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Original Research

How pharmacists check the appropriateness of drug therapy? Observations in community pharmacy

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Abstract

Background: In Alberta (Canadian province), the Chat Check Chart (CCC) model was developed to help pharmacists understand how patient care standards fit into routine practice. The CCC model outlines a process that covers the following: 1) Chart—asking three prime questions to gather information; 2) Check—perform pharmacotherapy workup by assessing prescription's indication, efficacy, safety and manageability; and 3) Chart—document findings of the pharmacotherapy workup.

Objectives: To characterize how pharmacist collect patient information and apply the pharmacotherapy workup when evaluating routine prescriptions in community pharmacy settings.

Methods: An observational study with a mixed methods analysis was employed. Participants were surveyed and audio-recorded talking with patients, as well as thinking aloud while evaluating medication therapy. Quantitative analysis was conducted to describe the proportion of time allotted to clinical or technical duties when using the 3 prime questions and pharmacotherapy workup in routine practice. A generic qualitative approach was conducted to describe how the pharmacists evaluated prescriptions and counseled patients.

Results: Nine pharmacists from five different pharmacy stores participated in this study. Fifteen recordings of consults and 14 think-alouds were eligible for analysis. Pharmacists allotted 16% of their think-aloud on clinical related issues for new and chronic medications, and the remainder on technical dispensing activities. All pharmacists checked if the medication was safe, but fewer than half checked if the prescription was indicated, effective, or useable (i.e., adherence). Pharmacists covered more content areas when checking the appropriateness for new prescriptions in comparison to chronic refills. Four overarching themes arose from the qualitative analysis: missed opportunities, absence of personalized assessments, reliance on routine pharmacist activities, and non-specific questions.

Conclusions: Pharmacists gathered insufficient clinical information to assess their patients' medication therapy, as they overly relied on the patients' profiles, asked patients non-specific questions, and missed

patient cues. Routine activities appeared to shape practice including a bias against refill prescriptions and a focus on technical dispensing activities.

Introduction

Over 40% of Canadians take prescription medications, and this number rises to 83% for those over 65 years of age.[1] One in seven adult Canadians has two or more chronic diseases, which often necessitates multiple medication therapy.[2] Polypharmacy – taking 5 or more medications – was at 11% for Canadians aged 45–64 and 30% for Canadians over 65 years of age.[1] Increasing the number of medications increases the risk of adverse drug reactions and subsequent hospitalization. A systematic review found that 4.6–12.1% of hospitalizations were due to drug-related problems (DRP).[3]

Pharmacists are well positioned to meet patients' health needs as the most accessible health care provider with expertise in medication management.[4] Pharmacists can apply the skills in pharmaceutical care to prevent DRPs, monitor medication therapy and optimize patients' medication therapy.[5] Pharmaceutical care is "the responsible provision of drug therapy for the purpose of achieving definite outcomes that improve a patient's quality of life."[6] Pharmacists' provision of pharmaceutical care has been shown to have a positive impact on patient outcomes,[7–12] and improve economic outcomes.[13,14]

In the pharmaceutical care model, pharmacist's core cognitive function is assessing the appropriateness of a medication therapy for an individual patient. This is commonly known as the pharmacotherapy workup (PTW), whereby a pharmacist determines if a therapy is indicated, effective, safe, and manageable for a specific patient after gathering the required information.[5] This has also been referred to as the "Clinical Check."[15] Both gathering the information and completing the PTW for a patient are often referred to as the patient assessment portion of the pharmaceutical care.[5] The PTW defines pharmacists' unique cognitive contribution to patient care. Using the PTW as a part of pharmaceutical care has resulted in improved clinical outcomes in 83% of patients and over a million dollar health

care saving.[16] However, research has not yet empirically characterized how pharmacists conduct the PTW in community pharmacies where medication dispensing often remains a part of practice.

Research has characterized patient assessment in professional nursing and medicine.[17] However, pharmacists have a distinct focus and training on medication appropriateness. Two studies empirically examined pharmacists' thought processes and suggested that pharmacists use a combination of structured reasoning and recognition of common patterns to solve simulated clinical cases.[18,19] The aim in this preliminary research is to advance pharmacy practice literature by assessing how community pharmacists assess medication therapy using direct observations.

In Alberta, community pharmacists have struggled with the practice change and reported that most of their practice time is allotted to dispensing activities.[20,21] For this reason, a partnership between a faculty member of the University of Alberta and the Alberta College of Pharmacists created a practical model to help pharmacists understand how the patient care fits into routine dispensing practice. The Chat Check Chart (CCC) model outlines a process in which pharmacists gather information (Chat), evaluate medications for appropriateness using the PTW (Check), and document patient care (Chart) using recognized tools or processes. Chat consists of three prime questions (3PQs) where the pharmacist asks three open-ended question to explore the patient's understanding about 1) the purpose of taking the medication (PQ1), 2) directions (PQ2) and 3) medication monitoring (PQ3). Again, Check consists of the PTW process. Chat is a brief data, assessment and plan (DAP) note format, and it is not routinely used in practice.[22,23] The Check Chat Chart model succinctly clarifies the standards of practice in Alberta, and is used to assess the quality of patient care. The Check Chat Chart model has increased pharmacists' self-efficacy and role beliefs toward assessment and documentation, as well as motivated

pharmacists to enhance routine care.[24,25] This observational research will focus on Chat and Check; in which community pharmacists gather patients' information, assess medications appropriateness, and provide tailored patient information.

Objectives

The purpose of this observational study with a mixed method analysis is to characterize what patient information pharmacists gather (i.e., 3PQs) and how pharmacists apply the PTW (i.e., indicated, effective, safe, and manageable) when evaluating routine prescriptions in community pharmacy settings.

Specific objectives are to measure the extent to which pharmacists use elements of the 3PQs and PTW in routine community practice, describe the proportion of time allotted to clinical or technical duties, and determine if there are differences in the use of the 3PQs and PTW for new fill and refill prescriptions. Simultaneously, a generic qualitative approach[26,27] was to explore how pharmacists apply the 3PQs and PTW.

Methods

Design

This observational study employed an embedded concurrent mixed method design.[28] The converging of qualitative and quantitative analyses allow for the calculation of the frequency as well as a rich description of how pharmacists gathered patient information and applied the PTW in routine community practice. The data consist of audio recordings of pharmacist-patient interactions (i.e., consultations) and think-alouds. In the think-alouds, pharmacists verbalized what they were doing, thinking about, and looking at in order to characterize their clinical decision making.[29] The think-aloud technique has its roots in psychological research and has become a common practice in clinical decision making since it was introduced in the 1970s.[30,31] The think-aloud has been useful in pharmacy practice research for understanding pharmacist-patient communications, pharmacists' cognitive thinking, and process of electronic prescription.[18,19,32–37]

Participants

A pharmacy chain partnered with researchers. Two regional managers designated five pharmacy stores with differing levels of busyness were chosen as well as one rural site were included. All pharmacists and pharmacy store managers individually consented to participation in the study.

Documentation of patient care (i.e., Chart) was not collected as it was not part of that original research objectives. At the time of this study, the CCC model and the related standards for practice were widely available, but this cohort of pharmacists had not received specific training.

Data collection

Survey

The pharmacists' surveys provided basic demographic information and gathered quantitative data to analyze burnout and role conflict experienced by pharmacists. Role conflict is the presence of two or more sets of expectations that are incompatible.[38,39] Role conflict was measured with a 9-item scale and has prior evidence for its reliability and validity.[38,39] Pharmacists also reported their perceptions of the busyness of their pharmacy. The survey data were used to describe the sample (Table 1).

Observations

Pharmacists approached patients who were dropping off prescriptions, asked if they were interested in participating, and referred patients to a researcher who obtained the patients' written consent. Next, the researcher audio-recorded both the pharmacists' talking with patients when the prescription was dropped off or picked up (i.e., consultation) and the pharmacists' thinking process when preparing the medication (i.e., think-aloud). During the think-aloud portion, the pharmacists were asked to verbalize what they were thinking about, looking at, and doing when preparing the medication (i.e., entering data into the computer, physically preparing the medication, and assessing the final prescription) as if they were explaining this task to a junior pharmacy student.

Data analysis

Analysis was completed using NVivo 10 and SPSS version 21 (IBM, IL., USA) to manage both quantitative and qualitative data.

Quantitative analysis

A quantitative codebook was developed to define the coding for each of the 3PQs and the four elements of the PTW. All instances of the 3PQs were coded during the consultation as an

Table 1
Demographics and job characteristics of pharmacists

ID	Age range	Gender	Perception of store business	Years of practice	Work burnout[a] (mean, median)	Role conflict[b] (mean, median)
1100	<25	Female	Slow with busy times	2	1.5, 1.5	3.3, 3.0
1200	36–45	Female	Slow with busy times	6	1.0, 1.0	4.0, 3.5
2100	25–35	Female	Slow	7	1.0,1.0	3.9, 3.0
2200	25–35	Male	Slow with busy times	6	1.5, 1.5	4.0, 4.0
3100	36–45	Female	Steady	14	1.5, 1.5	3.5, 3.0
4100	46–55	Female	Busy	29	0.5, 0.5	2.4, 3.0
4200	25–35	Female	Busy with slow times	7	4.0, 4.0	2.5, 2.5
5200	56–65	Female	Busy with slow times	40	0.5, 0.5	1.0, 1.0
5300	25–35	Male	Steady	4	2.0, 1.5	4.5, 5.0
			Mean ± std dev	12.8 ± 13.0	1.5 ± 1.1 (median 1.5)	3.2 ± 1.1 (median 3)

[a] 6-point, Likert-type scale (0 = Not at all, 1 = Just a little, 2 = A moderate amount, 3 = Pretty much, 4 = Quite a lot, and 5 = A great deal).

[b] 7-point, Likert-type scale (1 = very strongly disagree, 2 = strongly disagree, 3 = disagree 4 = neutral 5 = agree 6 = strongly agree, and 7 = very strongly agree).

open question, a closed question or a question asking what the doctor said. In some recordings, pharmacists discussed the topics of the 3PQs with patients rather than asking questions, so that portion of the 3PQs coding was included and referred to these instances as given information. PTW elements were coded during the think-aloud portion of the audio recording. The incidence of each PQ and PTW element was counted as if occurred or not (i.e., zero or one). Repeated incidences for the same prescription were not counted. Since the sample did not have equal numbers of new prescriptions and refills, the percentage of incidences were used to compare the incidence of PQ and PTW elements. Percentage of incidence was calculated by dividing the incidence of each element by the total number of prescriptions (Tables 2 and 3).

Clinical and technical times were measured in seconds. Clinical times include when the pharmacist was discussing clinical related issues with patients (e.g., 3PQs, asking about medical history, allergies) or thinking aloud about clinical related issues (e.g., PTW, past medical history). Technical times include when the pharmacist was discussing technical issues (e.g., insurance, paying the bill) or thinking aloud about technical things (e.g., counting pills, labeling, and checking the prescriber's name). The clinical and technical times in seconds were divided by the total seconds of each recording to calculate the percentage of clinical and technical times.

MBN and a research assistant independently coded the recordings. Differences in coding were discussed and resolved by a third person (LMG) if necessary. Inter-rater reliability was assessed using Cohen's kappa. The kappa value for the two coders was 0.82, which indicates a good agreement between the two coders. Descriptive statistics were used to calculate the occurrence of the 3PQs and PTW.

Pharmacists' surveys were analyzed and overall median scores of constructs (i.e., work burnout and role conflict) were calculated by taking the mean of related questions for each construct separately.

Qualitative analysis

All instances where pharmacists discussed clinical issues were transcribed in both think-aloud and consultations. Transcripts were analyzed using a generic qualitative approach.[26,27] Transcripts were reviewed and coded for two purposes: 1) to describe how the pharmacists evaluated prescriptions and counseled patients and 2) to describe how the pharmacists used the 3PQs and PTWs in consultations and think-alouds, respectively.

Two authors (MBN, LMG) reviewed the audio recordings to get a sense of the whole and then independently identified relevant codes and formulated a general description to the use of each of the PQ and PTW. Based on these codes and descriptions, themes were generated through

Table 2
Incidence of pharmacists using PTW in think-alouds per prescription

	New Rx $N = 7$ (n/N%)	Refill (prior usage) $N = 13$ (n/N%)	Total $N = 20$ (n/N%)
Incidence of PTW 1 – indicated	$n = 1$ (14.3%)	0	$n = 1$ (5%)
Incidence of PTW 2 – effective	$n = 3$ (42.9%)	$n = 1$ (9.1%)	$n = 4$ (20%)
Incidence of PTW 3 – safe	$n = 7$ (100%)	$n = 13$ (100%)	$n = 20$ (100%)
Incidence of PTW 4 – manageable	$n = 3$ (42.9%)	$n = 8$ (61.5%)	$n = 11$ (55%)
Proportion of clinical time[a]	17.2% ± 3.6 Min = 15.1%, max 22.5%	16.5% ± 10.1 Min = 2.5%, max = 37.2%	16.4% ± 8.7 Min = 2.5%, max = 37.2%
Proportion of technical time[b]	74.2% ± 13.3 Min = 59.5%, max = 85.8%	83.0% ± 10.4 Min = 60%, max = 97.1%	80.6% ± 11.4 Min = 59.5%, max = 97.1%

Abbreviations used: PTW, question to evaluate therapy; Rx, prescription; Min, minimum; Max, maximum.

[a] Clinical time: Moments where the pharmacist was thinking aloud about clinical issues including PTW elements (e.g., checking for drug allergies, interactions, and refill history).

[b] Technical time: Moments where the pharmacist was thinking aloud about technical things (e.g., counting pills, labeling, and checking the prescriber's name).

an interactive process of discussion and recourse to the data.

Results

Nine pharmacists participated in the study with an average of 12.8 ± 13.0 years of experience in practice, as represented in Table 1. Five pharmacy stores in Alberta, with one rural and four urban were included in the study. All the stores had a private counseling room. The pharmacists reported "a moderate amount" of work burnout (1.5 ± 1.1) and "disagreed" (3.2 ± 1.1) with having any role conflict (Table 1). The results of the

think-alouds will be presented first then the consultations as pharmacists asked the 3PQs after the PTW in 13 out of 15 interactions.

Pharmacotherapy-work up analysis

Fourteen think-alouds were recorded and analyzed, four think-alouds were recorded for seven new prescriptions, and 11 think-alouds for 13 refills. The pharmacists spent almost 80% of their time on technical checking activities. The proportion of time for clinical and technical checking tasks was similar between new prescriptions and refills (Table 2).

Table 3
Incidence of pharmacists discussing 3PQs in consultations per prescription

	New Rx $N = 7$ (n/N%)	Prior usage $N = 14$ (n/N%)	Total $N = 21$ (n/N%)
Incidence of PQ1 – purpose	$n = 5$ (71.4%)	0	$n = 5$ (23.8%)
Incidence of PQ2 – directions	$n = 6$ (85.7%)	$n = 5$ (35.7%)	$n = 11$ (52.4%)
Incidence of PQ3 – Monitoring	$n = 6$ (85.7%)	$n = 5$ (35.7%)	$n = 11$ (52.4%)
Proportion of clinical time[a]	38.9% ± 21.2 Min = 0, max = 63.6%	20.9% ± 22.4 Min = 0, max = 28.8%	27.2% ± 23.1 Min = 0, max = 63.3%
Proportion of technical time[b]	60.8% ± 21.1 Min = 36.4%, max = 99.5%	76.8% ± 24.6 Min = 34.8%, max = 99.9%	71.1% ± 24.1 Min = 34.8%, max = 99.9%

Abbreviations used: PQ, prime question; Rx, prescription; Min, minimum; Max, maximum.

[a] Clinical time: Moments where the pharmacist was discussing clinical issues with patients, such as asking about medical history, allergies, medication history.

[b] Technical time: Moments where the pharmacist was discussing technical aspects, such as insurance, social conversation, and paying the bill in consultation.

Table 4
Detailed description and qualitative themes for each audio recording

RPh #	Pt #	Type of Rx	PTW 1	PTW 2	PTW 3	PTW 4	PQ1	PQ2	PQ3	Qualitative themes
1100	Pt1	Refill			X	X		X	X	-Missed opportunity (assumption) -Reliance on routine (refill bias, hardcopy check)
	Pt2	New Rx		X	X	X	X	X	X	-Missed opportunity (assumption) -Depersonalized assessment (profile & product focused) -Reliance on routine (hardcopy check, reward card) -Nonspecific questions (any questions)
1200	Pt1	Refill			X	X			X	-Missed opportunity (assumption, instinctive judgments) -Depersonalized assessment (profile & product focused) -Reliance on routine (hardcopy check, refill bias, reward card) -Nonspecific questions (any questions)
	Pt2	New Rx			X	X				-Missed opportunity (assumption, instinctive judgments, missed patient cues) -Reliance on routine (hardcopy check) -Depersonalized assessment (almost completely technical)
2100	Pt1[a]	New Rx			X	X		X	X	-Missed opportunity (assumption, missed patient cues) -Depersonalized assessment (almost completely technical, profile & product focused) -Reliance on routine (hardcopy check)
2200	Pt1	Refill	n/a	n/a	n/a	n/a			X	-Missed opportunity (assumption, missed patient cues) -Reliance on routine (refill bias, reward card) -Nonspecific questions (still okay)
	Pt2	Refill	X		X	X		X	X	-Missed opportunity (assumption) -Reliance on routine (hardcopy bias, refill bias, reward card) -Nonspecific questions (any questions)
	Pt3	Refill			X	X				-Missed opportunity (assumption, instinctive judgments) -Reliance on routine (hardcopy check, refill bias) -Depersonalized assessment (profile & product focused, almost completely technical) -Nonspecific questions (still okay)
3100	Pt1	Refill 1 Refill 2		 X	X X	X 				-Missed opportunity (assumption) -Depersonalized assessment (profile & product focused, almost completely technical) -Reliance on routine (reward card) -Nonspecific question (any questions, still okay)
	Pt2	Refill 1 Refill 2			X X	X X				-Missed opportunity (assumption) -Depersonalized assessment (profile & product focused, almost completely

(Continued)

Table 4 (*Continued*)

RPh #	Pt #	Type of Rx	PTW 1	PTW 2	PTW 3	PTW 4	PQ1	PQ2	PQ3	Qualitative themes
										technical)
										-Reliance on routine (hardcopy check, reward card, refill bias)
										-Nonspecific question (any questions, still okay)
4100	Pt1	New Rx 1			X		X	X	X	-Missed opportunity (assumption, missed Pt cues)
		New Rx 2			X		X	X	X	
		New Rx 3			X		X	X	X	-Depersonalized assessment (profile & product focused)
										-Reliance on routine (hardcopy check, reward card)
										-Nonspecific questions (any questions)
4200	Pt1	Refill 1			X					-Depersonalized assessment (profile & product focused, almost completely technical)
		Refill 2			X					-Reliance on routine (hardcopy check, reward card)
										-Nonspecific questions (any questions)
5200	Pt1	Refill			X		X			-Missed opportunity (assumption, missed Pt cues)
										-Depersonalized assessment (profile & product focused, almost completely technical)
										-Reliance on routine (reward card, refill bias)
5300	Pt1	New Rx	X	X			X	X	X	-Missed opportunity (assumption, missed Pt cues)
										-Depersonalized assessment (profile & product focused)
										-Reliance on routine (hardcopy check, reward card)
										-Nonspecific questions (any questions)
	Pt2[a]	Refill 1 (dose adjusted)			X	X		X	X	-Missed opportunity (instinctive judgments)
										-Depersonalized assessment (profile & product focused)
		Refill 2			X			X		-Reliance on routine (hardcopy check, reward card, refill bias)
										-Nonspecific questions (any questions)

Abbreviations used: RPh, pharmacist; Pt, patient; Rx, Prescription; PQ, prime question; PTW, question to evaluate therapy.

[a] The only two cases where pharmacists asked PQs prior to think-aloud.

No pharmacist explicitly checked for prescriptions using all four elements of the PTW (Table 4). In 13 of the 15 think-alouds, pharmacists gathered clinical patient information (i.e., 3PQs) after the prescription was checked. Pharmacists used information provided in the profile such as refill intervals, medication allergies, interactions, and the presence of medical conditions to check for clinical appropriateness.

There was one instance of a pharmacist checking PTW1 (i.e., indication) (Table 5). Pharmacists checked for PTW2 (i.e., efficacy) in three think-alouds: two for new prescriptions and one refill. They checked if the dose appeared to be in the standard range for two new fills or whether the patient had used sufficient doses to be effective since the last refill.

Pharmacists checked for prescription PTW 3 (i.e., safety) in all think-alouds (21 instances), and in almost all cases pharmacists checked for safety by checking for drug interactions, allergies, and drug disease interactions as per information on patient profile (Table 5).

Table 5
Description of coded 3PQs and PTW and quotes

Definition	Description of coded instances	Example
PTW1 Indication	RPh assesses if medication is indicated for individual patient (1 instance)	"So for the three medications that I am for her, I am checking last fill date to see if they were used appropriately, two of them are migraine medications and one is a nasal spray" (RPh 2200)
PTW2 Effective	Check against standard dose (3 instances)	"Patient is one year old given 125 mg of [amoxicillin] 3 times a day, familiar with it. That's a standard dose" (RPh 5300)
PTW3 Safe	All RPhs checked for safety (21 instances): drug interactions, allergies, and drug disease interactions on patient profile.	"Check drug allergies, and then interactions, medical conditions." (RPh 4200)
PTW4 Manageable	Patients manage to take the medication (10 instances)	
	For refills, RPhs checked for patients' adherence with fill internals (7 instances)	"She got a 3 months or 90 day supply 89 days ago, so compliance is fabulous" (RPh 3100)
	For new prescriptions (3 instances), RPh added auxiliary labels to finish all or noted refills remaining.	"I will add an auxiliary label … finish all medication" (RPh 1100)
PQ1 Purpose	Leading questions (5 instances) (i.e., declarative) to verify indication	"Is it for a chest infection, throat infection … strep throat? Pt: Yeah." (RPh 1100)
	RPh giving information (1 instances)	"Doctor gave you something just in case if you develop yeast infection." (RPh 4100)
PQ2 Directions	Questions: (10 instances)	
	RPh asking closed questions (2 instances)	"But I think you are quite aware of how to use it right?" (RPh 2100)
	RPh asking "Did the doctor tell you?" (4 instances)	"Did the doctor give you specific instructions for how long? Pt: He just said to use it." (RPh 4100)
	RPh asking closed and open questions (1 instance)	"So do you just kind of alternate with these, or how do you use them" (RPh 2200)
	Pt asking questions (3 instances)	"RPh: Do have any questions or concerns? Pt: Yah, so since it is half way through the day, how does the three doses work" (RPh 5300)
	RPh giving information (8 instances)	"RPh 5200: So as before, one tablet one a day, swallow it whole. Pt: Um hum, um hum" (RPh 5200)
PQ3 Monitoring	Negative outcomes (i.e., adverse drug reactions) (8 instances)	
	RPh telling (6 instances)	"Now since the dose has increased, there is a possibility that you might have side effects because of the increase …" (RPh 5300)
	RPh asking closed (2 instances)	"Has he had any problems with, um, like weird muscle pain or muscle weakness …?" (RPh 2200)
	Positive outcomes of therapy (i.e., efficacy) (3 instances)	
	RPh telling (2 instances)	"Time frame, give it couple of days but really by the fourth or fifth dose you should notice an improvement in your symptoms." (RPh 1100)
	RPh asking closed questions (1 instance)	"Pt: Sometimes I don't take it every night. Yeah okay. Do you find you are completely sleepless when you do that?" (RPh 1200)

Abbreviations used: RPh, pharmacist; Pt, patient; PQ, prime question; PTW, question to evaluate therapy.

Six pharmacists checked for PTW4 (i.e., adherence) to prescriptions in 11 TAs (11 instances), eight for refills, and three for new prescriptions. For refills, pharmacists checked for patients' adherence by checking the patients' profile for refill intervals (Table 5). For new prescriptions, they added auxiliary labels to remind patients to finish all medication for new acute prescriptions or about the next refill for the repeated ones.

Consultations

Sixteen consultations were recorded; one consultation was excluded because it was incomplete. Fifteen consultations with 21 prescriptions were analyzed. Five consultations were for seven new prescriptions and the remaining ten were for 14 chronic refills or previously used prescriptions (Table 3).

Overall, pharmacists allotted 27% of total consult time discussing clinical issues with their patients. The amount of clinical time for new prescriptions was nearly double the clinical time for refills (Table 3).

Pharmacists discussed at least one of the 3PQs topics in 61.9% of interactions (Table 3). Pharmacists discussed PQ1 on the purpose of medication in five out of the seven new prescriptions, mainly using leading closed questions (i.e., declarative questions) to verify the potential use of new medications (Table 5). In this way, pharmacists displayed their knowledge of the medication before double checking for accuracy with the patient.

Pharmacists discussed PQ2 (i.e., direction) & PQ3 (i.e., monitoring) for new prescriptions more frequently than for refills (Table 2). PQ2 was initiated by pharmacists giving information on the directions (8 instances), and by pharmacists asking questions or patients asking questions (7 instances). Pharmacists asked three types of questions: 1) an inquiry of what did the doctor say (4 instances) 2) closed questions (2 instances) and 3) one open question (Table 5).

Pharmacists discussed PQ3 in half of consultations (Table 3). They focused on adverse reactions, mainly in the form of giving statements (i.e., 6 instances) rather than questions (i.e., 2 instances; Table 5). Pharmacists discussed benefits and positive outcomes of therapy in 3 instances. In the 21 prescriptions, pharmacists asked or discussed no PQ in eight prescriptions (7 refills and 1 new), one PQ in four prescriptions (all refills), two PQs in four prescriptions (3 refills and 1 new), and three PQs in five prescriptions (all new).

Qualitative

Four overarching themes described how pharmacists evaluated prescriptions and counseled patients (Table 4): *Missed opportunities, Depersonalized assessments, Reliance on routines* and *Nonspecific questions*.

Missed opportunities

This overarching theme appeared primarily but not strictly in think-alouds and included the following three sub-themes: *Assumptions, Missed patient cues* and *Instinctive judgments*.

Assumptions. Pharmacists seemed to check for prescription appropriateness using incomplete information and act on assumptions or hunches. Two pharmacists assumed that the dose was appropriate without checking the indication based their perception that "it is pretty commonly used that way" (RPh 1200) or being "familiar with it, it is a standard dose" (RPh 5300). One pharmacist assumed that the patient knew how to apply a newly prescribed cream.

> *(RPh 2100/Pt):*
>
> *RPh: "So is this a new medication for you?"*
>
> *Pt: "Yes."*
>
> *RPh: "But I think you are quite aware of how to use it, right?"*
>
> *Pt: "Uh, you can remind me if you like"*

Missed patient cues. Pharmacists often missed some of the patients' cues. Some patients gave cues that indicated their confusion, uncertainty, or hesitation about their medications; these cues could be inferred from their tone of voice or behaviors. In the previous example (RPh 2100), there was hesitation in the patient's response about knowing how to use his medication "Uh, you can remind me if you like." Pharmacist (2100) missed that cue and did not tell the patient how to use his medication.

Instinctive judgments. No pharmacist made an explicit check all of the four elements of PTW. In some places, pharmacists seemed to make a complete assessment of prescriptions instinctively without actually verbalizing it. In one audio recording, the pharmacist checked for the safety element of PTW and decided quickly that it

"looks good": "no significant interactions to check; everything looks good" (RPh 5300).

Depersonalized assessments

This overarching theme included two sub-themes: *Profile & product focused* and *Almost completely technical.*

Profile & product focused. In most cases, pharmacists checked the prescriptions' appropriateness using patients' profile information on the computer before discussing medications with patients. Pharmacists thus may not be aware of indication for new prescriptions and efficacy and adverse events for refills. In some cases, pharmacists started new profiles for new patients and did not gather information on other medications or medical conditions. However, pharmacists explicitly checked for drug-drug and drug disease with these incomplete profiles. In one audio recording, a pharmacist checked if the patient was getting the full benefit of his inhaler by checking his profile and did not confirm therapy outcomes with the patient later in the consultation:

Almost completely technical. Some consultations were completely technical and pharmacists did not counsel the patient at all.

> *(RPh 4200/Pt):*
>
> RPh: "So your total is 74.55 and do you have [rewards] card?"
>
> Pt: I don't but my mom does.
>
> RPh: "That's alright. I just need you to sign there that you picked it up today."

RPh 5200 and 3100 were also solely technical in both consultations and think-alouds to the extent that the patients' medications or medical conditions could not be identified. Both pharmacists stated the quantities dispensed and refills remaining.

Reliance on routines

Pharmacists appeared to have common routines that shaped their practice. Three sub-themes were identified under routines: *Hardcopy check, Refill bias,* and *Rewards card.*

Hardcopy check. Most pharmacists assessed appropriateness in a routine manner. Pharmacists could be heard systematically reviewing interactions, allergies, and refill intervals on the prescriptions' hardcopy (i.e., computer printout). The checking procedure associated with the hardcopy was focused on technical items mainly (e.g.,

correct doctor and patient names) and clinical items related to safety and refill intervals. Pharmacists focused on the hardcopy elements rather than patients' clinical experiences or outcomes. In one extreme example, one pharmacist followed the same routine with test strips to check blood sugars and stated, "I check interactions, allergies, and medical conditions, none of which I think is significant" (RPh 2200).

Refill bias. Pharmacists typically checked for refill safety and refill intervals. There were no instances that captured pharmacists evaluating the effectiveness of a refill. Pharmacists verbalized this refill bias, "This is a refill for [patient name]. I am not too concerned about counselling her on usage or dosing or storage because I think she is familiar with that" (RPh 2200).

Another example of reliance on routines was the *Rewards Cards* or loyalty program cards (i.e., cards made by the store that allow customers to get price reduction or special promotions). Pharmacists asked for the patients' reward cards in 11 of 15 consultations. One patient appeared to be used to this routine in consultations.

> *(RPh 5300/Pt):*
>
> RPh: Did you have any questions or concerns on it today?
>
> Pt: "No, I am just looking for my [rewards] card"

Nonspecific questions

In almost every consultation, pharmacists used broad, general, or *Nonspecific Questions* to check for patient concerns or understanding. In some recordings, only non-specific questions characterized the consultations. *Nonspecific Questions* included two types of questions or themes: *Any Questions?* and *Still Okay?* Patients generally responded with "No, I don't have any questions" or "Yes, I am still okay," except on two occasions (RPh 1100, 5300) where the patients had a question related to directions (PQ2).

In some refill consultations, pharmacists checked if the patients had any issues with their medications by asking if they were *Still Okay* with their medications. RPh 2200 used this type of question when he was counseling a patient about her and her husband's medications.

> *(RPh 2200/Pt):*
>
> RPh: "And are you okay with this one?"
>
> Pt: "Yes I am"
>
> RPh: "And is he okay using all of these?"

Pt: *"Yes he is"*

RPh: *"Any concerns with them?"*

Pt: *"Nope. Nope, he is okay."*

In some cases, pharmacists asked "any questions or concerns" upfront in the consultations for agenda setting purposes, and if the patients did not have any concerns, then pharmacists would bring their own agenda.

(RPh 1200/Pt):

RPh: *"Did you have any questions or concerns?"*

Pt: *"Nope. I have been taking it for probably 5 years."*

RPh: *"Okay, have you talked to your doctor about stopping it …. "*

Pharmacists also used non-specific questions to end consultations. The following consultation, typifies how pharmacists use *Any Questions* to signal an end to the conversation.

(RPh 3100/Pt):

RPh: *"Any questions or concerns?"*

Pt: *"No."*

RPh: *"Everything is good?"*

Pt: *"Everything is"*

RPh *"… Any questions give us a shout."*

Discussion

A combination of observations and think-aloud technique were used to characterize how pharmacists gather information and evaluate medication appropriateness in a community pharmacy setting.

Pharmacotherapy-work up

In Alberta, pharmacists are legally responsible for monitoring drug therapy and determining the appropriateness of each prescription they dispense.[40] In this study, all pharmacists checked if the medication was safe, but not all explicitly checked to see if the prescription was indicated, effective, safe, and manageable (i.e., adherence).

The prescription checks in this study were predominately technical and product focused (i.e., dispensing). Similarly, Albertan pharmacists have reported their roles to be mainly product focused.[20,21] Similar studies used indirect measure of PTW reported that the majority of the pharmacists' time is devoted to dispensing medications,[41–43] and they

allotted less than 11% to prescription monitoring and checking for appropriateness.[44,45]

Consultations

Pharmacists in this study discussed the medication's purpose, directions, and monitoring for less than 53% of all types of prescriptions. In consultations, pharmacists tend to be more focused on technical issues, as reported in several studies.[46–50] Emmerton and Jefferson found that a range of 17.6–46.9% of pharmacists' time is devoted to "professional" activities, while the rest is devoted to "business" and "non-productive" activities.[51] Similar studies reported that pharmacists spend less than 49% of their time on "professional activities."[44,45,52]

Pharmacists spent twice as much time on discussing clinical issues for new medications compared to refills (39% vs. 21%, respectively). Pharmacists discussed or queried the medication's purpose, directions, and monitoring for 71% of new medications, but did so for less than 36% of chronic refills. Previous studies reported similar findings; pharmacists asked patients clinical related questions in 39% of new prescriptions compared to 26% for refills.[53] In a review study, pharmacists' counseling for new prescriptions varied from 29% to 69%.[54]

Qualitative themes

Four overarching themes characterized the pharmacists' transcripts: *Missed opportunities, Depersonalized assessments, Reliance on routines* and *Nonspecific questions.*

Missed opportunities

This study suggests that pharmacists missed the opportunity to gather information or encourage the patient to participate. Yet, pharmacists often list a lack of patient information as a barrier to detecting drug related events.[19] Research in pharmacy and medicine suggests that pharmacists need to engage patients in consultations not only by asking questions, but by phrasing questions in a way that encourages the patient to participate.[33,55]

Pharmacists' assumptions and their holistic assessments of prescriptions may represent intuition or automaticity in making decisions as described by Hoffman.[56] Intuition could explain why pharmacists in this study signed off prescriptions before making explicit assessing the four elements in the PTW. Intuitive thinking generates decisions automatically without effort and with

low or no level of consciousness possibly represents a sign of expertise.[57] On the other hand, intuitive practice can lead to premature closure where decisions are made before verification or overconfidence bias: a tendency to believe that individuals know more than they do and act on incomplete information instead of carefully collected cues.[58]

Depersonalized assessments

Pharmacists' reliance on patients' profiles rather than communicating with patients possibly resulted in pharmacists giving unsolicited information to patients. This tendency has been reported elsewhere.[33,59–61] In this study, pharmacists predominantly used close-ended questions as noted in the pharmacy literature since the 1990s.[36,53,62,63] Pharmacists focused on reviewing instructions on the vial and the common side effects rather than asking questions and making assessments.[64]

Reliance on routines

In think-aloud data, pharmacists followed a routine check for safety and refill intervals and they were less likely to check for prescriptions indication and effectiveness. Reliance on technical dispensing routines may hinder pharmacists from detecting drug related problems related to patients' experience and consequently increase the rates of patients' morbidity and mortality, in addition to the huge economic burden on the health care system.[65–68]

Pharmacists did not routinely check appropriateness for refills in think-alouds. Pharmacists may have viewed refills as routines unless something changed about the prescription (e.g., dose increased). Witry reported that the routine nature of refills acts as a barrier for refill counseling,[46] and Guirguis and Lee reported that pharmacists believe they give priority to new patients or patients with new prescriptions.[25] Patients have also been found to be less interested in engaging in a dialogue about their refills when compared to first-time prescriptions.[69,70]

In previous studies, pharmacists reported a lack of time and workload as barriers for refill counseling.[46,60,71] Lack of time and store business did not appear to be the barrier as pharmacists in this study reported that their stores' busyness to be "steady" on average. This situation suggests that the routine nature of refills, not time pressures, to be the main barrier for failing to make a complete assessment for refills.[25,46]

Nonspecific questions

Pharmacists tended to ask non-specific questions (e.g., do you have any questions or concerns?) in place of more specific questions such as the 3PQs. While pharmacists are encouraged to start in an open manner, specific questions are required to monitor drug therapy. Witry suggested that pharmacists may perceive that they have insufficient information to ask more specific or meaningful questions.[64] Patients who experience depersonalized consultations may become disinterested in talking to their pharmacists about refills and prefer an automated prescription delivery system over a regular pick-up counter.[70]

The results of this study indicate that pharmacists tended to ask declarative (leading) questions or sometimes vague questions rather than asking the 3PQs in the form of open questions. Pharmacists want to appear knowledgeable about medications and thus ask declarative questions to "save face."[24] Nguyen suggested that declarative statement could function as a question where used by pharmacy interns who sought information about the purpose of the therapy.[59]

Future research on clinical decision making in pharmacy may benefit from a combination of prospective think-aloud and retrospective think-alouds to increase the depth and completeness of information collected as well as protocol analysis for a more inductive interpretation of pharmacists' clinical decision making.[29] Ultimately, research should evaluate the link between pharmacists clinical decision making and patient outcomes. Pharmacists practice research should also investigation methods to address pharmacists' bias toward new refills and reliance on technical routines.

Limitations

This study has a few limitations. First, the sample was insufficient to make generalizations about the findings beyond the participating pharmacists. In this study, pharmacists completed the think-aloud sessions with minimal real-world interruptions and were not prompted or guided by the researcher. However, a real-world setting may have introduced additional variability in the data.[56]

The think-aloud technique is prone to reactivity; pharmacists may perform better than usual because of a more structured working process or perform worse due to the double workload.[72,73]

Think-aloud and consultation recordings are susceptible to one type of reactivity (i.e., the Hawthorne effect); where pharmacists or patients may have modified or improved their behaviors as they were aware they were recorded. If the Hawthorne effect played a role in the quality of this study's results, pharmacists' actual patient care process usually has fewer PTW elements than reported.

Another limitation was the incompleteness of verbal reports due to the absence of interviews or retrospective think-alouds. It was difficult to determine if pharmacists were using intuitive approaches or they simply stopped verbalizing their thoughts which may preclude definite conclusions. This study used audio recordings and non-verbals were not captured. Finally, selection bias was a limitation in this study as pharmacists were responsible for the recruitment of patients from their practice, which may have led to bias within the sample.

Conclusion

Community pharmacists focused their attention on checking medication safety and providing information to patients with new prescriptions. Pharmacists gather insufficient clinical patient information to assess medication therapy, as they overly relied on computer profiles, asked patients non-specific questions, and missed patient cues. Routine activities appeared to shape practice, including a bias against refills prescriptions and a focus on technical dispensing activities. Future research on pharmacists' assessment skills should attend to the role of routines and the physical environment on patient care in community pharmacies.

References

1. Rotermann M, Sanmartin C, Hennessy D, Arthur M. *Prescription medication use by Canadians aged 6 to 79*; 2014.
2. Centre for Chronic Disease Prevention. *Chronic Disease and Injury Indicator Framework*. Fall ed; 2014.
3. Fried TR, O'Leary J, Towle V, Goldstein MK, Trentalange M, Martin DK. Health outcomes associated with polypharmacy in community-dwelling older adults: a systematic review. *J Am Geriatr Soc* 2014;62:2261–2272.
4. Lynas K. Pharmacists still most trusted professionals, says Ipsos Reid. *Can Pharm J (Ott)* 2011; 144:55.
5. Strand LM, Cipolle RJ, Morley PC. *Pharmaceutical Care Practice*. 3rd ed. New York, NY: McGraw-Hill; 2012.
6. Hepler CD, Strand LM. Opportunities and responsibilities in pharmaceutical care. *Am J Hosp Pharm* 1990;47:533–543.
7. Mangiapane S, Schulz M, Muhlig S, Ihle P, Schubert I, Waldmann HC. Community pharmacy-based pharmaceutical care for asthma patients. *Ann Pharmacother* 2005;39:1817–1822.
8. McLean W, Gillis J, Waller R. The BC community pharmacy asthma study: a study of clinical, economic and holistic outcomes influenced by an asthma care protocol provided by specially trained community pharmacists in British Columbia. *Can Respir J* 2003;10:195–202.
9. Van Mil JF, Schulz M. A review of pharmaceutical care in community pharmacy in Europe. *Harv Health Policy Rev* 2006;7:155–168.
10. Westerlund T, Gelin U, Pettersson E, Skärlund F, Wågström K, Ringbom C. A retrospective analysis of drug-related problems documented in a national database. *Int J Clin Pharm* 2013;35:202–209.
11. Thomas R, Huntley AL, Mann M, et al. Pharmacist-led interventions to reduce unplanned admissions for older people: a systematic review and meta-analysis of randomised controlled trials. *Age Ageing* 2014;43:174–187. http://dx.doi.org/10.1093/ageing/aft169.
12. Viswanathan M, Kahwati LC, Golin CE, et al. Medication therapy management interventions in outpatient settings: a systematic review and meta-analysis. *JAMA Intern Med* 2015;175:76–87.
13. RESPECT Trial Team. Cost-effectiveness of shared pharmaceutical care for older patients: RESPECT trial findings. *Br J Gen Pract* 2010;60:e20–e27. http://dx.doi.org/10.3399/bjgp09X482312.
14. Barnett MJ, Frank J, Wehring H, et al. Analysis of pharmacist-provided medication therapy management (MTM) services in community pharmacies over 7 years. *J Manag Care Pharm* 2009;15: 18–31.
15. Royal Pharmaceutical Society. *Clinical Check: A quick Reference Guide*; Published 16 May 2011. Accessed 22.02.16, https://www.nicpld.org/courses/hospVoc/assets/RPS_ClinicalCheckQuickReferenceGuide.pdf.
16. Strand LM, Cipolle RJ, Morley PC, Frakes MJ. The impact of pharmaceutical care practice on the practitioner and the patient in the ambulatory practice setting: twenty-five years of experience. *Curr Pharm Des* 2004;10:3987–4001.
17. Higgs J. *Clinical Reasoning in the Health Professions*. 3rd ed. Amsterdam: Butterworth Heinemann: Elsevier; 2008.
18. Akhtar S, Rutter P. Pharmacists thought processes in making a differential diagnosis using a gastro-intestinal case vignette. *Res Soc Adm Pharm* 2015; 11:472–479.

19. Phansalkar S, Hoffman JM, Hurdle JF, Patel VL. Understanding pharmacist decision making for adverse drug event (ADE) detection. *J Eval Clin Pract* 2009;15:266–275.

20. Rosenthal MM, Breault RR, Austin Z, Tsuyuki RT. Pharmacists' self-perception of their professional role: insights into community pharmacy culture. *J Am Pharm Assoc (2003)* 2011;51: 363–367.

21. Al Hamarneh YN, Rosenthal M, McElnay JC, Tsuyuki RT. Pharmacists' perceptions of their professional role: insights into hospital pharmacy culture. *Can J Hosp Pharm* 2011;64:31–35.

22. Gardner B, Herrier R. *Pharmacist-patient Consultation Program PPCP--unit I: An Interactive Approach to Verifying Patient Understanding*. New York, NY: Pfizer Inc; 1997.

23. Gardner M, Boyce RW, Herrier RN. *Pharmacist-patient Consultation Program: An Interactive Approach to Verify Patient Understanding*. New York, NY: Pfizer Inc; 1991.

24. Guirguis LM. Mixed methods evaluation: pharmacists' experiences and beliefs toward an interactive communication approach to patient interactions. *Patient Educ Couns* 2011;83:432–442. http://dx.doi.org/10.1016/j.pec.2011.04.038.

25. Guirguis LM, Lee S. Patient assessment and documentation integrated in community practice: Chat, check, and chart. *J Am Pharm Assoc (2003)* 2012; 52:e241–e251.

26. Caelli K, Ray L, Mill J. 'Clear as mud': toward greater clarity in generic qualitative research. *Int J Qual Methods* 2008;2:1–13.

27. Kahlke R. Generic qualitative approaches: pitfalls and benefits of methodological mixology. *Int J Qual Methods* 2014;13:37–52.

28. Creswell JW, Plano Clark VL. *Designing and Conducting Mixed Methods Research*. 2nd ed. Thousand Oaks, CA: Sage; 2011.

29. Ericsson K, Simon H. *Protocol Analysis: Verbal Reports as Data*. rev. ed. Cambridge, MA: MIT Press; 1993.

30. Banning M. Clinical reasoning and its application to nursing: concepts and research studies. *Nurse Educ Pract* 2008;8:177–183.

31. Elstein AS, Shulman LS, Sprafka SA, Allal L. In: *Medical Problem Solving: An Analysis of Clinical Reasoning*, vol. 2. Cambridge, MA: Harvard University Press; 1978.

32. Warholak TL, Rupp MT. Analysis of community chain pharmacists' interventions on electronic prescriptions. *J Am Pharm Assoc* 2009;49:59–64.

33. Greenhill N, Anderson C, Avery A, Pilnick A. Analysis of pharmacist–patient communication using the Calgary-Cambridge guide. *Patient Educ Couns* 2011;83:423–431.

34. Iqbal N, Rutter P. Community pharmacists reasoning when making a diagnosis: a think-aloud study. *Int J Clin Pharm* 2013;21:17–18.

35. Odukoya O, Chui MA. Retail pharmacy staff perceptions of design strengths and weaknesses of electronic prescribing. *J Am Med Inform Assoc* 2012;19: 1059–1065.

36. Rutter P, Patel J. Decision making by community pharmacists when making an over-the-counter diagnosis in response to a dermatological presentation. *Self Care* 2013;4:125–133.

37. Odukoya OK, Chui MA. Using think aloud protocols to assess E-prescribing in community pharmacies. *Innov Pharm* 2012;3:88.

38. Rizzo JR, House RJ, Lirtzman SI. Role conflict and ambiguity in complex organizations. *Adm Sci Q* 1970;15:150–163.

39. Mott DA, Doucette WR, Gaither CA, Pedersen CA, Schommer JC. Pharmacists' attitudes toward worklife: results from a national survey of pharmacists. *J Am Pharm Assoc (2003)* 2004;44: 326–336.

40. Alberta College of Pharmacists. *Standards of Practice for Pharmacists and Pharmacy Technicians*. Alberta College of Pharmacists; 2011.

41. Schommer JC, Pedersen CA, Doucette WR, Gaither CA, Mott DA. Community pharmacists' work activities in the united states during 2000. *J Am Pharm Assoc (Wash)* 2002;42:399–406.

42. Schommer JC, Pedersen CA, Gaither CA, Doucette WR, Kreling DH, Mott DA. Pharmacists' desired and actual times in work activities: evidence of gaps from the 2004 national pharmacist workforce study. *J Am Pharm Assoc (2003)* 2006;46: 340–347.

43. Scott DM. 2006 North Dakota pharmacists' wage and workload assessment. *Int J Pharm Technol* 2009;25:14–23.

44. McCann L, Hughes CM, Adair CG. A self-reported work-sampling study in community pharmacy practice: a 2009 update. *Pharm World Sci* 2010;32(4): 536–543.

45. Davies JE, Barber N, Taylor D. What do community pharmacists do?: results from a work sampling study in London. *Int J Pharm Pract* 2014;22:309–318.

46. Witry MJ, Doucette WR. Community pharmacists, medication monitoring, and the routine nature of refills: a qualitative study. *J Am Pharm Assoc (2003)* 2014;54:594–603. http://dx.doi.org/10.1331/JAPhA.2014.14065.

47. Claesson C, Burman K, Nilsson JLG, Vinge E. Prescription errors detected by Swedish pharmacists. *Int J Pharm Pract* 1995;3:151–156.

48. Rupp MT, DeYoung M, Schondelmeyer SW. Prescribing problems and pharmacist interventions in community practice. *Med Care*; 1992: 926–940.

49. De Oliveira DR, Shoemaker SJ. Achieving patient centeredness in pharmacy practice: openness and the pharmacist's natural attitude. *J Am Pharm Assoc* 2003;2006(46):56–64.

50. Westerlund T, Almarsdóttir AB, Melander A. Drug-related problems and pharmacy interventions in community practice. *Int J Pharm Pract* 1999;7: 40–50.

51. Emmerton L, Jefferson K. Work sampling observations of community pharmacists: a review. *Int J Pharm Pract* 1996;4:75–78.

52. Olsson E, Ingman P, Ahmed B, Kälvemark Sporrong S. Pharmacist–patient communication in Swedish community pharmacies. *Res Soc Adm Pharm* 2014;10:149–155.

53. Sleath B. Pharmacist question-asking in New Mexico community pharmacies. *Am J Pharm Educ* 1995;59:374–376.

54. Puspitasari HP, Aslani P, Krass I. A review of counseling practices on prescription medicines in community pharmacies. *Res Soc Adm Pharm* 2009;5: 197–210.

55. Heritage J, Maynard DW. Problems and prospects in the study of physician-patient interaction: 30 years of research. *Annu Rev Sociol* 2006;32:351–374.

56. Hoffman K. *A Comparison of Decision-making by "expert" and "novice" Nurses in the Clinical Setting, Monitoring Patient Haemodynamic Status Post Abdominal Aortic Aneurysm Surgery*. Sydney: University of Technology; 2007 [Dissertation].

57. Croskerry P. Clinical cognition and diagnostic error: applications of a dual process model of reasoning. *Adv Health Sci Educ Theory Pract* 2009;14:27–35.

58. Croskerry P. Achieving quality in clinical decision making: cognitive strategies and detection of bias. *Acad Emerg Med* 2002;9:1184–1204.

59. Nguyen HT. The prime questions in authentic patient's consultations: a call for additional research on current and new paradigms. *Res Soc Adm Pharm* 2013;9:339–352.

60. Schommer JC, Wiederholt JB. The association of prescription status, patient age, patient gender, and patient question asking behavior with the content of pharmacist–patient communication. *Pharm Res* 1997;14:145–151.

61. Skoglund P, Isacson D, Kjellgren KI. Analgesic medication—communication at pharmacies. *Patient Educ Couns* 2003;51:155–161.

62. Morrow N, Hargie O, Donnelly H, Woodman C. "Why do you ask?" A study of questioning behaviour in community pharmacist-client consultations. *Int J Pharm Pract* 1993;2:90–94.

63. Smith F. Community pharmacists and health promotion: a study of consultations between pharmacists and clients. *Health Promot Int* 1992;7:249–255.

64. Witry MJ. *Community Pharmacist Medication Monitoring Attitudes and Decision Making*. Iowa City: University of Iowa; 2013 [Dissertation].

65. McLean W. *Clinical Pharmacy and Prevention of Adverse Drug Events*. The Institute for Safe Medication Practices Canada (ISMP-Canada); March 2002, http://www.ismp-canada.org/download/Hnews0203.pdf. Accessed Aug 2015.

66. Bates DW, Spell N, Cullen DJ, et al. The costs of adverse drug events in hospitalized patients. *JAMA* 1997;277(4):307–311.

67. Leape LL, Cullen DJ, Clapp MD, et al. Pharmacist participation on physician rounds and adverse drug events in the intensive care unit. *JAMA* 1999;282: 267–270.

68. Kucukarslan SN, Peters M, Mlynarek M, Nafziger DA. Pharmacists on rounding teams reduce preventable adverse drug events in hospital general medicine units. *Arch Intern Med* 2003;163: 2014–2018.

69. Kaae S, Mygind A, Saleem S. A characterization of the current communication patterns in Danish community pharmacies - an observational study. *Res Soc Adm Pharm* 2013;9:958–964.

70. Hirsch JD, Oen A, Robertson S, Nguyen N, Daniels C. Patient request for pharmacist counseling and satisfaction: automated prescription delivery system versus regular pick-up counter. *J Am Pharm Assoc (2003)* 2009;49: 73–77.

71. Worley MM, Schommer JC, Brown LM, et al. Pharmacists' and patients' roles in the pharmacist-patient relationship: are pharmacists and patients reading from the same relationship script? *Res Soc Adm Pharm* 2007;3:47–69.

72. Van Den Haak M, De Jong M, Jan Schellens P. Retrospective vs. concurrent think-aloud protocols: testing the usability of an online library catalogue. *Behav Inf Technol* 2003;22:339–351.

73. Russo JE, Johnson EJ, Stephens DL. The validity of verbal protocols. *Mem Cognit* 1989;17: 759–769.