimes we notice the patient has his discharge envelope in hand and is out the door."

4.4.2.3. Lack of effective communication with cognitively impaired patients. Patients on the geriatric ward are often cognitively impaired presenting significant challenges in providing patient education or gathering information.

"We have a lot of clientele with cognitive impairments. (...) So you know patient education during stay and at discharge... I can't give you a number, but in more than 75% of cases I can't invest time in it because I know they won't have any sort of recollection. In this case, we educate the caregiver if ever he [the patient] returns home"

4.4.2.4. Lack of technical support. Pharmacists expressed a lack of technical support and lack of pharmacy technicians as barriers to integration of all 8 interventions. Lack of technology was mostly expressed for documentation purposes. In all centers, clinical notes are handwritten.

"If you would see the network infrastructure at the [Hospital]. It's sad... It's sad!"

Pharmacy technicians were not available on the ward in any center. In 3 STGUs, pharmacy technicians collaborated with pharmacists to complete medication reconciliation on admission by working from the main pharmacy. However, they did not meet with patients to complete data collection, and some pharmacists even expressed a lack of trust in their capabilities.

"We have pharmacy assistants who do medication reconciliation on admission. I'll be honest, because here we are honest, there's a lot of mistakes. Me, I'm meticulous. There's a lot of mistakes. I would love to do the medication reconciliation myself because it takes me more time to correct their mistakes, talk to the patient and contact the community pharmacy."

4.4.2.5. Workload. The number of patients assigned to each clinical pharmacist is an important determinant of productivity.

"For sure at 18 [beds] it's [all 8 interventions] feasible. At 30 [beds] I wouldn't say so."

4.4.2.6. Collaboration with other healthcare providers. Pharmacists acknowledged that collaboration with the multidisciplinary team was generally positive and allowed pharmacists to play a bigger role in transitional care.

"The team knows us. They know our role which makes our job easier. We don't have any trouble performing our interventions. They are always open to discussion."

4.4.3. Individual level

4.4.3.1. Lack of time. According to the pharmacists there aren't enough hours in a day to complete all 8 interventions for every patient admitted on the ward. Some interventions cannot be routinely performed simply because of lack of time.

"It's truly the time. You chose what has the highest level of impact"

4.4.3.2. Beliefs about professional responsibilities. Certain pharmacists did not undertake certain interventions because they believed some are not their responsibility. This was particularly noted at discharge and post-discharge.

"Technically the community pharmacist is also responsible for pharmacotherapy. So, if a patient presents with a script for denosumab with renewals, maybe it's up to him [the community pharmacist] to ensure the patient had the proper blood work because he's the one who sees the patient more often and communicates with the family physician."

5. Discussion

This study provides a systematic documentation of current pharmacists' practice during all stages of transitions of care of older adults admitted to STGUs in the Greater Montreal area. Data emerging from this study suggest that pharmacists are implicated in transitions of care for hospitalized older adults by performing various pharmaceutical interventions. However, the current role of pharmacists appears to be inconsistent throughout the continuum of care, with most interventions being performed on admission compared to discharge and post-discharge.

Data suggest that the best patient outcomes are achieved with multifaceted interventions that include activities focused on discharge planning.^{14,23–26} This study revealed that pharmacists worry about effective transition from the hospital to the next care setting. However, only about the third of all pharmacists indicated that they completed a pharmaceutical care plan at discharge at least half of the time. Moreover, during interviews, pharmacists seemed to have some uncertainty and discrepancies as to what pharmaceutical care plan at discharge should be presented and communicated to the next healthcare provider. They mostly defined pharmaceutical care plan at discharge as the action to transfer discharge information rather than a premeditated analysis with an individualized and tailored care plan. This confusion could explain the discrepancies between the results of the self-administered questionnaire and the retrospective data collection of STGU 2. Indeed, all pharmacists in STGU 2 reported completing and documenting a pharmaceutical care plan at discharge at least half of the time, however no pharmaceutical care plans at discharge were documented in the retrospective data collection. Therefore, a standardized definition of a pharmaceutical care plan at discharge could help to fully integrate this intervention into practice.

Whether it be evaluated subjectively or objectively, medication reconciliation at discharge was less performed by pharmacists compared to medication reconciliation on admission. In all STGUs the physician achieves medication reconciliation at discharge by completing a discharge prescription form. Medication reconciliation on admission is computerized which allows to easily capture the list of admission medication and any changes that occur during the hospital stay on a discharge prescription form. Besides, this practice has been shown to increase conformity rates of community pharmacy patient profiles after hospitalization according to a previous study.²⁷ This could explain why this intervention is not prioritized by pharmacists.

Integration of post-discharge follow-ups was very limited in the studied STGUs according to the self-administered questionnaire and the retrospective data collection. Most centers did not have the resources to ensure its coordination. Moreover, during the interviews most pharmacists mentioned that community pharmacists would be better suited to undertake this role in care transition. This reflects that beliefs about each care provider's role and responsibility could lead hospital pharmacists to abstain from undertaking certain interventions. Defining the role of primary care and hospital pharmacists could help to avoid overlap or overlook among pharmaceutical interventions.

Aside from post-discharge follow-up, patient education was the least commonly performed intervention according to the self-administered questionnaire and the retrospective data collection. Challenges such as difficulties to communicate with cognitively impaired patients was commonly expressed as a barrier. Results from the retrospective study suggested a trend with provision of patient counseling and the absence of cognitive impairment. However, this did not reach statistical significance, most likely due to the small sample size.

Overall, documentation of interventions could be improved across all STGUs. However, in the retrospective data collection in STGU 2,

pharmaceutical interventions were documented more frequently than in STGU 1. In STGU 2, a documentation policy was implemented in the hospital urging pharmacists to systematically document their assessment on admission and at discharge. Interestingly, pharmacists practicing in this institution seemed the most involved at all stages of care transition. Therefore, policies and procedures seemed to pressure pharmacists to undertake certain interventions. This was also noted in other centers as medication reconciliation is almost always performed on admission. Indeed, this intervention is a required organizational practice of Accreditation Canada explaining why the rate of completed medication reconciliation in this study is higher than in previous studies.¹⁶ Providing pharmacists with transitional care guidelines as a standard of best practice could possibly improve productivity related to the 8 pharmacist-led interventions.

In addition to the challenges highlighted above, other barriers preventing pharmacists to intervene at different moments throughout transitions of care are relevant to discuss. Lack of time seems to be the most important barrier to the integration of all 8 interventions in clinical practice. This is not surprising considering a previous study showing that medication reconciliation on the geriatric ward takes twice as long to complete compared to the internal medicine ward, most likely due to the fact that older adults are often polymedicated.²⁸ This lack of time could be partially explained by 2 barriers expressed by pharmacists. First, pharmacists expressed the complexity of caring for older adults arising from polypharmacy and multiple comorbidities. Second, a higher number of admissions was commonly explained to impede on the scope of achievement. Indeed, this was in agreement with the findings from the retrospective data collection. STGU 1, being the least staffed with the most beds intervened the least at different stages of transitions of care. STGU 2 had the least number of beds and seemed the most involved at all stages during the transitions of care process. This shows the heterogeneity in time allocation by administrators for pharmaceutical care of older adults. Considering that older adults are at higher risk of post-discharge ADEs and the positive impact pharmacists can have on preventing those ADEs, more pharmacist resources should be allotted to ensure the best care to this vulnerable population.^{7,11}

Lack of technology was mostly expressed as a barrier for documentation purposes. All pharmacists write their clinical notes by hand which can be time consuming. Having an electronic pharmaceutical care plan on admission could ease the preparation of a pharmaceutical care plan at discharge. Moreover, electronic health records were perceived as an essential tool in reconciling medication. Electronic health records allow a certain interconnectivity in the outpatient setting, as having access to the medication list, laboratory results and medical imagery. If the electronic health record expands by integrating hospital discharge summaries,^{22,29} it will be interesting to see how this tool could be exploited by hospital pharmacists to share their pharmaceutical care plan at discharge to the next healthcare providers.

Most barriers expressed by participants were previously reported in the literature.^{16,18,19} However, a lack of collaboration with other healthcare providers did not seem to be a major issue among participants in contrast to previous studies. The role of hospital pharmacists is usually well recognized among healthcare professionals in the Greater Montreal area. Inter-professional collaboration was mainly perceived as a facilitator rather than a barrier by participants in this study.

Interprofessional collaboration is key in order to ensure pharmaceutical care throughout transitions of care. First, in the included STGUs, pharmacy technicians did not seem to play an integrative role in the geriatric care teams apart from supporting pharmacists in medication reconciliation on admission. Collaboration with pharmacy technicians could be increased by having them meet patients to perform medication histories or to educate patients on certain devices. Delegation of certain technical interventions could help pharmacists to save valuable time and allow them to reprioritize their interventions throughout the continuum of care. During interviews one pharmacist reported high error rates and others suggested a certain lack of trust towards pharmacy technicians performing medication reconciliation. This could partially explain why pharmacists delay to delegate more complex tasks to pharmacy technicians. A growing body of evidence

shows that trained pharmacy technicians are just as qualified as other healthcare professionals to accurately gather medication history information.³⁰ Pharmacy technicians in Quebec are currently not board certified as in other parts of the country. A restructure of the academic curriculum for pharmacy technicians is under way. It will be interesting to see how these increased qualifications will translate into an expansion of their role on clinical wards. Moreover, a common challenge faced by pharmacists was not knowing when a patient will be discharged. Improving communication with the care team to know when a discharge is planned could help pharmacist to schedule their time in order to increase interventions at discharge.

Intraprofessional collaboration with pharmacists practicing in the community setting could be improved. While many pharmacists routinely handed off information to their colleagues practicing in community pharmacies, none of the participants collaborated with pharmacists practicing in Family Medicine Units. This practice setting is starting to emerge for pharmacists in Quebec. Including these pharmacists in care transitions could further ensure proper follow-up and potentially avoid post-discharge ADEs.³¹

5.1. Strength and limitations

To our knowledge, this is the first study to quantify the integration of pharmaceutical interventions in clinical practice throughout the continuum of care, specifically in the older hospitalized population returning home. While there is a growing body of evidence on the impact of pharmacist-led interventions during transitions of care, few studies describe their actual integration in current practice.^{13,14,16} This study provides great insight on barriers perceived by clinical pharmacists. Gaining in depth understanding of current challenges will help provide recommendations in order to improve current pharmaceutical care provided to older adults.

This study has a few limitations that must be taken into considerations. First, a prospective study was not feasible considering the context of COVID-19 at the time of the data collection. A retrospective chart review was therefore selected as a reasonable alternative; however, data collection was only possible in 2 of the 4 participating STGUs considering COVID-19 constraints. Given the extensive amount of eligible charts in STGU 1, a random sample selection was deemed optimal considering the time available for the chart review. It was already known from the self-administered questionnaire that in STGU 1 pharmacists mostly performed medication reconciliation on admission, it then felt reasonable that the sampling would not affect the results. Data obtained from the questionnaire are subjective, based on recall and subject to desirability bias. In addition, the questionnaire was not validated. While the retrospective chart review provided objective data, it was limited to documented interventions only. As some interventions are not systematically documented, it was impossible to identify all interventions.³²

Moreover, the results of this study only reflect the practice and perceptions of pharmacists working in 4 STGUs of the Greater Montreal area. Despite the small sample size, this study provides a general overview of current practice and challenges in various practice settings. STGUs included in this study were well diversified including 2 teaching hospitals and 2 community hospitals with various capacities and workloads.

6. Conclusions

This study highlights the current role of pharmacists during transitions of care of older adults and provides insight on current challenges. The scope of pharmacist-led interventions varies between institutions. The focus is mainly on admission compared to discharge and post-discharge due to lack of time and increased workload. It would be essential that administrators prioritize this population at higher risk of ADEs by allotting enough time to pharmaceutical care. Clearly identifying what is expected in a pharmaceutical care plan at discharge and for post-discharge follow-ups in a discharge planning guideline would be relevant to empower pharmacists to complete those interventions. Other barriers such as lack of communication

and lack of technical support must be overcome to allow expansion of the pharmacist's role through all stages of transitions of care. Indeed, intraprofessional and interprofessional collaboration are necessary for the care of older adults to meet their multiple needs arising from their complexity. Understanding and addressing these barriers is essential in providing pharmacists with the tools and resources they need to ensure the best possible care throughout transitions of care of older adults.

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Ethical approval

This study was approved by the Research Ethics Board of the Comité d'éthique de la recherche vieillissement neuroimagerie du CIUSSS du Centre-Sud-de-l'Île-de-Montréal.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A. Supplementary data

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