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"May You Live in Interesting Times": Minimizing Contributors to Pharmacist Burnout

Glen Brown

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Most readers will recognize the main title of this editorial, a curse of sorts that was apparently coined by a British politician in the 1930s. Of course, the irony is that this curse is actually calling for the recipient to experience dangerous or troubling times. We in the pharmacy profession are currently experiencing "interesting times", with all the various connotations entailed by the term "interesting". The expanding and ever-more-complex array of pharmacotherapeutic options now available (such as monoclonal antibodies and checkpoint inhibitors), the increasing number of previously unrecognized medical conditions for which our patients now have treatment options available, the increasing bureaucratic complexity of obtaining funding for new drug therapies, and the frustrations of modifying therapeutic plans because of drug shortages: these are just some of the "interesting" challenges that pharmacists face daily. Although we all welcome the growing recognition of pharmacists' contributions to patient care and their increasing independence in providing such care, the extension of our roles comes at a cost. One aspect of this cost is burnout.

In this issue, Blue and others[1] add further evidence of the growing prevalence of burnout among hospital pharmacists, specifically Canadian pharmacists. Burnout—a constellation of symptoms of emotional exhaustion, depersonalization, and feelings of reduced personal accomplishment—is the mental process caused by unmanageable or unanticipated stressors resulting from a person's work.[2] Although the authors acknowledge the study's small sample size (n = 171), their findings suggest a high prevalence of some characteristics of burnout among Canadian pharmacists. Given that burnout has been associated with individuals changing jobs, changing professions, or experiencing a reduction in enthusiasm for their current roles,[2] efforts to minimize burnout would be beneficial for the profession, as well as the individual. So how can this syndrome be minimized?

Burnout may be more prevalent among pharmacists with increasingly demanding job responsibilities (including clinical workload, teaching, administration, and research), with certain demographic characteristics (such as being early in their career or unmarried) or personality traits (such as type A or competitive personalities), or having traits and desires that do not match those needed for the pharmacist's current role.[3] Strategies are needed to address all of these contributors. Individual pharmacists need to come to an understanding of their own personal traits and develop strategies to counteract those traits contributing to burnout.[2] Pharmacy administration can create an environment for assisting pharmacists in coming to such an understanding and subsequent minimization of burnout. Such efforts to address mental health, whether at the level of individual pharmacists or pharmacy departments collectively, are frequently described as wellness or well-being programs.[4]

Blue and others[1] suggest that factors contributing to burnout in their study sample included various job characteristics, such as not working to full scope of practice, excessive on-call or overtime requirements, assignment of nonclinical duties without sufficient time available to perform them, and lack of recognition of work performed. Pharmacy administrators must recognize the existence of these and other factors contributing to their pharmacists' frustrations, as well as barriers to resolving them. By exploring methods of resolving barriers to the provision of high-level patient care, while maintaining reasonable workload, administrators can help pharmacists to remain engaged in their roles. Such organizational factors are not easily addressed, but without efforts to do so, they will continue to contribute to burnout. Implementing strategies to improve the fit of individual pharmacists with their respective positions (including making it possible to work to full scope of practice), regularly recognizing individuals' contributions, and providing opportunities for individuals to expand their knowledge, impact, and responsibilities (i.e., creating a potential career pathway) would all be beneficial in minimizing the development of burnout.[2,3] Through these processes, our "interesting times" can perhaps become positive experiences.

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ON THE FRONT COVER

Mount Chester, Kananaskis Country, Alberta

This photograph of Mount Chester glistening in the sun after a light dusting of snow was captured in September 2018 by June Chen, who was using a Canon PowerShot SD1100 IS Digital Camera. A few hours later, June summited Mount Chester.

June is a clinical pharmacist at the University of Alberta Hospital in Edmonton. She practises on the cardiac intensive care and cardiovascular surgery units. During the summer months, she enjoys hiking in the mountains, and all year round, she likes to dance contemporary jazz.

The *CJHP* would be pleased to consider photographs featuring Canadian scenery taken by CSHP members for use on the front cover of the Journal. Winter-themed photographs are especially needed, so get your cameras out! If you would like to submit a photograph, please send an electronic copy (minimum resolution 300 dpi) to publications@cshp.ca.

« Puissiez-vous vivre à une époque intéressante » : Réduire au minimum les facteurs de l'épuisement professionnel des pharmaciens

par Glen Brown

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La plupart des lecteurs reconnaîtront le titre principal de cet éditorial comme une sorte de malédiction qui aurait été inventée par un politicien britannique dans les années 1930. Bien sûr, l'ironie réside dans le fait que cette malédiction appelle en fait le destinataire à vivre des moments dangereux ou troublants. Nous, professionnels de la pharmacie, vivons actuellement une « époque intéressante », avec toutes les diverses connotations qu'implique le terme « intéressant ». L'éventail croissant et toujours plus complexe d'options pharmacothérapeutiques désormais disponibles (telles que les anticorps monoclonaux et les inhibiteurs de point de contrôle), le nombre croissant de conditions médicales non reconnues dans le passé pour lesquelles nos patients disposent désormais d'options de traitement, la complexité bureaucratique grandissante visant à obtenir un financement pour de nouvelles thérapies médicamenteuses et les frustrations occasionnées par le besoin de modifier les plans de soins en raison de la pénurie de médicaments : ce ne sont là que quelques-uns des défis « intéressants » auxquels les pharmaciens sont confrontés au jour le jour. Même si nous saluons la reconnaissance grandissante de leurs contributions à l'égard des soins aux patients et de leur indépendance croissante visant à les prodiguer, l'élargissement de l'éventail de nos responsabilités s'accompagne de coûts. L'épuisement professionnel en est un.

Dans ce numéro, Blue *et al.*[1] nous livrent une preuve supplémentaire de la prévalence croissante de l'épuisement professionnel chez les pharmaciens d'hôpitaux, en particulier les pharmaciens canadiens. L'épuisement professionnel – une constellation de symptômes d'épuisement émotionnel, de dépersonnalisation et de réduction du sentiment d'accomplissement personnel – est le processus mental provoqué par des facteurs de stress ingérables ou imprévus résultant du travail.[2] Bien que les auteurs reconnaissent la petite taille de l'échantillon de l'étude (n = 171), leurs résultats suggèrent une prévalence élevée de certaines caractéristiques de l'épuisement professionnel chez les pharmaciens canadiens. Puisque l'épuisement a été associé au changement d'emploi ou de profession ou à une perte d'enthousiasme à l'égard de son emploi actuel,[2] des efforts pour le réduire au minimum seraient bénéfiques autant pour la profession qu'à titre individuel. Alors, comment réduire ce syndrome?

L'épuisement professionnel peut être plus répandu chez les pharmaciens ayant des responsabilités professionnelles de plus en plus exigeantes (notamment la charge de travail clinique, l'enseignement, l'administration et la recherche), chez ceux présentant certaines caractéristiques démographiques (p. ex. le fait d'être en début de carrière ou d'être célibataire), ceux exhibant certains traits de personnalité (comme le type A ou une personnalité compétitive), ou ceux ayant des qualités et des désirs qui ne correspondent pas à ceux qu'exige le rôle actuel du pharmacien.[3] Des stratégies sont nécessaires pour répondre à tous ces facteurs. Chaque pharmacien doit comprendre ses propres traits de personnalité et élaborer des stratégies permettant de neutraliser ceux qui contribuent à l'épuisement.[2] L'administration de la pharmacie peut créer un environnement pour aider les pharmaciens à y parvenir et à réduire l'épuisement au minimum. De tels efforts pour aborder la santé mentale, que ce soit à l'échelle des pharmaciens ou, collectivement, des services de pharmacie, sont souvent décrits comme des programmes de bien-être ou de mieux-être.[4]

Blue *et al.*[1] suggèrent que les facteurs contribuant à l'épuisement professionnel dans l'échantillon de leur étude comprenaient diverses caractéristiques professionnelles. Par exemple, le fait de ne pas exercer pleinement ses compétences, les exigences excessives en matière de garde ou d'heures supplémentaires, l'attribution de tâches non cliniques sans avoir suffisamment de temps pour les exécuter et le manque de reconnaissance des travaux effectués. Les administrateurs de pharmacie doivent reconnaître l'existence de ces facteurs et d'autres qui contribuent aux frustrations de leurs pharmaciens, ainsi que des obstacles à leur résolution. En explorant des méthodes pour surmonter les obstacles qui entravent la prestation de soins de haut niveau

aux patients, tout en maintenant une charge de travail raisonnable, les administrateurs peuvent aider les pharmaciens à rester engagés dans leur rôle. Ces facteurs organisationnels ne sont pas faciles à aborder, mais sans entreprendre de tels efforts, ils continueront de contribuer à l'épuisement professionnel. La mise en œuvre de stratégies pour améliorer l'adéquation des pharmaciens à leur poste (y compris en leur permettant d'exercer pleinement leurs compétences), la reconnaissance régulière de leurs contributions et la possibilité d'élargir leurs connaissances, leur impact et leurs responsabilités (c.-à-d., la création d'un cheminement de carrière potentiel) constitueraient des éléments bénéfiques pour réduire au minimum le développement de l'épuisement professionnel.[2,3] Grâce à ces processus, notre « époque intéressante » pourrait devenir une expérience positive.

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Design and Development of an Escape Game as a Knowledge Transfer Tool in Preparation for an Accreditation Visit in a Health Care Facility

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ABSTRACT

Background: Knowledge transfer helps health care staff to be competent, well informed, and up to date. It also contributes to adherence to standards and best practices.

Objectives: To design, implement, and evaluate an escape game based on a selection of Accreditation Canada required organizational practices (ROPs).

Methods: This prospective descriptive study involved nurses and pharmacists in a health care centre. An escape game based on 6 ROPs was designed. The game was played by teams of participants in a patient room within the centre, with each game lasting 25 minutes. Participants' satisfaction with various aspects of their experience was assessed.

Results: A total of 200 people (52 teams) participated in the escape game. About half of the teams ($n = 28$) completed the game within the allotted time (average completion time 20 minutes, 53 seconds; standard deviation [SD] 2 minutes, 45 seconds). On average, 1.32 (SD 0.88) clues were provided to successful teams and 1.88 (SD 0.95) to unsuccessful teams. Participants were very satisfied with their experience. However, members of unsuccessful teams had significantly lower agreement that the escape game was relevant to their practice and that it was an effective method of communication.

Conclusions: An escape game based on a selection of ROPs was successfully implemented as part of the hospital's preparation for an accreditation visit. Use of an escape game as a knowledge transfer tool was appreciated by the staff.

Keywords: escape game, knowledge transfer, accreditation, medication use process

RÉSUMÉ

Contexte : La transmission des connaissances aide le personnel de la santé à être compétent, bien informé et à jour. Elle contribue également au respect des normes et des meilleures pratiques.

Objectifs : Concevoir, mettre en œuvre et évaluer un jeu d'évasion basé sur une sélection de pratiques organisationnelles requises (POR) d'Agrément Canada.

Méthodes : Des infirmiers et des pharmaciens d'un centre de santé ont participé à cette étude prospective descriptive. Un jeu d'évasion basé sur 6 POR a été conçu. Des équipes de participants y ont joué dans une chambre de patient au sein du centre, chaque partie durant 25 minutes. La satisfaction des participants à l'égard de divers aspects de leur expérience a été évaluée.

Résultats : Au total, 200 personnes (52 équipes) y ont participé. Environ la moitié des équipes ($n = 28$) ont terminé le jeu dans le temps imparti (temps moyen d'achèvement 20 minutes, 53 secondes ; écart type [ET] 2 minutes, 45 secondes). En moyenne, 1,32 indice (ET 0,88) a été remis aux équipes qui l'ont réussi et 1,88 (ET 0,95) aux équipes qui ont échoué. Les participants étaient très satisfaits de leur expérience. Cependant, les membres des équipes ayant échoué étaient significativement moins d'accord sur le fait que le jeu d'évasion était pertinent pour l'exercice de leur profession et qu'il s'agissait d'une méthode de communication efficace.

Conclusions : Un jeu d'évasion basé sur une sélection de POR a été mis en place avec succès dans le cadre de la préparation de l'hôpital à une visite d'agrément. L'utilisation d'un jeu d'évasion comme outil de transmission des connaissances a été reçue de manière positive par le personnel.

Mots-clés : jeu d'évasion, transmission des connaissances, accréditation, processus d'utilisation des médicaments

INTRODUCTION

Knowledge transfer is "a process implemented to preserve, enhance and ensure the sharing of experience and knowledge acquired collectively in an organization" [authors' translation of definition from Office québécois de la langue française].[1]

In health care settings, knowledge transfer is essential for the safe delivery of care. It helps health care staff to be competent, well informed, and up to date and also helps to ensure their activities align with current standards and best practices.

To encourage and verify the transfer and application of knowledge, hospitals may participate in an external accreditation process. In Canada, Accreditation Canada offers the QMentum program, which consists of about

100 standards as well as a series of required organizational practices (ROPs).[2,3]

In Quebec, every hospital must be accredited by Accreditation Canada, the national accreditation organization, for the health and social services it provides. This accreditation is valid for a maximum period of 5 years, and hospitals must ensure that their accreditation is always up to date.[4]

Many strategies are available to support the transfer and application of knowledge, including use of an intranet, distribution of email messages and documents, presentation of information or training sessions, and organization of simulations and serious games (i.e., games "whose purpose is other than mere entertainment"[5]). Serious games include advertising games, "edutainment" games, creative games, informational games, error chambers, and escape games.[6] An escape game is a game built around a specific scenario in which participants solve, collectively and within a limited time, a problem or a puzzle, typically to escape from an enclosed space. Such games can be real or virtual.[7] After conducting a literature review on the use of escape games in health care settings,[8] we hypothesized that an escape game could be useful in imparting knowledge related to Accreditation Canada ROPs during preparation for an accreditation visit in a health facility.

The main objective was to design, implement, and evaluate an escape game based on a selection of Accreditation Canada ROPs, as part of the preparation for a hospital accreditation visit.

METHODS

Study Design and Setting

This prospective descriptive study was conducted as part of a continuous improvement program for professional practices at CHU Sainte-Justine, a tertiary hospital in Montréal, Quebec, with 500 beds and a mother-and-child clientele.

Study Team

Our study team consisted of a pharmacy resident in internship (A.C.), an intern in quality management (A.D.), 2 pharmacists (S.A., J.F.B.), and the hospital's director of quality, evaluation, performance, and ethics (G.P.). The study team had prior knowledge of and work experience in preparation for accreditation and quality of care.

Principles

To allow caregivers to participate in the escape game during working hours, we established the following criteria for the game's design: the duration of each game had to be no more than 30 minutes; the equipment needed for the game had to be mobile, so that each iteration of the game could be set up close to the targeted care units; the setting of the game had to re-create a patient's room; and the accessories required to play the game had to be minimized, to facilitate set-up and initiation of each new iteration of the game.

Game Design

Our team began by signing up for a 60-minute commercial escape game, as a learning experience. The aim of the commercial game was to identify a murderer in a storyline with 3 rooms and many puzzles.

Next, the team identified the following 6 Accreditation Canada ROPs relating to the drug-use system as targets of knowledge transfer for the game that was being developed: client identification, medication reconciliation at transitions of care, high-alert medications, hand hygiene compliance, infusion pump safety, and disclosure of incidents affecting patient safety. The English wording of the ROPs is presented in this report, but the French versions were used when the game was designed. Clues relating to 2 other ROPs were added to the scenario (specifically, the "Do Not Use" list of abbreviations and information about concentrated electrolytes); these clues were not useful for success in the escape game but could still transmit some relevant knowledge.

During a subsequent brainstorming session, our team created a realistic scenario comprising 6 puzzles that involved a patient lying in a bed, with each puzzle having an associated padlock. The goal of the game was to figure out that the patient had had an allergic reaction to an antibiotic. The solution to each puzzle unlocked the associated padlock, revealing a clue for the next puzzle. Table 1 lists the 6 ROPs, the information that was sought for each ROP (the puzzle), and the actions required to identify the item being sought (to solve the puzzle).

Finally, our team prepared a written description of the scenario, specified the typical layout for the game (i.e., patient room with bed, bedside table, infusion pump, bulletin board, and computer), and purchased the accessories required (e.g., plush toy monkey [to represent the patient], blue wig [to represent the allergic reaction], posters).

The Game

The game took place in an unoccupied patient room near the work location of each targeted clinical team. Participants were greeted by a member of the research team and were blindfolded before entry into the room. Once the team of participants had entered the room, a 1-minute soundtrack was used to present the instructions. Upon removing their blindfolds, participants had to notice that the patient in the room had blue hair, and the objective was to find out what might explain this adverse event. Participants were given 25 minutes to solve the 6 puzzles and open the 6 padlocks. After 20 minutes, participants were given a 5-minute warning. A member of the research team remained in the room at all times and could provide clues (no maximum)

TABLE 1. Required Organizational Practices (ROPs), Associated Objectives, and Actions Required

ROP	Objective (Puzzle)	Actions Required to Solve the Puzzle
Client identification	Find the first name of the patient (not provided on identification bracelet)	• Find the patient's hospital card among various cards available in the room (match photograph with patient) • Correctly identify the patient using the hospital card and the patient's bracelet • Find out the patient's first name • Unlock the padlock using the first name
Medication reconciliation at care transitions	Identify discrepancies between the patient's medications taken at home and prescriptions written when the patient was admitted to hospital	• Collect the patient's file containing the medication reconciliation report and the bag of medications taken at home • Identify unintentional discrepancies between the medication reconciliation report and the admission prescriptions • Unlock the padlock using the code
High-alert medications	Identify high-alert medications from among the selected drugs	• Retrieve the drugs stored in the cabinet • Sort drugs according to risk level (high risk and non–high risk) using the hospital's list • Count the number of drugs of each type • Unlock a video on the computer using the code obtained, based on correspondence between numbers and letters
Hand hygiene compliance	Identify the correct sequence of hand hygiene	• Play the video on handwashing • Order the various steps of handwashing • Unlock the padlock using the code
Infusion pump safety	Identify the code on the pump (using ultraviolet light)	• Retrieve the ultraviolet lamp from the drawer • Look for the numbers written with invisible ink on the infusion pump • Unlock the padlock using the code
Disclosure of patient safety incident	Identify the correct location on the AH-223 form[a] to document the adverse event	• Retrieve the form • Find the adverse event (allergy) that occurred using the clues present in the room (an allergy bracelet was hidden in the bed sheets, as if it had fallen off the patient's wrist; an order was written in the patient's file for the drug to which the patient is allergic; and that same drug was in the syringe placed in the infusion pump) • Unlock the end-of-game video by typing the name of the checkbox on the form; the video presents the 6 ROPs discussed in the game

[a]The AH-223 form is an incident and accident report required by the Ministère de la santé et des services sociaux in the province of Quebec.

upon request. The research team member noted the number of clues given to each team. To add suspense to the activity, a generic soundtrack was played during the entire period of the game. At the end of the game, whether or not the team was successful, a video was shown on the computer screen reviewing the 6 ROPs targeted by the game, and the researcher answered participants' questions and distributed copies of the satisfaction survey.

Figure 1 illustrates the arrangements used for the escape game, and Figure 2 shows an example of the patient record to which participants had access.

Pilot Testing

To confirm the feasibility of the game, 5 groups of nurses and pharmacists (4 persons per group) were invited to participate in the game and provide comments on the scenario, the clarity of the instructions, and the puzzles. On the basis of feedback received, 19 alterations were made to the scenario (e.g., addition of posters to support the scenario, illustrating good hand hygiene and listing high-alert medications; improvement of poster content; reformulation of certain clues; change in location of an accessory; correction of inaccuracies).

Study Participants

Study participants were recruited from the facility's health care staff. All clinical employees of the hospital were invited to form teams of 4 players, but teams of any size were accepted. Special efforts were made to recruit members of the nursing and pharmacy staff, and each team had to include at least 1 nurse. Each team had to register by phone or email to book a time to play the game. Time slots were offered mainly during the day, but some were booked in the evening or at night.

Recruitment

A communication plan was established for recruitment of participants, including promotion of the escape game in the hospital's newsletter and specific bulletins distributed to clinical teams, production of a trailer (the trailer,

in French, is available here: https://www.youtube.com/watch?v=ZfWNEtICYx0&feature=youtu.be), posting of announcements on bulletin boards, creation of a dedicated page on the hospital's intranet, distribution of email messages to team managers, and direct solicitation through clinical team leaders. To encourage participation, prizes (valued at $100 each) were offered to the 3 teams with the fastest times to successfully complete the game, and there was also 1 participation draw.

Evaluation

To assess participant satisfaction, we developed a questionnaire consisting of 12 questions: 2 questions about the participants themselves (i.e., job title, clinical team), 1 question about prior participation in escape games, 1 question about participants' interest in escape games, and 8 questions about participation in this particular game (i.e., general assessment, organization of the activity, quality of the

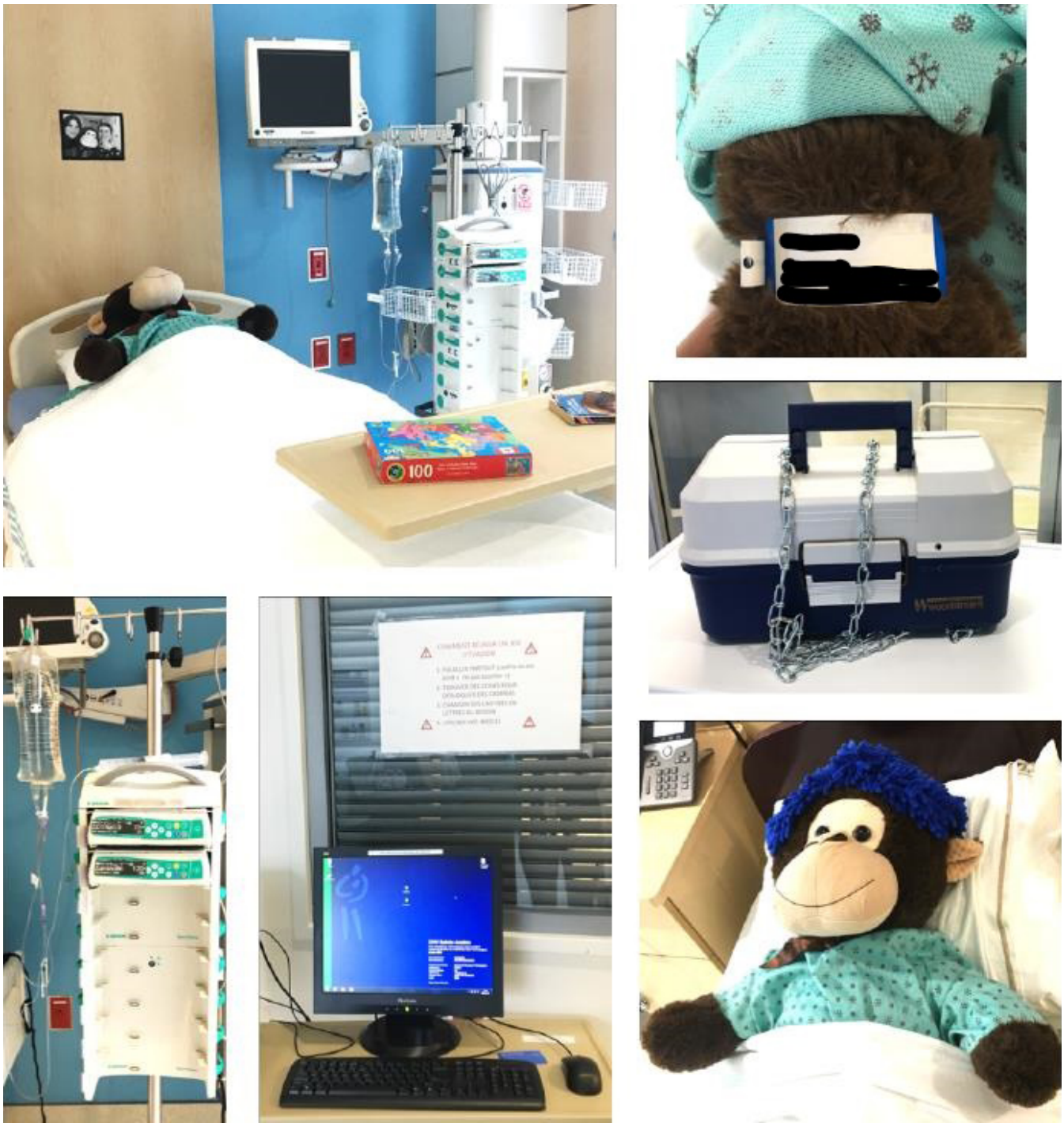


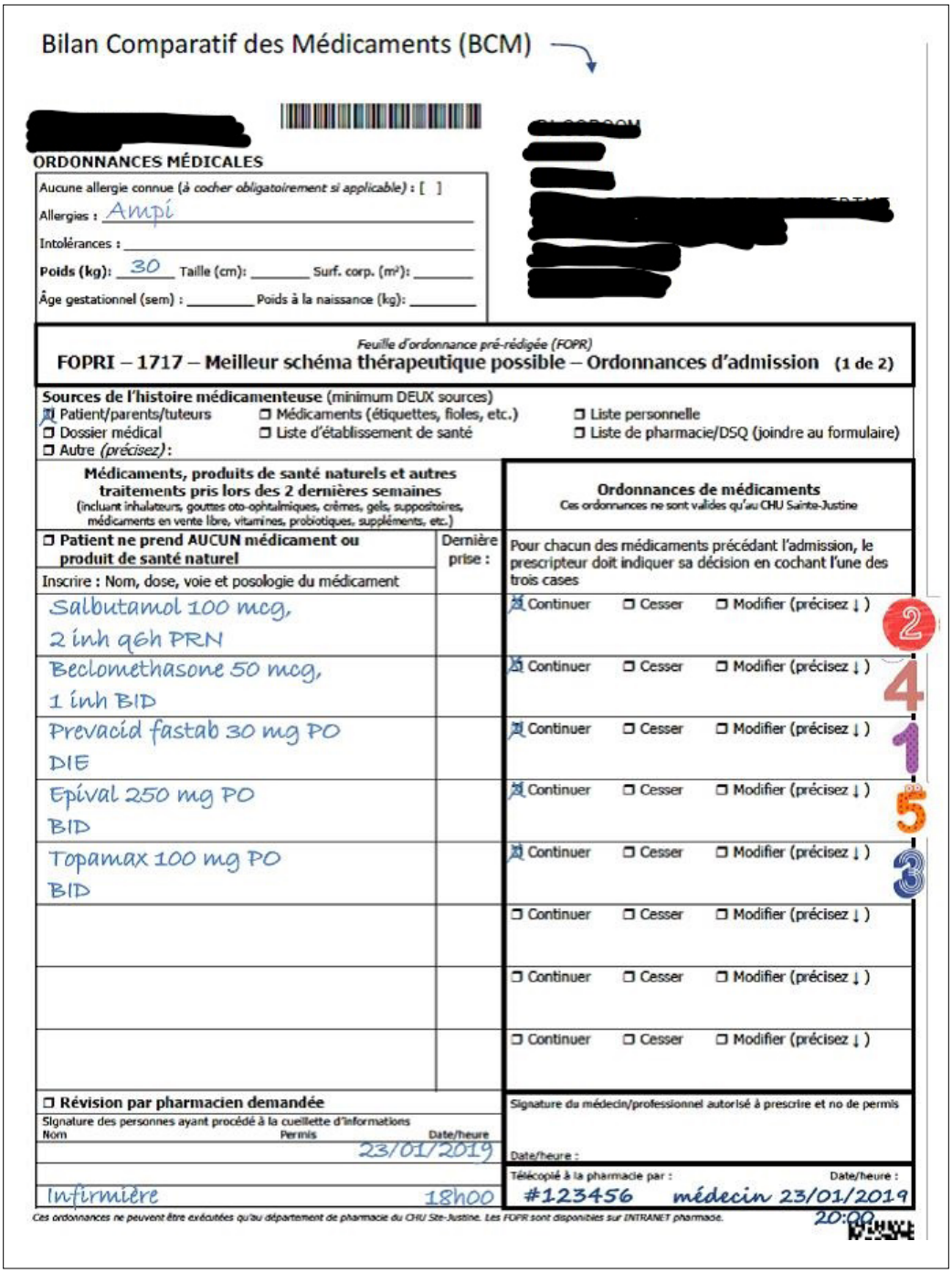
FIGURE 1. Set-up of the escape game.

activity, relevance of the activity, effectiveness of the activity in communicating information about the ROPs, impact on team communication, effectiveness of the advertising, and potential recommendation to colleagues to participate in the future). Responses for the last 8 questions were based on a 4-point Likert scale (strongly agree, partially agree, partially disagree, totally disagree).

The time spent on developing and managing the project was tracked, as were the expenses incurred.

Analysis Plan

The data collected were entered and analyzed in a spreadsheet (Excel, Microsoft Corporation). Satisfaction data were compared between participants who successfully completed the game and participants who did not solve all the puzzles. A χ^2 test was used to compare differences in proportions, with p values less than 0.05 being considered statistically significant.


Bilan Comparatif des Médicaments (BCM)

[redacted]

ORDONNANCES MÉDICALES

Aucune allergie connue (*à cocher obligatoirement si applicable*) : [ ]
Allergies : Ampi
Intolérances : _____
Poids (kg): 30 Taille (cm): _____ Surf. corp. (m²): _____
Âge gestationnel (sem) : _____ Poids à la naissance (kg): _____

Feuille d'ordonnance pré-rédigée (FOPR)
FOPRI – 1717 – Meilleur schéma thérapeutique possible – Ordonnances d'admission (1 de 2)

Sources de l'histoire médicamenteuse (minimum DEUX sources)
☒ Patient/parents/tuteurs ☐ Médicaments (étiquettes, fioles, etc.) ☐ Liste personnelle
☐ Dossier médical ☐ Liste d'établissement de santé ☐ Liste de pharmacie/DSQ (joindre au formulaire)
☐ Autre *(précisez)*:

Médicaments, produits de santé naturels et autres traitements pris lors des 2 dernières semaines (incluant inhalateurs, gouttes oto-ophtalmiques, crèmes, gels, suppositoires, médicaments en vente libre, vitamines, probiotiques, suppléments, etc.)		**Ordonnances de médicaments** Ces ordonnances ne sont valides qu'au CHU Sainte-Justine
☐ **Patient ne prend AUCUN médicament ou produit de santé naturel**	Dernière prise :	Pour chacun des médicaments précédant l'admission, le prescripteur doit indiquer sa décision en cochant l'une des trois cases
Inscrire : Nom, dose, voie et posologie du médicament		
Salbutamol 100 mcg, 2 inh q6h PRN		☒ Continuer ☐ Cesser ☐ Modifier (précisez ↓) 2
Beclomethasone 50 mcg, 1 inh BID		☒ Continuer ☐ Cesser ☐ Modifier (précisez ↓) 4
Prevacid fastab 30 mg PO DIE		☒ Continuer ☐ Cesser ☐ Modifier (précisez ↓) 1
Epival 250 mg PO BID		☒ Continuer ☐ Cesser ☐ Modifier (précisez ↓) 5
Topamax 100 mg PO BID		☒ Continuer ☐ Cesser ☐ Modifier (précisez ↓) 3
		☐ Continuer ☐ Cesser ☐ Modifier (précisez ↓)
		☐ Continuer ☐ Cesser ☐ Modifier (précisez ↓)
		☐ Continuer ☐ Cesser ☐ Modifier (précisez ↓)

☐ **Révision par pharmacien demandée**

Signature des personnes ayant procédé à la cueillette d'informations
Nom Permis Date/heure
23/01/2019
Infirmière 18h00

Signature du médecin/professionnel autorisé à prescrire et no de permis
Date/heure :

Télécopié à la pharmacie par : Date/heure :
#123456 médecin 23/01/2019 20:00

Ces ordonnances ne peuvent être exécutées qu'au département de pharmacie du CHU Ste-Justine. Les FOPR sont disponibles sur INTRANET pharmacie.

FIGURE 2. Example of a patient record. For this clue, participants needed to correctly identify discrepancies and use the colored numbers to the right to unlock the padlock.

Ethics Review

The institutional review board of our centre confirmed that no ethics review was required for this quality improvement study, as per the Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans (2018).

RESULTS

The escape game was offered from February 20 to May 9, 2019. A total of 200 people (52 teams) participated in the escape game. It was estimated that the recruitment efforts reached 1050 people; the participation rate was therefore estimated at 19% (200/1050).

The teams consisted of 2 to 6 participants (mean 3.8, standard deviation [SD] 0.84). Nurses were the most frequent participants (76%, 152/200), followed by pharmacists (12%, 24/200) and those with other job titles (12%, 24/200), including administrative officers, orderlies, and managers.

The teams came from various departments in the hospital: pediatrics (31%, 16/52), hematology-oncology (23%, 12/52), maternity (21%, 11/52), intensive care (12%, 6/52), pharmacy (6%, 3/52), neonatology (4%, 2/52), and emergency (4%, 2/52).

Just over half of the teams (54%, 28/52) completed the game within the 25-minute time limit. Among these teams, the average time to complete the game was 20 minutes, 53 seconds (SD 2 minutes, 45 seconds).

The average number of clues provided was 1.32 (SD 0.88) for successful teams and 1.88 (SD 0.95) for unsuccessful teams.

All participants agreed to complete the evaluation questionnaire, and 196 of the 200 participants answered all of the questions. Overall, 113 of the 200 participants (57%) had played an escape game before participating in this game. Additionally, 178 (89%) of the participants indicated an interest in games, including escape games. In general, most participants were very satisfied with their experience. For 4 of the 8 statements about perceptions of the game, there was no statistically significant difference in level of satisfaction between participants from teams that completed the game on time and those from teams that were unsuccessful. Relative to members of the successful teams, participants from teams that did not complete the game within the time limit had significantly lower agreement that the escape game was relevant to their practice and that the game was an effective way to communicate information about ROPs (Table 2).

The project required 148 person-hours of the study team's time: 62 person-hours to develop the game, 6 person-hours to develop and implement the communication plan, 30 person-hours to set up the room and the puzzles (for multiple iterations of the game), 36 person-hours to run the games, and 14 person-hours to manage the project. In addition to the cost of team members' time, expenses for the project were related to communication efforts ($400) and accessories ($200).

DISCUSSION

This study has demonstrated the feasibility of designing and presenting an escape game focused on knowledge of the medication-use system and the organizational practices required by a health accreditation body. To our knowledge, only one other escape game has been developed and described in the context of preparing for an accreditation visit.[9]

The concept of escape games dates to the early 2010s.[10] In a literature review published in 2019, our team identified 16 publications (conference abstracts and articles) concerning escape games in the field of health care.[8] There are still few data available on this subject.

TABLE 2. Participants' Satisfaction with the Escape Game

Statement	Success; % (*n*/*N*) Agreeing[a] with Statement		*p* Value
	Successful	Unsuccessful	
I enjoyed the escape game very much	96 (102/106)	84 (79/94)	0.003
I think the activity was very well organized	97 (103/106)	93 (87/94)	0.14
I think the activity was of very good quality	97 (103/106)	91 (86/94)	0.08
The escape game is relevant in the context of my duties	94 (99/105)	74 (68/92)	< 0.001
An escape game is an effective way to communicate ROPs	96 (101/105)	82 (75/91)	0.001
The escape game allowed me to work on team communication	95 (101/106)	90 (82/91)	0.09
Advertising around the game encouraged me to participate	78 (83/106)	71 (65/92)	0.22
I would recommend this game to my colleagues	97 (103/106)	83 (77/93)	0.001

ROP = required organizational practice.
[a]Agreement based on the number who selected "strongly agree" or "partially agree" on the Likert-type scale.

Our escape game had similarities to other escape games that have been described in the literature. For example, it was intended for health care professionals and students[11-14] and was designed to improve participants' knowledge of a given topic[11,15-17] and to develop teamwork and collaboration.[18,19] However, our game did not include specific measurement tools to verify knowledge acquisition and retention. Only 2 other previously reported escape games have included a knowledge assessment.[17,20]

Our game was, above all, intended to create a fun and satisfying learning environment, as was achieved by Nelson and others[11] and Kinio and others.[14] As originally conceived, our rules of play targeted teams of 4 people, but we allowed teams of 2 to 6 players to participate, so that no volunteers were turned away. Teams of 2 to 6 players have been reported in previous studies, depending on the games developed.[12-14,16,17,21,22] Larger numbers of players are generally not desirable, given the size of the game space and the number of concurrent activities to be performed by the participants. If there are too many players, participation and participant satisfaction could be compromised.

Although our team devised a detailed communications plan, including strategies such as a video to generate curiosity and interest, we found it relatively difficult to recruit participants. Our study took place in a university hospital, where it can be difficult to plan for health workers' participation in activities like this, given changing clinical activities and needs for patient care. Some participants were allowed to participate during their regular working hours, whereas others chose to participate in the game during their lunch breaks. Additionally, team managers varied in the extent to which they promoted this study among their staff. Nonetheless, we were pleased to have a total of 200 participants.

It can also be difficult to generate interest in activities related to accreditation visits. Typically, many actions must be taken to correct discrepancies noted during audits and self-assessment. In contrast, our escape game was designed in a fun way, without knowledge assessments before and after the game, to encourage participation and discussion. Some teams included managers, which may have led some participants to be more reserved about getting involved, because of the risk of highlighting their ignorance of certain ROPs. For the game to remain fun, it is important that participants feel they are on an equal footing with their teammates and that they feel united in striving to achieve a common goal.

Our study has highlighted the following conditions for success in the design and implementation of an escape game in a health care setting. First, the game should be as realistic as possible and should be pretested. Second, the game must be designed to ensure a high success rate, such that the majority of teams are able to succeed, to justify their effort and to reinforce the positive messages transmitted. In the evaluation survey for our game, a lower proportion of participants who did not successfully complete the game within the available time rated the activity as relevant to their work compared with those who successfully completed the activity (74% versus 94%, $p < 0.001$). Third, the activity must remain confidential within the team, to allow participants to fully engage in the game without fear of being evaluated by a superior or a colleague outside the team. Fourth, the activity must be fun (including the presence of funny, surprising elements that stand out from everyday life). Fifth, the choice of facilitator is important because this person must be able to mobilize participants quickly, by giving clear instructions and offering pleasant feedback. Finally, a debriefing session may be useful, to ensure complete transfer of the shared knowledge.

We developed this game as part of our facility's training courses in pharmacy and risk and quality management. Thus, other than the time invested by students in their training, development costs were limited. Despite these limited costs, it is uncertain whether the results achieved are worth the effort required. In other words, could the 6 ROPs be taught to 200 people more efficiently, and could we have transmitted more knowledge during the 30-minute period of the game? Although the game was generally successful and the participants enjoyed the activity, we believe that other, traditional approaches would be more effective in imparting knowledge. However, participating in a fun activity was appreciated by staff and stood out in a stressful health care environment. Our study did not allow us to measure the indirect benefits on the work environment or the residual appreciation of participants in the weeks and months following the activity.

This study had some limitations. We did not conduct any debriefing after each iteration of the game, which could have helped to fill in knowledge that participants did not attain during the game and to answer questions and comments from participants. Thus, our escape game cannot be fully considered as a simulation tool but rather can be construed only as a serious game. Our study did not include a measure of knowledge retention over time. Although participants reported a high level of satisfaction, we could not verify whether the game actually improved their knowledge of ROPs. Doing so would have required measurement of their level of knowledge before and after the game. As mentioned previously, we believe that participation in such a game must be confidential, to ensure that participants express themselves freely and have fun during the activity. Any pre-and-post evaluation would require participant identification and loss of confidentiality.

CONCLUSION

As part of the preparation for a hospital accreditation visit, it was feasible to design, implement, and evaluate an escape game involving a selection of organizational practices

required by Accreditation Canada. The use of escape games is now a recognized knowledge transfer strategy and is appreciated by health care staff. More work is needed to confirm the impact of escape games on the acquisition and retention of shared knowledge.

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Clinical Pharmacy Services in Ambulatory Oncology: An Environmental Scan of the Canadian Practice Landscape

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ABSTRACT

Background: Canadian clinical pharmacy key performance indicators (cpKPIs) have been developed for inpatient hospital practice but are not established for ambulatory oncology. This study represents the first step in developing cpKPIs for ambulatory oncology.

Objectives: To describe the current landscape of pharmacy services in ambulatory oncology in Canada and to identify perspectives related to the development and implementation of cpKPIs in this practice setting.

Methods: In this national cross-sectional study, a web-based questionnaire was distributed to pharmacists working in ambulatory oncology settings. Potential participants who self-identified as pharmacists practising in an ambulatory oncology setting were eligible. Survey questions focused on participants' demographic characteristics, oncology pharmacy services provided, metrics captured, and pharmacists' perceptions of cpKPIs. All data were analyzed using descriptive statistics.

Results: A total of 44 responses were received, with most respondents practising in community hospitals in British Columbia, Ontario, and Atlantic Canada. The services most commonly provided were chemotherapy order verification, laboratory monitoring, identification and resolution of drug therapy problems, and counselling on anticancer medications. Twenty-six of the 44 respondents (59%) indicated that performance metrics or patient outcomes were tracked at their respective institutions, with none being universally captured. Overall, 43 (98%) of the respondents favoured the development of cpKPIs for ambulatory oncology practice.

Conclusions: Despite growing patient care needs in ambulatory oncology, there is significant heterogeneity in the scope of pharmacy services offered and the outcomes used to qualify their impact within this setting across Canada. This study demonstrates a clear need for national consensus cpKPIs to inform pharmacy resource utilization and patient-centred quality improvement initiatives.

Keywords: clinical pharmacy key performance indicator, key performance indicator, ambulatory oncology, oncology pharmacy, outpatient oncology, Canada

RÉSUMÉ

Contexte : Des indicateurs clés de performance de la pharmacie clinique canadienne (cpKPI) ont été élaborés pour la pratique hospitalière en milieu hospitalier, mais n'ont pas été définis pour l'oncologie ambulatoire. Cette étude constitue la première étape de l'élaboration de cpKPI pour l'oncologie ambulatoire.

Objectifs : Décrire le paysage actuel des services pharmaceutiques en oncologie ambulatoire au Canada et cerner les perspectives liées au développement et à la réalisation de cpKPI dans ce contexte de pratique.

Méthodes : Dans cette étude transversale nationale, un questionnaire en ligne a été distribué aux pharmaciens qui travaillent en oncologie ambulatoire. Les participants potentiels qui se sont identifiés comme des pharmaciens exerçant dans ce contexte étaient autorisés à participer. Les questions de l'étude portaient sur les caractéristiques démographiques des participants, les services de pharmacie offerts en oncologie, les paramètres saisis et les perceptions des pharmaciens à l'égard des cpKPI. Toutes les données ont été analysées à l'aide de statistiques descriptives.

Résultats : Au total, 44 réponses ont été reçues, la plupart des répondants exerçant dans des hôpitaux communautaires de la Colombie-Britannique, de l'Ontario et du Canada atlantique. Les services les plus couramment fournis étaient : la vérification des ordonnances de chimiothérapie, la surveillance en laboratoire, l'identification et la résolution des problèmes de pharmacothérapie et les conseils portant sur les médicaments anticancéreux. Vingt-six des 44 répondants (59 %) ont indiqué que les indicateurs de performance ou les résultats pour les patients faisaient l'objet d'un suivi dans leurs établissements respectifs, bien qu'aucun ne soit universellement saisi. Dans l'ensemble, 43 répondants (98 %) étaient favorables à l'élaboration de cpKPI pour la pratique de l'oncologie ambulatoire.

Conclusions : Malgré les besoins croissants des patients en oncologie ambulatoire, la portée des services pharmaceutiques offerts et les résultats utilisés pour qualifier leur effet dans ce contexte au Canada sont fortement hétérogènes. Cette étude démontre un besoin évident de consensus portant sur les cpKPI à l'échelle nationale pour éclairer l'utilisation des ressources pharmaceutiques et les initiatives d'amélioration de la qualité centrées sur le patient.

Mots-clés : indicateurs clés de performance de la pharmacie clinique, indicateur clé de performance, oncologie ambulatoire, pharmacie oncologique, oncologie ambulatoire, Canada

INTRODUCTION

Clinical pharmacy key performance indicators (cpKPIs) are quantitative measures of quality; they reflect pharmacy practice activities associated with evidence-based improvements in meaningful patient outcomes.[1,2] Standardized metrics such as cpKPIs are valuable for several reasons, but ultimately they can measure progress toward minimum practice standards, demonstrate the value of pharmacy services, and justify resource allocation. They also allow for comparison within and between institutions and identification of opportunities for improvement and advancement, with the goal of ensuring that all patients are receiving the highest quality health care.

In 2015, the Canadian Society of Hospital Pharmacists (CSHP) published a Canadian consensus guideline, which detailed 8 cpKPIs relating to inpatient hospital pharmacy.[1] However, these metrics are not generalizable to activities performed in an ambulatory pharmacy setting, which can differ significantly from inpatient care activities. In fact, very few international cpKPIs exist for ambulatory pharmacy, and, to our knowledge, there are none established for oncology pharmacy practice.[3,4]

In recent years, oncology pharmacy practice has evolved toward having a more specialized and patient-centred focus, to meet the increasing patient care needs that have resulted from the growth of complex anticancer therapies, multiple lines of therapy, and increased overall survival.[5-7] Oncology pharmacists have become important members of multidisciplinary care teams, and their contributions to optimizing drug therapy have had meaningful impacts on patient outcomes.[8-22] They are involved in routine direct patient care activities, such as medication reconciliation, but they also participate in services such as clinical trials, which indirectly affect patient care.[5,8,14] Given the wide spectrum of adverse effects associated with anticancer therapies, oncology pharmacists also play a critical role in educating patients, preventing drug interactions, monitoring for toxicities, managing disease-related symptoms, and providing supportive care.[8,12,23-26]

In parallel with these advancements, there has been a notable shift toward providing cancer treatments in outpatient clinics and within the community.[8] This has created opportunities for clinical pharmacy services within ambulatory oncology. For example, pharmacists may be involved in formal follow-up programs and adherence assessments.[7,16,19,27,28] Nonetheless, the pharmacist's role in ambulatory oncology remains largely undefined within and across organizations. Without benchmarks or metrics to capture the impact of pharmaceutical care activities, the evolution of this practice area has lacked a guiding direction. To ensure continued practice advancement that will translate into improved quality of care for oncology patients across Canada, it is imperative to define appropriate, meaningful, objective indicators.[6] Thus there exists a need to reach consensus as to what constitutes a cpKPI for ambulatory oncology pharmacy.

Before cpKPIs can be established in this practice setting, it is crucial to first understand the current practice landscape in Canada. The primary objective of this study was to describe the ambulatory oncology pharmacy services provided across Canada and how their impact is currently being assessed. The secondary objective was to describe oncology pharmacists' perceptions of the development, implementation, and evaluation of cpKPIs in this practice setting. It was anticipated that the results of this study would reveal gaps in the services provided by ambulatory oncology pharmacists, demonstrate a need for standardized metrics, and help inform future steps for developing candidate cpKPIs.

METHODS

An anonymous, online, cross-sectional survey was distributed to more than 650 oncology pharmacists in Canada from March 23 to September 14. 2020. The study protocol was reviewed and approved by the University of Waterloo Research Ethics Committee (ORE#41716).

Participants

The target survey population consisted of pharmacists in Canada providing care to patients with malignant disease treated in an outpatient setting. This definition encompassed pharmacists working in outpatient health care institutions and specialty community pharmacies. Participants self-identified as meeting the inclusion criteria and provided informed consent before beginning the survey. Pharmacy technicians, pharmacy students, and pharmacists working solely in an inpatient oncology practice were ineligible to participate, and survey responses that were incomplete were excluded from the analysis.

Survey Questionnaire

Data were collected through an online questionnaire, which was based on the study objectives and informed by relevant publications investigating pharmacist interventions in ambulatory oncology. The survey collected demographic information about the participants (e.g., years in oncology practice, practice site setting and province of work, oncology subspecialties, amount of direct oncology patient care), as well as pharmacy oncology services provided and details of any metrics captured by either individual pharmacists or their institution. Participants were asked to indicate how often they provided listed patient care activities according to a 4-point Likert scale (ranging from "never" to "often"). Lastly, participants were asked to provide feedback regarding the development and implementation of cpKPIs for ambulatory oncology.

Five oncology pharmacists in the study working group (L.H., J.W., M.L., S.E., T.M.) piloted the survey questionnaire for content validity, comprehensiveness, and clarity. These 5 pharmacists were excluded from participating in the survey.

Data Collection

The survey was conducted using Qualtrics Research Core software, version 05-09/2020 (© 2020, https://www.qualtrics.com). The survey was distributed to all members of the Canadian Association of Pharmacy in Oncology (CAPhO), a national voluntary organization of oncology pharmacy practitioners. An invitation detailing the purpose of the study and how to participate was featured in the news section of the CAPhO website and distributed through CAPhO's social media page and e-newsletter, and was also distributed by personal communication from individual study team members to pharmacists in the field using a snowball technique. Responses to the survey were voluntary, and no compensation or other incentives were offered. Participants could withdraw from the survey at any time before their responses were submitted. Respondents were assured that all information was anonymous and that no individual could be identified from the results. Two email reminders were sent through the CAPhO distribution process described above, at 1 month into data collection and 1 month before the last day of survey availability.

Statistical Analysis

All data were synthesized and presented as descriptive statistics, including frequencies and means.

RESULTS

Of the 60 people who opened the survey, 4 did not meet the inclusion criteria and 12 submitted an incomplete response. Therefore, a total of 44 ambulatory oncology pharmacists self-identified as meeting the study inclusion criteria and submitted complete responses to the survey. The demographic and practice characteristics of these pharmacists are presented in Table 1. Survey responses were received from 9 provinces, and most respondents were practising in British Columbia, Ontario, or Atlantic Canada. On average, respondents had been practising in oncology care for 10 years (range 0.5–30 years). Almost half of respondents worked in community hospitals, with 12 (27%) working in university-affiliated teaching hospitals, 2 (5%) working in specialty oncology pharmacies, and 2 (5%) working in other settings such as a cancer centre or BC Cancer. The majority of respondents (n = 29, 66%) reported that they spent more than half of their day on direct oncology patient care services, and 26 (59%) reported that they saw 10 to 50 cancer patients per week in a direct patient care setting.

TABLE 1. Characteristics of Respondents (n = 44)

Characteristic	No. (%) of Respondents[a]
Time in practice (years) (mean and range)	9.7 (0.5–30)
Province or territory	
British Columbia	8 (18)
Alberta	2 (5)
Saskatchewan	1 (2)
Manitoba	3 (7)
Ontario	13 (30)
Quebec	3 (7)
Newfoundland and Labrador	6 (14)
Nova Scotia	5 (11)
New Brunswick	3 (7)
Prince Edward Island	0 (0)
Northwest Territories, Yukon, Nunavut	0 (0)
Practice setting	
Community hospital, urban setting (population > 100 000)	20 (45)
University-affiliated teaching hospital	12 (27)
Rural hospital (population < 100 000)	8 (18)
Specialty non–hospital oncology pharmacy	2 (5)
Other[b]	2 (5)
Type of patient	
Medical and/or hematologic oncology	40 (91)
Radiation oncology	26 (59)
Blood and bone marrow transplant	23 (52)
Pediatric	10 (23)
Direct oncology patient care services per day (%)	
< 25	8 (18)
25–50	7 (16)
51–75	9 (20)
> 75	20 (45)
No. of cancer patients seen per week	
< 10	8 (18)
10–50	26 (59)
51–100	6 (14)
> 100	3 (7)
Did not specify	1 (2)

[a]Except where indicated otherwise.
[b]Responses included BC Cancer, cancer centre.

Pharmacist Services

Twenty of the 44 respondents (45%) reported that their respective institutions currently had a formal pharmacist-led monitoring program for oncology patients, with the follow-up duration varying considerably, from 1 cycle to all treatment cycles. Figure 1 details the direct and indirect patient care activities reported by respondents. The direct patient care services most commonly reported as being provided by the oncology pharmacists were chemotherapy order verification, laboratory monitoring, counselling on new oncology prescriptions, and identification and resolution

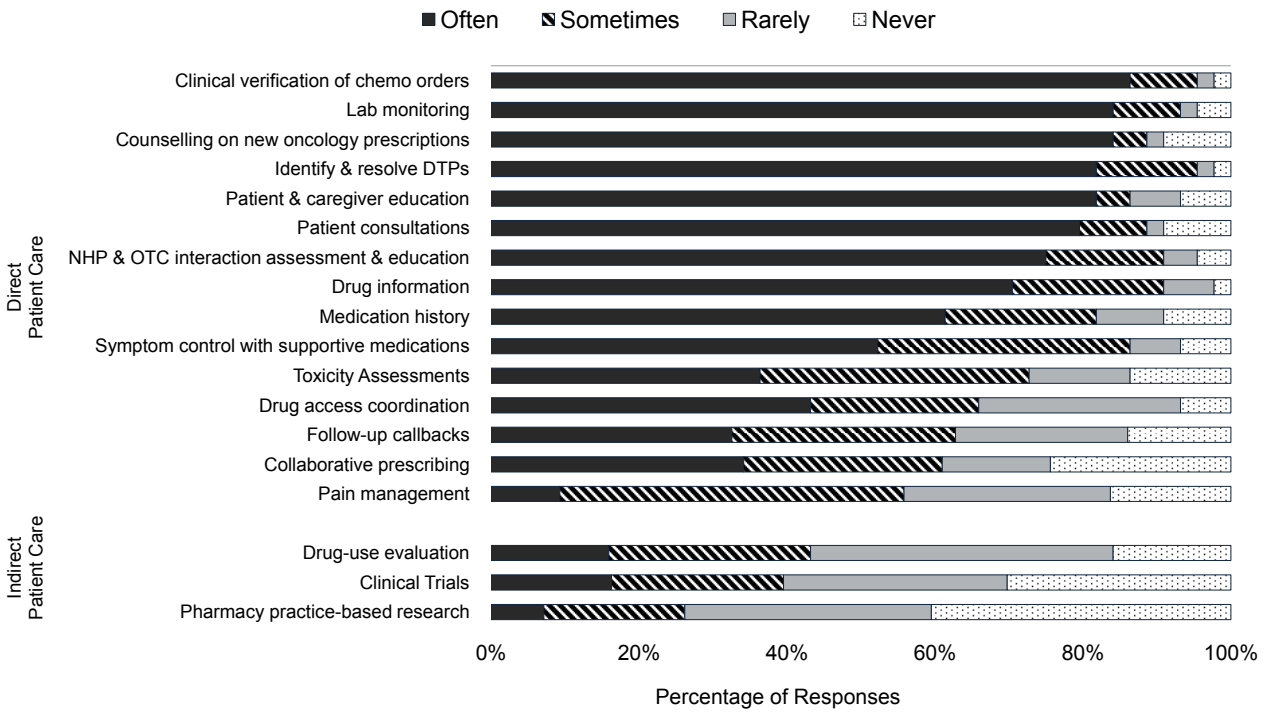

FIGURE 1. Frequency of patient care activities performed by ambulatory oncology pharmacists. Other activities identified in the comments section of the survey: therapeutic drug monitoring, bedside rounds, education of learners and other health care providers, protocol development, hospital committee work such as formulary management, and software programming. DTP = drug therapy problem, NHP = natural health product, OTC = over the counter.

of drug therapy problems. In contrast, the direct patient care services provided least often included pain management, follow-up call-backs, and collaborative prescribing. Similar trends were observed when data were stratified according to the amount of time that respondents reported spending on direct patient care.

With respect to indirect patient care activities, 23% to 43% of pharmacists reported they were "sometimes" or "often" involved in activities such as drug-use evaluation, clinical trials, and practice-based research (Figure 1). However, a number of additional activities were recognized by survey respondents, such as education of pharmacy learners and other health care providers, protocol development, and participation in hospital committee work such as formulary management and software programming. When the data were stratified by the amount of time spent on direct patient care, oncology pharmacists who had less time for direct patient care were also less likely to be involved with the indirect patient care services specified in the survey.

Pharmacy Performance Metrics and Outcome Measures

Twenty-six (59%) of the respondents stated that either they or their department currently tracked pharmacy performance metrics or statistics related to patient outcomes. Of the institutions that did such tracking, half collected data longitudinally across multiple clinic visits. Such metrics were usually captured by the pharmacy department; however, a handful of pharmacists reported that they personally tracked outcome measures (Figure 2). No metric was universally captured; the metrics most often collected included time spent on patient care visits and phone calls, pharmacist intervention rate, number of serious adverse events, and medication error rate. One respondent reported that both they and their institution tracked CSHP's national consensus cpKPIs. Use of an electronic documentation system (n = 24, 55%) and self-reporting (n = 12, 27%) were the most common methods to capture this information; patient surveys (n = 7, 16%) and Microsoft Excel (n = 1, 2%) were less often used.

Pharmacists' Perceptions of Key Performance Indicators for Outpatient Oncology

Overall, 43 (98%) of the respondents said they would favour the development of cpKPIs for ambulatory oncology. Respondents reported that cpKPIs were an opportunity to set practice standards across institutions, facilitate training of new staff, provide a tool to demonstrate the value of clinical pharmacy activities, and enable negotiations with management for increased staffing. Reported barriers were fairly consistent across responses; common themes included the lack of time and staffing to implement and document cpKPIs, difficulties with accurately capturing metrics across different electronic systems, lack of evidence in the literature

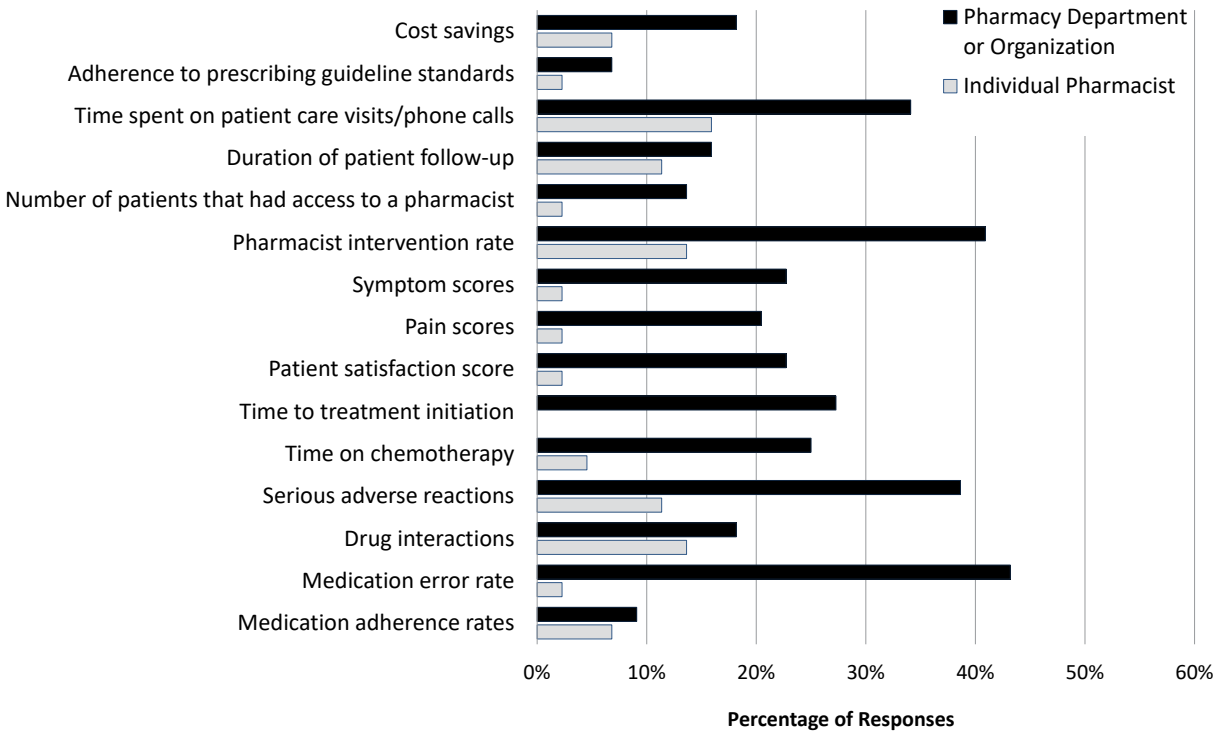

FIGURE 2. Frequency of pharmacy performance metrics and patient outcomes captured by individual pharmacists or by their respective pharmacy departments or organizations. Other metrics identified in the comments section of the survey: Canadian Society of Hospital Pharmacists' clinical pharmacy key performance indicators, intervention codes, number of new patients, total number of patients treated.

to support clinical pharmacy activities in ambulatory oncology, and challenges in achieving consensus within and across provinces and institutions. Respondents also reported a number of enablers that could help to overcome these challenges, such as the use of technology and expansion of the role of registered pharmacy technicians.[29] Furthermore, several respondents mentioned the strong network that exists within oncology pharmacy in Canada, which is supported by a national organization (i.e., the CAPhO) that could assist with value messaging and pharmacist buy-in.

DISCUSSION

To our knowledge, this is the first study attempting to describe pharmacist services provided in ambulatory oncology and to identify how these activities are being assessed. Our study captured pharmacists' perspectives across a variety of ambulatory oncology practice settings in Canada—from hospitals to specialty community pharmacies.

Overall, the activities performed by pharmacists in this practice setting were heterogeneous, which was recognized by survey respondents as a potential barrier to the cpKPI development process. Nonetheless, pharmacists appeared to be involved in a core group of activities, namely, chemotherapy order verification, laboratory monitoring, identification and resolution of drug therapy problems, and counselling on new oncology prescriptions. A recent systematic review reported that the largest benefit of pharmacist activities in outpatient oncology was the improvement in medication safety.[8] It is therefore reassuring that the majority of respondents were heavily involved in activities that contribute to this outcome, such as identification and resolution of drug therapy problems. The provision of patient education has also previously been reported as a key intervention by pharmacists in ambulatory oncology.[9,30-32] This intervention significantly decreases symptoms related to cancer, reduces adverse events, and leads to improvement in patients' quality of life.[9] Pharmacist-led patient education is a valued service, as evidenced by its inclusion as a consensus cpKPI in other practice settings.[3,4,33]

Fewer than half of respondents (45%) reported that their institution had a formal pharmacist-led monitoring program, and even fewer reported that they are often involved in toxicity assessments. These results are comparable to findings in a previous study conducted in Atlantic Canada, which found that fewer than 60% of practice sites had a follow-up service facilitated by the oncology pharmacy team.[7] This presents an opportunity for expanded pharmacy services, as such programs have been shown to reduce treatment-related adverse effects and improve patient adherence, and they are effective at identifying drug therapy problems.[7,16,18,19,23,27,28,34]

In our study, pharmacists who spent less time on direct patient activities were also less involved in indirect patient

care activities. This finding seems counterintuitive; however, the list of services on the survey questionnaire was by no means exhaustive, so this result likely reinforces the extent of administrative responsibilities not captured by the survey in which ambulatory oncology pharmacists can be heavily involved. This result also highlights how involvement in direct patient care can lead to increased opportunities for pharmacists to contribute to system-level advancements in patient care. This aligns with the World Health Organization's concept of a nine-star pharmacist, a concept detailing the goals for a robust and comprehensive role for pharmacists.[35,36]

In a recent US-based study, a Delphi expert panel was used to identify the clinical services that board-certified oncology pharmacists most frequently perform.[31] Similar to our study, the panel found that pharmacists were highly involved in adjusting chemotherapy, providing patient education, and managing adverse events. Interestingly, the Delphi panel also identified frequent pharmacist involvement in pain management and toxicity assessments, which does not align with the results of our study. Unfortunately, the Delphi panel study did not appear to incorporate literature or patient outcomes to help guide the consensus activities and thus the panel's conclusions may not represent evidence-informed practice.

Our results showed that pharmacy performance metrics were captured by only about half of the survey respondents. Clinical outcomes were most often evaluated indirectly through the use of pharmacist intervention rate, whereas direct clinical outcomes (e.g., symptom scores) were less commonly captured. Metrics pertaining to patient safety constituted a dominant theme, which is not surprising given that medication safety is a key and valuable role in which pharmacists are regularly involved.[8] The time spent on patient care visits was also commonly collected, which likely pertains to pharmacy resource allocation. It is unclear exactly how these metrics are utilized in practice by pharmacy management or organizations, as that type of analysis was outside the scope of this study.

There was practically unanimous support from survey respondents for the development of cpKPIs for the ambulatory oncology setting. They recognized that to make a compelling case to management for increased pharmacy staffing, it is imperative to demonstrate that pharmacy services have significant value in terms of patient outcomes. Unfortunately, we found that high-quality evidence to support this case is limited, and future practice-based research is likely needed to bridge some of these evidence gaps.[9] Relatively few published studies have focused on outpatient oncology pharmacy, and much of the literature consists of single-centre observational studies with small sample sizes. A commonly reported barrier to cpKPI implementation by survey respondents was staff shortages and lack of time to take on additional responsibilities. On the basis of these reported concerns, pharmacists will likely place value on cpKPIs that are practical to implement and efficient to measure. The increased use of electronic reporting platforms may also help facilitate the ease of use and feasibility of cpKPI tracking.

Limitations and Future Directions

This study had some limitations that should be highlighted. First, the number of survey responses was low, despite the survey being left open for an extended period. The study was conducted during the COVID-19 pandemic, and no incentives were offered, which may have negatively affected participation. We were also unable to calculate a true survey response rate for 2 reasons: CAPhO membership includes pharmacists working in areas outside the target population of this survey and CAPhO membership is voluntary, such that additional survey distribution relied on the snowball technique. For these reasons, we could not accurately determine the total number of eligible participants who received the survey. Moreover, because not all ambulatory oncology pharmacists are CAPhO members, there was likely an underrepresentation of pharmacists working in this specialty pharmacy setting.

Additionally, these data were primarily driven by participants in a few select provinces. It is therefore challenging to assess whether these results are generalizable to all Canadian pharmacists working in ambulatory oncology. We also recognize that the survey did not allow participants to delineate between rural and suburban practice areas, and the prespecified population threshold used to define these categories was somewhat arbitrary. More extensive subgroup analyses were limited by the relatively small sample size of this study and would be exploratory in nature. As such, we are unable to describe variation in workload or allocation of pharmacy resources across institutions and provinces. Similarly, we could not confidently determine workplace factors that may be affecting pharmacists' activities or contributing to reported cpKPI barriers.

To address these limitations and move forward with the cpKPI development process, the next phases of this research will include structured interviews and focus group discussions with both pharmacy management and frontline pharmacists working in ambulatory oncology practice settings. The results of this survey will help inform the question development for these qualitative semistructured discussions, as well as future Delphi panel surveys.

CONCLUSION

These survey results suggest significant heterogeneity in the services that Canadian pharmacists provide for patients with malignant disease treated in an outpatient setting. Similarly, a wide range of metrics and patient outcomes are being captured by only a limited number of institutions.

This study demonstrates a clear need for, and end user interest in, national consensus cpKPIs within this practice setting. However, further practice-based research is likely needed to fill evidence gaps and inform cpKPI development.

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Impact of Implementing Electronic Health Records on Medication Safety at an HIMSS Stage 6 Hospital: The Pharmacist's Perspective

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ABSTRACT

Background: Medication errors can cause severe injuries and may lead to death. Electronic health records (EHRs) that are well designed and implemented could help to reduce medication errors. The medication management process needs close study to understand how medication safety metrics evolve as hospitals mature in terms of their EHR implementation.

Objective: To examine the effect of adopting EHRs on medication errors at the Royal Commission Hospital in Jubail, Saudi Arabia, a Health Information Management System Society (HIMSS) stage 6 hospital.

Methods: This study had a quasi-experimental time-series design. Retrospective data were collected for 1.5-year periods before and after implementation of EHRs. The variables analyzed were obtained from various units in the study setting. Data on medication errors were collected from the risk management section of the quality department. The medication management process was studied qualitatively. The quantitative data were analyzed using descriptive and inferential statistics.

Results: The median number of medication orders per patient showed a significant decrease, from 22.76 before EHR implementation to 18.76 after implementation ($p < 0.001$). The median number of incidents per patient showed a significant increase, from 0.029 before to 0.040 after implementation ($p = 0.004$). The qualitative analysis of processes involved in the medication management process helped to explain these changes.

Conclusion: Contrary to expectations, this study showed that an HIMSS stage 6 hospital could experience an increase in medication errors following implementation of EHRs. Qualitative analysis showed that the increase in medication error reporting rate could be attributed to an increase in detection following improvement in the medication management process. This has implications for interpreting quality metrics as hospitals mature in terms of their EHR implementation.

Keywords: electronic health record, medication errors, medication safety, pharmacist intervention

RÉSUMÉ

Contexte : Les erreurs de médication peuvent causer des blessures graves et entraîner la mort. La bonne conception et la mise en place de dossiers de santé électroniques (DSE) pourraient aider à les réduire. Le processus de gestion des médicaments doit faire l'objet d'un examen attentif pour comprendre comment les paramètres de sécurité relatifs aux médicaments évoluent à mesure que les hôpitaux se modernisent grâce à la mise en place de DSE.

Objectifs : Examiner l'effet de l'adoption des DSE sur les erreurs de médication au Royal Commission Hospital de Jubail, en Arabie saoudite, un hôpital de stade 6 de la Health Information Management System Society (HIMSS).

Méthodes : Cette étude utilisait une méthodologie de série chronologique quasi expérimentale. Des données rétrospectives ont été recueillies pendant des périodes de 1,5 an avant et 1,5 an après la mise en place des DSE. Les variables analysées ont été obtenues à partir de diverses unités dans le cadre de l'étude. Les données sur les erreurs de médication ont été recueillies auprès de la section de gestion des risques du service qualité. Le processus de gestion des médicaments, quant à lui, a été étudié de manière qualitative. Les données quantitatives ont été analysées à l'aide de statistiques descriptives et inférentielles.

Résultats : Le nombre médian d'ordonnances médicales par patient a fortement diminué, passant de 22,76 avant à 18,76 après la mise en place des DSE ($p < 0,001$). Le nombre médian d'incidents par patient a quant à lui augmenté de manière importante et est passé de 0,029 avant à 0,040 après la mise en place des DES ($p = 0,004$). Les résultats de l'analyse qualitative des étapes du processus de gestion des médicaments expliquent en partie ces changements.

Conclusion : Contrairement aux attentes, cette étude a montré qu'un hôpital de stade 6 de la HIMSS pourrait connaître une augmentation des erreurs de médication à la suite de la mise en place de DSE. L'analyse qualitative a montré que l'augmentation du taux de déclaration des erreurs de médication pouvait être attribuée à une augmentation de la détection suivant l'amélioration du processus de gestion des médicaments. Ce constat a des implications pour l'interprétation des indicateurs de la qualité à mesure que les hôpitaux se modernisent en mettant en place des DSE.

Mots-clés : dossier de santé électronique, erreurs de médication, sécurité des médicaments, intervention en pharmacie

INTRODUCTION

Medication safety plays an important role in reducing medication errors. All health care providers (including hospital pharmacists) are collectively responsible for reducing medication errors. In the modern era, health care providers are digitally connected through electronic health records (EHRs). The EHR serves as the information-gathering medium for the patient. As reported by Atasoy and others,[1]

> Ideally, information gathering begins before a patient encounter, retrieving records from other providers or past patient encounters. This, and other information, is then updated at the beginning of the patient's interaction with the physician or nursing staff; additional data—such as lab values, images, and progress notes—are added as the encounter progresses.

At a minimum, the EHR facilitates documentation and communication among health care providers, reduces misunderstanding and miscommunication, and expedites the provision of care. EHR systems can be enhanced to include e-prescribing, as well as testing for drug–drug interactions, testing for drug allergies, testing for dosing errors, and subsequent documentation of the results of testing once completed.[2] In general, the benefits of EHRs far outweigh their drawbacks.[2-5]

Despite the many advantages of EHRs, medication errors continue to occur. From the perspective of the hospital pharmacist, medication errors "may occur in the storage, prescribing, transcription, preparation and dispensing, or administration and monitoring of medications."[6] Hence, for the purpose of enhancing the role of hospital pharmacists in reducing medication errors, the International Pharmaceutical Federation, in its revised "Basel Statements on the Future of Hospital Pharmacy" (approved in 2014), made several pertinent recommendations. Some of these recommendations deal with the interaction of the pharmacist with the EHR for the purposes of documentation and therapeutic decision-making.[7] In this regard, Nelson and others[8] performed a literature review and summarized 3 main ways in which pharmacists use EHRs. The first is documentation, which includes medication reconciliation notes, allergy documentation, and "interventions". The second is medication reconciliation, which includes comparing and contrasting medication lists and "[evaluating] effectiveness and adverse drug events." The third is patient evaluation and monitoring, which includes "identifying potential medication problems, reviewing medication regiments, [and] checking drug-drug interactions".[8]

It is thus important to shed light on the pharmacist's role in medication safety within the EHR environment. However, given that EHR implementation is not uniform in all health care settings, a yardstick is needed to measure the level of implementation in each setting, to better contextualize the pharmacist's role. A good tool for this purpose is the Health Information Management Systems Society (HIMSS) electronic medical record adoption model (EMRAM).[9] This model, developed in 2005, comprises 8 stages, numbered from 0 to 7. At stage 0, none of the 3 ancillaries (laboratory, radiology, and pharmacy) is installed. At stage 1, EHR systems are installed in all 3 ancillaries. Over time, the EHR system matures progressively until, by stage 7, it has become paperless.[9] In this staging process, metrics are developed for monitoring progress from one stage to the next. This model assumes a steady increase in "indicators of good performance" and, correspondingly, a steady decrease in "indicators of poor performance". For example, medication errors are reduced by stage 4 and eliminated by stage 6.[9]

Evidence is now emerging to challenge this narrative. As Bowman[10] has pointed out, it is not merely the design of the EHR system that is important, but also its implementation, or how it is incorporated into clinical processes and how users apply it in routine clinical care. In short, there is a qualitative dimension to the use of EHRs, which is manifested in many ways. One example is found in the early literature on factors leading to the slow adoption of EHRs by physicians, despite availability.[1] The quantification of medication errors can be complemented by a qualitative investigation of process factors involved in the implementation of EHRs.

The study reported here takes a closer look at medication management within an EHR system. Once the EHR system has been implemented, it is expected that the medication management process—including assessing, prescribing, verifying and dispensing orders, administering, and monitoring—will change, either through the addition of new options or the modification of previous options. These new options, such as electronic medication reconciliation and availability of drug guidelines, would directly integrate standard pharmacy functions with the EHR. For such integration, pharmacists should be applying these options and providing the system team with feedback by reporting any medication errors that do occur.

The aims of the study were to compare the incidence of medication errors and the medication error reporting process before and after implementation of EHRs. The specific objectives were to calculate quantitative indicators of medication safety, to describe qualitative indicators of medication safety, to compare qualitative and quantitative indicators of medication safety before and after implementation of EHRs, and to ascertain the effect of EHR implementation on medication safety. It was anticipated that the results would be useful in reviewing the health care quality metrics as EHR systems progress from one HIMSS EMRAM stage to the next.

METHODS

Study Setting

The study was conducted at the Royal Commission Hospital in Jubail, Saudi Arabia, a 200-bed secondary care hospital providing inpatient and outpatient care to the local population. The hospital uses a commercial EHR system (BestCare), which was implemented on October 31, 2017. At the time of the study, the hospital was ranked at HIMSS stage 6; more recently, in November 2021, it was elevated to HIMSS stage 7.

Ethics Approval

The study received ethics approval from Imam Abdulrahman Bin Faisal University (IRB-PGS-2020-03-003) and the study setting where the research was conducted.

Study Design

The study had a quasi-experimental time-series design and was based on retrospective data for a 1.5-year period before the implementation of EHRs (February 1, 2016, to July 30, 2017) and a 1.5-year period after implementation (December 1, 2018, to May 31, 2019). Included in the study were incident reports and pharmacist interventions related to medication errors. A pharmacist intervention refers to action taken from the pharmacist to the prescriber intended to prevent a medication error. Before EHR implementation, medical staff submitted incident reports manually to the risk management unit; after EHR implementation, incidents were reported electronically to the same unit. Incident reports and pharmacist interventions not related to medication errors during the study period were excluded (e.g., adverse drug reactions and patients' refusal of medication therapy).

The study was a full population study (not a sample), because all medication errors satisfying the inclusion criteria were considered. The data (for all inpatients) for different units in the study setting were based on monthly reports obtained from the risk management department (incident reports) or the pharmacy department (pharmacist interventions). The medication errors were classified by staff members in the study setting (i.e., the Royal Commission Hospital) as wrong dose, wrong drug, drug–drug interaction, missed dose, wrong patient, wrong route, wrong dilution, wrong time, wrong frequency, wrong unit, wrong formula, expired medication, and contraindicated drug.

Statistical Analysis

For the analysis, 2 sets of data were collected, quantitative (based on the monthly reports) and qualitative. The monthly reports on medication-related incidents and medication orders (before and after EHR implementation) were normalized by patient data for comparability. The z-test for difference in proportion was used to compare proportions, and the Mann-Whitney *U* test was used to compare medians. Statistical significance was defined as $p < 0.05$. The analyses were done using PAST software.[11] The qualitative variables refer to medication management process functions before and after EHR implementation. Using a qualitative approach, the medication management process was broken down into steps, and the risks of medication error before and after EHR implementation were identified and analyzed.

RESULTS

Depending on the number of patients seen, monthly medication orders at a hospital can run into the hundreds or thousands. Table 1 shows the monthly numbers of medication orders in relation to the number of patients at the study site before and after EHR implementation. The median medication order per patient was 22.76 before EHR implementation and 18.76 after implementation. According to the Mann-Whitney *U* test, the difference between the medians was statistically significant ($p < 0.001$). Similarly, Table 2 shows the monthly incident reports in relation to the number of patients at the study site before and after EHR implementation. The median incidents per patient was 0.029 before EHR implementation and 0.040 after implementation. According to the Mann-Whitney *U* test, the difference between the medians was statistically significant ($p = 0.004$).

The breakdown of medication errors by type is shown in Table 3 for the period before implementation and in Table 4 for the period after implementation. The most frequent type of error before EHR implementation was wrong-dose errors (42 reports), followed by wrong-drug errors (33 reports), whereas errors involving expired medication were least frequent (3 reports) (Table 3). After EHR implementation, the pattern for most and least frequent error types was similar: wrong-dose errors remained most frequent (121 reports), followed by wrong-drug errors (95 reports), with errors involving expired medication being least frequent (3 reports) (Table 4).

Before implementation of the EHR system, pharmacist interventions were performed but not recorded (Table 3). After implementation, pharmacist interventions were documented automatically in the EHR system (Table 4). The total number of pharmacist interventions in the post-implementation period was 5329, with the highest monthly total ($n = 445$) in January 2019. In addition, the highest monthly number of reported errors after implementation ($n = 26$ in August 2018) did not correspond to the highest monthly number of orders, but rather to the lowest number of pharmacist interventions (165).

To complement this quantitative analysis, a qualitative description of pharmacist interventions and the medication management process was carried out and is summarized in Table 5. The overall process was subdivided as follows: assessing, prescribing, verifying and dispensing the order,

TABLE 1. Medication Orders per Patient before and after Implementation of Electronic Health Records[a]

Month and Year	No. of Medication Orders	No. of Patients	Orders/ Patient
Before implementation			
2016			
February	8 419	436	19.31
March	8 504	430	19.78
April	8 398	415	20.24
May	8 615	416	20.71
June	8 065	325	24.82
July	8 171	293	27.89
August	8 713	338	25.78
September	8 935	349	25.60
October	8 809	454	19.40
November	9 674	393	24.62
December	9 802	483	20.29
2017			
January	9 764	480	20.34
February	10 049	429	23.42
March	9 837	443	22.20
April	10 122	458	22.10
May	9 957	427	23.32
June	10 254	360	28.48
July	9 825	375	26.20
Total	165 913	7 304	
Mean			22.72
Median			22.76
After implementation			
2017			
December	6 859	366	18.74
2018			
January	7 802	375	20.81
February	7 516	395	19.03
March	8 148	434	18.77
April	8 977	531	16.91
May	9 437	571	16.53
June	6 618	358	18.49
July	8 363	452	18.50
August	7 596	432	17.58
September	8 113	472	17.19
October	9 664	545	17.73
November	9 627	502	19.18
December	10 167	539	18.86
2019			
January	10 160	569	17.86
February	9 606	449	21.39
March	10 447	535	19.53
April	11 065	568	19.48
May	9 285	447	20.77
Total	159 450	8 540	
Mean			18.67
Median			18.76

[a]For comparison between the 2 periods, $U = 25$, $z = 4.32$, $p < 0.001$.

TABLE 2. Incidents per Patient before and after Implementation of Electronic Health Records[a]

Month and Year	No. of Incident Reports	No. of Patients	Incidents/ Patient
Before implementation			
2016			
February	10	436	0.023
March	13	430	0.030
April	10	415	0.024
May	9	416	0.022
June	11	325	0.034
July	12	293	0.041
August	10	338	0.030
September	14	349	0.040
October	12	454	0.026
November	11	393	0.028
December	12	483	0.025
2017			
January	13	480	0.027
February	11	429	0.026
March	16	443	0.036
April	20	458	0.044
May	17	427	0.040
June	16	360	0.044
July	10	375	0.027
Total	227	7304	
Mean			0.033
Median			0.029
After implementation			
2017			
December	15	366	0.041
2018			
January	20	375	0.053
February	16	395	0.041
March	23	434	0.053
April	18	531	0.034
May	16	571	0.028
June	21	358	0.059
July	15	452	0.033
August	26	432	0.060
September	18	472	0.038
October	16	545	0.029
November	22	502	0.044
December	21	539	0.039
2019			
January	23	569	0.040
February	19	449	0.042
March	17	535	0.032
April	21	568	0.037
May	17	447	0.038
Total	344	8540	
Mean			0.040
Median			0.040

[a]For comparison between the 2 periods, $U = 71$, $z = 2.87$, $p = 0.004$.

administering the drug, and monitoring. The pharmacist's role changed considerably during EHR implementation. For example, in terms of preparation of a discharge medication summary, such summaries were not available before EHR implementation but could be generated by the system after implementation. Similarly, 9 of the 10 steps in the prescribing process were not done before EHR implementation, but these were all feasible after implementation. For the verifying and dispensing process, 5 of the 9 steps were not available before EHR implementation, but could be added afterward. For the administering process, 2 of the 3 steps were not done before EHR implementation, but could be done afterward. Finally, for the monitoring process, 6 of the 8 steps were not done before EHR, but could be done afterward. Some of the steps (e.g., in the prescribing, verifying and dispensing, and monitoring processes) became easier and clearer after EHR implementation. Finally, some steps that were formerly completed manually could be completed electronically after EHR implementation (in the prescribing, verifying and dispensing, and monitoring processes).

Table 5 shows that various pharmacist interventions are important aspects of the medication management process that help to increase error detection. For example, during the verifying process, if the pharmacist has any concerns during review of medication orders, they will advise the prescriber by means of an intervention. This process is added to the medication management process, which helps the pharmacist to write notes immediately. In addition, such interventions are automatically documented in the patient's file.

DISCUSSION

With the introduction of EHR systems in hospitals, it is expected that medication errors will decline. In addition, with EHR systems that include a pharmacy module and

TABLE 3. Types of Errors before Implementation of Electronic Health Records, February 2016 to July 2017

Month-Year	Wrong Dose	Wrong Drug	Drug–Drug Interaction	Missed Dose	Wrong Patient	Wrong Route	Wrong Dilution	Wrong Time	Wrong Frequency	Wrong Unit	Wrong Formula	Expired Medication	Contraindicated Drug	Total	Pharmacist Interventions
Feb-16	1	1	1	1	2	1	0	2	0	0	1	0	0	10	NR
Mar-16	3	1	2	2	1	0	1	1	0	2	0	0	0	13	NR
Apr-16	2	1	1	0	2	1	0	1	0	0	1	1	0	10	NR
May-16	1	2	2	1	0	0	0	1	0	1	0	0	1	9	NR
Jun-16	3	1	3	0	1	0	1	1	0	0	1	0	0	11	NR
Jul-16	2	1	2	2	0	1	0	1	0	1	1	0	1	12	NR
Aug-16	1	1	1	3	1	0	1	1	0	1	0	0	0	10	NR
Sep-16	1	2	2	1	3	1	1	1	1	0	0	0	1	14	NR
Oct-16	2	1	1	2	1	1	2	1	1	0	0	0	0	12	NR
Nov-16	2	1	1	1	1	1	1	2	0	0	1	0	0	11	NR
Dec-16	1	1	2	1	1	1	1	1	1	1	0	1	0	12	NR
Jan-17	2	3	1	1	2	2	0	1	1	0	0	0	0	13	NR
Feb-17	1	2	1	1	2	1	1	1	1	0	0	0	0	11	NR
Mar-17	2	4	2	1	1	1	1	1	0	1	1	0	1	16	NR
Apr-17	6	5	3	2	1	1	0	1	1	0	0	0	0	20	NR
May-17	7	4	1	1	1	1	0	1	1	0	0	0	0	17	NR
Jun-17	3	2	2	2	1	2	0	1	1	1	0	1	0	16	NR
Jul-17	2	0	2	1	1	1	1	1	1	0	0	0	0	10	NR
Total	42	33	30	23	22	16	11	20	9	8	6	3	4	227	NR

NR = pharmacist interventions not recorded.

clinical decision support features, further reductions in medication errors are expected.[4] These were our expectations for the current study. In addition, for the particular study setting, we expected that the total number of medication orders would increase over time, following the addition of new medical services, such as hyperbaric medicine, plastic surgery, and extended care. However, the findings were opposite to both expectations. More specifically, the number of medication orders declined and the number of medication errors increased after implementation of the EHR system. This counterintuitive finding could only be explained by a qualitative study of the system from the pharmacist's perspective.

In our qualitative study, we found several reasons for the reduction in medication orders. First, the new options available in the EHR system solved some previously existing problems. For example, the new system does not continue processing an order if the requested medication is not included in the hospital's drug formulary. Second, for medications with different dose strengths, prescribers sometimes had to enter more than 1 order for the same medication to obtain the desired amount; however, the EHR system allows automatic selection of the most suitable dosage with a single medication order, which has thus reduced the overall number of medication orders. Third, in the new system, use of the "order setting" decreases the number of medication orders because prescriptions for several medications can be combined in a single order, especially for orders with more than 2 components; previously, a separate order would have been required for each component.

We identified several reasons for the unexpected increase in the number of incident reports related to medication errors after EHR implementation. First, pharmacists on the EHR team played a role in guiding the design of the system, by determining their needs and desired changes from the existing system and how they could integrate the new system into their workflow. This higher level of awareness contributed to a higher error detection rate than before EHR implementation. This finding aligns with a study

TABLE 4. Types of Errors after Implementation of Electronic Health Records, December 2017 to May 2019

Month-Year	Wrong Dose	Wrong Drug	Drug–Drug Interaction	Missed Dose	Wrong Patient	Wrong Route	Wrong Dilution	Wrong Time	Wrong Frequency	Wrong Unit	Wrong Formula	Expired Medication	Contraindicated Drug	Total	Pharmacist Interventions
Dec-17	4	3	1	1	1	0	1	1	1	0	1	1	0	15	213
Jan-18	6	4	2	1	2	0	1	1	1	1	1	0	0	20	267
Feb-18	5	4	1	2	1	1	0	1	0	1	0	0	0	16	263
Mar-18	8	5	3	1	2	0	1	0	1	1	0	0	1	23	235
Apr-18	5	5	2	1	1	0	1	1	1	0	0	1	0	18	252
May-18	5	4	1	1	1	1	0	0	1	0	1	0	1	16	307
Jun-18	8	7	3	0	1	1	0	0	0	0	0	0	1	21	205
Jul-18	6	3	2	0	1	1	0	1	0	1	0	0	0	15	226
Aug-18	9	7	3	1	2	1	0	0	1	0	0	1	1	26	165
Sep-18	8	3	2	1	0	1	1	0	0	1	0	0	1	18	218
Oct-18	5	7	1	0	1	0	0	1	0	0	0	0	1	16	302
Nov-18	7	7	3	0	0	1	0	0	1	0	1	0	2	22	357
Dec-18	8	6	2	1	1	0	1	0	0	0	0	0	2	21	433
Jan-19	8	7	3	1	0	1	0	1	0	1	0	0	1	23	445
Feb-19	7	6	3	1	0	0	1	0	0	0	0	0	1	19	443
Mar-19	6	5	3	0	0	1	0	0	1	0	1	0	0	17	376
Apr-19	9	7	2	1	0	0	0	0	0	0	0	0	2	21	375
May-19	7	5	3	1	1	0	0	0	0	0	0	0	0	17	247
Total	121	95	40	14	15	9	7	7	8	6	5	3	14	344	5329

TABLE 5 (Part 1 of 2). Steps of Medication Management Process before and after Implementation of Electronic Health Records

Process and Steps	Description	Before[a]	After[a]
Assessing			
Patient identification	Information for the particular patient, including name, address, birth date, gender	Yes	More data available
Medication history	Complete list of previous and current medications used by patient	From dispensed list	From different sources
Diagnosis	Accurate diagnosis of patient's problem	Sometimes missed or unclear	Differentiation between current and previous diagnoses
Electronic medication reconciliation	Request from physician to pharmacist to review patients' medications	No	Yes
Discharge summary	Document outlining details of the patient's hospital stay	No	Yes
Prescribing			
Medication selection	Selection (by clinician) of optimal medication for the patient	No	Yes
Clinical decision support system (safety check)	Safety check to ensure selected medication does not interfere with patient's allergies, other drugs, or medical conditions, taking into account patient's body size and pharmacokinetics for proper dose	No	Yes
Formulary and benefits check	List of prescription drugs used by practitioners in a given setting to identify drugs offering the greatest overall value	No	Yes
Drug guideline	Document providing guidance for decision-making and criteria regarding medicines, management, and treatment in specific areas of health care	No	Limited for specific medications
Medication ordered	Seamless transmission of medication order from clinician to dispenser	Yes	Easier and with greater clarity
Documentation of ordered medication	Documentation of the order in a location where health care provider can access the information	No	Yes
Illegible handwriting	Although prescriber usually knows what is written, pharmacist may have problems reading and interpreting information	No	No (paperless)
Prescriber instructions	Specific notes from prescriber to dispenser	Entered manually	Listed as options
Dose calculation	Dosage adjustment calculations based on clinical features such as weight or renal function	No	Yes
Knowledge update	Updates to ensure the prescriber has the latest drug information	No	Limited
Verifying and dispensing order			
Evaluate/approve order	Review of medication order and approval for dispensing	No	Yes
Clinical decision support system (safety check)	Safety check to ensure selected medication does not interfere with patient's allergies, other drugs, or medical conditions, taking into account patient's body size and pharmacokinetics for proper dose	No	Yes
Double-check procedures	Additional safety check, by another pharmacist	Manual	Electronic
Medication distribution	Delivery of medication to dispensing location	Yes	Yes
Patient and medication identification	Identification and verification of patient and medication order by health care professional	No	Yes
Medication preparation and labelling	Identification, preparation, labelling, and packaging of medication order for delivery to dispensing location	Yes	Easier and clearer
Education	Education of the clinician on medication use, storage, toxicity, and contraindications	No	Yes
Use of a colour alert	System to alert dispenser to the need for care with certain drugs	No	Yes
Use of a look-alike/ sound-alike alert	System to prevent mixup between medications with names that look or sound similar	Physical	Electronic
Administering			
Medication information identification	Identification of correct medication by review of drug name, dose, time of day, and route	Yes	More data available
Dispensing of individual dose	Accurate individual medication dose properly dispensed to clinicians	No	Yes
Time when dose was taken	Administration of proper dose to the patient at the right time	No	Yes

TABLE 5 (Part 2 of 2). Steps of Medication Management Process before and after Implementation of Electronic Health Records

Process and Steps	Description	Before[a]	After[a]
Monitoring			
Routine dosing and tracking	Routine administration of proper medication dose and recording of time when medication is taken or not taken	No	Yes
Reporting and trending	Receipt by clinician of overview and trending data from medication log and outcomes	No	Yes
Integrated plan of care	Automated notes for health care professional relating to specific points	No	Yes
Recall of medication	Removal of medication from the market because it is found to be either defective or potentially harmful	No	Yes
Restricted medication	Closed formulary, which may limit drugs for use by specific physicians, in specific patient care areas, or for specific diseases	No	Yes
Admission medication reconciliation	Review of patients' home medications at the time of admission	Manual	Electronic
Access to laboratory results	Check for appropriate baseline laboratory results	Yes	Easier and clearer
Documentation of all details	Process of providing required data for patients' medications (written by health care provider)	No	Yes

[a]In the "Before" and "After" columns, the entry "No" means that this function was not performed before implementation of electronic health records, and the entry "Yes" means that this function was being performed after implementation of electronic health records.

that observed cognitive workload changes among nurses during the transition from a manual system to an EHR system.[12] Second, the new system allowed pharmacists to see more details of individual prescriptions, including information about the prescriber (consultant or specialist), specific instructions, and the patient's medication history. Third, the pharmacy supervisor could monitor workflow through the new system, which helped in managing the medication-use process, identifying particular users (prescribers or dispensers), tracking the time of ordering and dispensing, and even determining the particular medication given to an individual patient; pharmacists are expected to be more alert to medication errors with this level of supervision. Fourth, the new system facilitated communication among health care providers in case of order changes or the addition of instructions from the prescriber. This option allowed pharmacists to see deleted or cancelled orders and the person who made the change; it also allowed pharmacists to write notes for the prescriber, whenever errors involving double entries, wrong patient, or wrong dose were detected. Fifth, after EHR implementation, pharmacists had easy access to many services that helped them check laboratory results to verify whether a medication dispensed from the pharmacy had been given to a patient or not. Sixth, the quality department modified the incident report window, making it easier to access. This facilitated the documentation of incidents and automatic reporting to the risk unit, which again helped in increasing the reporting of medication errors.

One of the main limitations of this study was the manual documentation of pharmacist interventions before EHR implementation; as such, data were not available for comparison with interventions after EHR implementation (which were recorded in the system). Another limitation was the small number of errors analyzed, given that pharmacists reported only 344 errors out of 5329 interventions (less than 7%). Finally, another limitation of this study is that the risk unit in the quality department modified the incident report window at the study setting, with the result that staff members understood well how to use it. This may have helped staff members to report medication errors better than before.

CONCLUSION

The EHR system introduced at the study site significantly changed the medication management process. Changes were manifested at all stages of the medication management process, including assessing, prescribing, verifying and dispensing of orders, administering medications, and monitoring. Collectively, these changes led to decrease in the number of medication orders per patient and an increase in the error detection rate. Notably, this study showed that an HIMSS stage 6 hospital could experience an increase in errors with implementation of an EHR system. This might also happen if a hospital facility were to "leapfrog" from a manual system to a high stage in the HIMSS EMRAM.

The results of this study suggest that the information technology unit in the study setting could consider including pharmacist interventions for the purposes of incident reporting and could create an option for such interventions within the EHR system. This might improve clarity and avoid duplication of work. Finally, health care providers are urged to report any medication errors to the risk management unit to improve medication safety and other clinical care services.

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Canadian Hospital Pharmacists' Perceptions of Workplace Preparedness and Personal Well-Being during the COVID-19 Pandemic

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ABSTRACT

Background: Little is known about hospital pharmacists' experiences during the COVID-19 pandemic, as studies to date have focused on community pharmacy practices.

Objectives: To determine hospital pharmacists' perceptions of their workplace preparedness for the COVID-19 pandemic and to measure their mental well-being with the Warwick-Edinburgh Mental Well-being Scale (WEMWBS).

Methods: Pharmacists working in Canadian hospital inpatient settings during the COVID-19 pandemic were invited to participate in a 2-part online survey. Part A was a 46-item survey containing statements related to directions and support from leadership, personal protective equipment practices, work environment, and emotions. Part B assessed respondents' mental well-being using the validated 14-item WEMWBS. Responses to both parts of the survey were based on Likert scales. The survey was open from July to September 2020. Descriptive analyses were applied.

Results: A total of 432 hospital pharmacists consented to participate in the study. Most respondents were women (337/432, 78%), and most were 25 to 44 years old (293/432, 68%). Most respondents were confident that their workplace and pharmacy department were effectively managing patient demand (314/389, 81%) and the pandemic more generally (263/394, 67%). They also felt that their workplace teams were working well together (314/386, 81%). Interestingly, 22% (86/391) of the respondents did not agree that they had received training for COVID-19 infection prevention and control practices. The mean WEMWBS score was 48.9 (standard deviation 8.6), which indicated average mental well-being.

Conclusions: After the initial wave of the COVID-19 pandemic, respondents perceived their hospitals and departments as being able to manage the pandemic and reported average mental well-being. Ensuring that all hospital pharmacists receive training for effective COVID-19 infection prevention and control practices is crucial. How their perceptions and well-being have changed since the time of the survey is unknown.

Keywords: hospital pharmacists, COVID-19, coronavirus disease 2019, mental well-being, workplace preparedness

Note: This article contains supplementary material (Supplement 1), available at https://www.cjhp-online.ca/index.php/cjhp/issue/view/211

RÉSUMÉ

Contexte : On sait peu de choses sur les expériences des pharmaciens d'hôpitaux pendant la pandémie de COVID-19, car les études à ce jour se sont concentrées sur les pratiques de la pharmacie communautaire.

Objectifs : Cerner les perceptions des pharmaciens d'hôpitaux quant à la préparation de leur lieu de travail à la pandémie de COVID-19 et mesurer leur bien-être mental à l'aide de l'échelle de bien-être mental Warwick-Edinburgh (WEMWBS).

Méthodes : Les pharmaciens qui travaillaient en milieu hospitalier canadien pendant la pandémie de COVID-19 ont été invités à participer à un sondage en ligne en deux volets. Le volet A consistait en une enquête portant sur 46 éléments contenant des déclarations liées aux orientations et au soutien de la direction, aux pratiques en matière d'équipement de protection individuelle, à l'environnement de travail et aux émotions. Le volet B a quant à lui permis d'évaluer le bien-être mental des répondants à l'aide de l'échelle WEMWBS validée à 14 points. Les réponses aux deux volets de l'enquête se basaient sur des échelles de Likert. Le sondage était ouvert de juillet à septembre 2020. Des analyses descriptives ont été appliquées.

Résultats : Au total, 432 pharmaciens d'hôpitaux ont accepté de participer à l'étude. La plupart des répondants étaient des femmes (337/432, 78 %), et la plupart avaient entre 25 et 44 ans (293/432, 68 %). La plupart des répondants étaient convaincus que leur lieu de travail et leur service de pharmacie géraient efficacement la demande des patients (314/389, 81 %) et la pandémie en général (263/394, 67 %). Ils ont aussi estimé que leurs équipes de travail travaillaient bien ensemble (314/386, 81 %). Fait intéressant : 22 % des répondants (86/391) convenaient ne pas avoir reçu de formation sur les pratiques de prévention et de contrôle des infections à la COVID-19. Le score moyen sur l'échelle WEMWBS était de 48,9 (écart type 8,6), ce qui indique un bien-être mental moyen.

Conclusions : Après la première vague de la pandémie de COVID-19, les répondants ont perçu leurs hôpitaux et leurs services comme étant capables de gérer la pandémie et ont déclaré un bien-être mental moyen. Veiller à ce que tous les pharmaciens d'hôpitaux reçoivent une formation sur les pratiques efficaces de prévention et de contrôle des infections à la COVID-19 est crucial. On ne sait pas comment leurs perceptions et leur bien-être ont changé depuis le moment de l'enquête.

Mots-clés : pharmaciens d'hôpitaux, COVID-19, maladie à coronavirus 2019, bien-être mental, préparation au travail

INTRODUCTION

Health care workers, including pharmacists, are vital resources during a pandemic. Their health and well-being are crucial for continuous and safe patient care. To date, studies evaluating pharmacists' experiences during the COVID-19 pandemic have predominantly focused on community pharmacy practice settings and mental health concerns such as anxiety, depression, and burnout.[1-7] A recent study of predominantly hospital pharmacists in the United States found that more than 50% of respondents experienced moderate or high likelihood of burnout and secondary traumatic stress while working during the COVID-19 pandemic.[1] Another survey, involving Australian pharmacists, found greater burnout scores during the pandemic, especially among men.[2] The authors of both studies recommended that comprehensive support should be made available for pharmacists, to mitigate any long-term consequences of burnout, with examples of such support including crisis management training, increased staffing, and implementation of self-care practices to promote psychological wellness. Furthermore, to date only 1 study has assessed pharmacists' knowledge, perceptions, and attitudes during the COVID-19 pandemic.[8] It found that, in general, pharmacists had a good understanding of the disease and its transmission, but the study was designed to specifically evaluate how the media influenced this understanding. No other information is available on how pharmacists informed themselves about the disease and its evolving treatment strategies. The challenges of the pandemic and its impact on hospital pharmacists may be different in Canada than elsewhere; therefore, exploring Canadian hospital pharmacists' perceptions of their workplace, mental well-being, and professional obligations during the pandemic is important. The aim of this study was to describe the perceptions of Canadian hospital pharmacists in relation to their workplace preparedness and personal well-being during the COVID-19 pandemic.

The study consisted of 2 parts. The primary objective for Part A was to determine hospital pharmacists' perceptions of their workplace preparedness for the COVID-19 pandemic. The primary objective for Part B was to measure mental well-being with the Warwick-Edinburgh Mental Well-being Scale (WEMWBS). The secondary objective was to compare mean WEMWBS scores in relation to different regions of Canada, sex categories, age, practice roles, and provision of direct care to COVID-19 patients.

METHODS

Study Design

This was a voluntary cross-sectional study of hospital pharmacists across Canada. All participants provided informed consent. The study was approved by the Fraser Health Department of Ethics and Research.

Study Population

Hospital pharmacists working in a Canadian hospital during the COVID-19 pandemic were eligible to participate. Pharmacists who were not practising, who were working in an outpatient setting, or who had not worked during the COVID-19 pandemic were excluded. Participants were recruited using nonprobability snowball sampling by connecting with hospital pharmacists through social networking applications and professional networks across Canada.

Study Instrument

The self-administered online survey was created and conducted using Qualtrics software (https://www.qualtrics.com) and was available in both English and French. The participants were invited to respond to an anonymous 2-part questionnaire that was available from July 21 to September 11, 2020. The survey was programmed to monitor Internet Protocol addresses to prevent multiple entries from the same address.

Part A of the survey sought pharmacists' perceptions of their workplace preparedness. This 46-item validated survey went through 2 stages of development. During the first phase, the team searched out relevant questionnaires from the literature, and created new questions; the draft survey was then piloted by the investigators. Permission was obtained from the World Health Organization (WHO) to adapt and include questions from its research protocol entitled "Perceptions of Health Workers Regarding Local Infection Prevention and Control Procedures for COVID-19".[9] The survey questions were revised to reflect pilot feedback, and revised versions were then tested for internal validity with 3 pharmacists and 1 nonpharmacist researcher to ensure understandability of content, readability, clarity, and acceptability. The survey included a variety of multiple-choice, yes/no/unsure, and 3-point Likert-scale questions (with options of agree, neither agree nor disagree, disagree) and contained 8 main sections: demographic characteristics (10 items); experience during COVID-19 or previous pandemics (5 items); directions, plans, and support from leadership (6 items); service demand and delivery (8 items); personal protective equipment (PPE) practices (2 items); beliefs about capabilities, social/professional role, and teamwork/work environment (7 items); educational resources (2 items); and emotions (6 items).

Participants were required to complete Part A of the survey before starting Part B, which assessed mental well-being using the 14-item WEMWBS.[10] The WEMWBS has been developed and extensively validated in the general population of the United Kingdom, as well as various international populations, including health care professionals and French-speaking cohorts.[11,12] The WEMWBS has good construct validity, as it demonstrates moderately high correlations with other scales that measure aspects of mental health, general health, and emotional intelligence.[10] The 14 statements of the WEMWBS assessed eudaimonic

(focused on psychological functioning and a sense of meaning and purpose in life) and hedonic (focused on happiness, contentment, and life satisfaction) constructs of mental well-being in the previous 2 weeks.[10] Responses were recorded on a 5-point Likert scale ranging 1, for "none of the time", to 5, for "all the time". The total score was calculated by summing the 14 individual scores for each statement. The complete list of the English survey questions is available in Supplement 1 (available at https://www.cjhp-online.ca/index.php/cjhp/issue/view/211); the French survey questions are available by request to the corresponding author.

Statistical Analysis

Descriptive statistics were used to calculate frequencies and percentages for the primary objective of Part A. For Part B, cut points defining low, average, and high mental well-being were calculated by determining 1 standard deviation (SD) above and below the mean, as outlined by the WEMWBS analysis guidelines.[13] One-way analysis of variance (ANOVA) and the Student *t* test were used for analyzing the secondary outcomes, as appropriate. For Part A, respondents who did not answer every question were included in the analysis for the questions to which they responded. For each question, the denominator for calculating percentages was adjusted to reflect the number of respondents to the particular question. For Part B, respondents who did not answer every question were excluded, because the effect of using estimations for the WEMWBS scores has not been tested.[10]

RESULTS

Demographic Characteristics

A total of 432 inpatient hospital pharmacists provided responses to some or all questions in Part A of the survey, for an estimated response rate of about 6.5% (based on data available from the National Association of Pharmacy Regulatory Authorities[14]). A total of 377 inpatient hospital pharmacists provided complete responses in Part B, for an estimated response rate of about 5.7%. Complete data for demographic characteristics are presented in Table 1. For both Part A and Part B, respondents were predominantly women, and most respondents were 25–44 years of age. Although most respondents worked in a clinical practice setting with at least 10 years of pharmacy practice experience, only about half had provided direct care to COVID-19 patients. Overall, the majority of respondents were from the Prairie provinces (Alberta, Saskatchewan, Manitoba), followed by the west coast (British Columbia) and central Canada (Ontario, Quebec).

Pharmacists' Perceptions of Workplace Preparedness

The following 6 sections present findings from Part A of the questionnaire. Complete results from Part A are presented in Figure 1, Figure 2, Table 2, and Table 3.

Directions, Plans, and Support from Leadership

Two-thirds of respondents (67%) agreed that they felt confident that their pharmacy department had been managing the pandemic effectively (Figure 1). Furthermore, almost two-thirds of respondents (62%–66%) agreed that clear guidelines and policies had been implemented to manage medication shortages and medication supply procedures and to inform pharmacists of how to practise in a safe and effective way. Overall, about two-thirds of respondents (66%–69%) felt supported by their leadership throughout the pandemic and were able to openly express any questions or concerns.

TABLE 1. Baseline Characteristics of Survey Respondents

Characteristic	Survey Part; No. (%) of Respondents: Part A (*n* = 432)[a]	Part B (*n* = 377)[b]
Age (years)		
18–24	4 (1)	4 (1)
25–44	293 (68)	256 (68)
45–54	82 (19)	69 (18)
≥ 55	53 (12)	48 (13)
Sex, female	337 (78)	296 (79)
Education		
Residency Year 1/Year 2	121 (28)	108 (29)
BSc/Entry-to-Practice PharmD	177 (41)	154 (41)
Master's	55 (13)	47 (12)
PharmD, PhD	78 (18)	67 (18)
Overseas equivalent	1 (< 1)	1 (< 1)
Time in practice (years)		
0–4	82 (19)	73 (19)
5–9	78 (18)	67 (18)
10–19	133 (31)	117 (31)
≥ 20	139 (32)	120 (32)
Location[c]		
West coast	126 (29)	108 (29)
Prairie provinces	187 (43)	167 (44)
Central Canada	104 (24)	88 (23)
Atlantic provinces	12 (3)	12 (3)
Northern region	3 (1)	2 (1)
Current practice setting		
Clinical	323 (75)	290 (77)
Distribution or other nonclinical	36 (8)	29 (8)
Management or leadership	73 (17)	58 (15)
Provided direct care to COVID-19 patients	203 (47)	187 (50)

[a]Participants could drop out at any time in Part A.
[b]Only participants who provided complete responses to Part B were included in the analysis.
[c]West coast = British Columbia; Prairie provinces = Alberta, Saskatchewan, Manitoba; central Canada = Ontario, Quebec; Atlantic provinces = New Brunswick, Nova Scotia, Prince Edward Island, Newfoundland and Labrador; northern region = Northwest Territories, Nunavut, Yukon.

Service Demand and Delivery

When asked about managing patient demand, 81% of respondents felt confident that their workplace was doing so effectively (Figure 1). This value dropped to 64% when respondents were asked if they felt their workplace would be able to continue managing patient demand. About one-quarter of respondents (26%) reported not being able to complete their usual role within regular working hours, whereas 19% indicated there was insufficient staffing to complete the work required for usual pharmacy services.

PPE Practices

Only about two-thirds of respondents (59%–64%) agreed when asked if they had received training for COVID-19 infection prevention and control practices, and similarly when asked if they were confident in donning and doffing PPE.

Capabilities, Social/Professional Role, and Teamwork/Work Environment Beliefs

Almost all respondents (92%) agreed it was their professional responsibility to care for COVID-19 patients (Figure 1). More than three-quarters of respondents (84%) perceived their team members to be under significant stress. Nonetheless, most respondents (81%–84%) believed their teams had been working well and respectfully together. Just over half of all respondents (56%) felt they were able to provide the best patient care during the pandemic.

FIGURE 1 (PART 1 OF 2). Pharmacists' perceptions, based on responses to Likert-type questions. Percentages are based on the number of respondents for each question, which ranged from 383 to 394. SARS-CoV-2 = severe acute respiratory syndrome coronavirus 2.

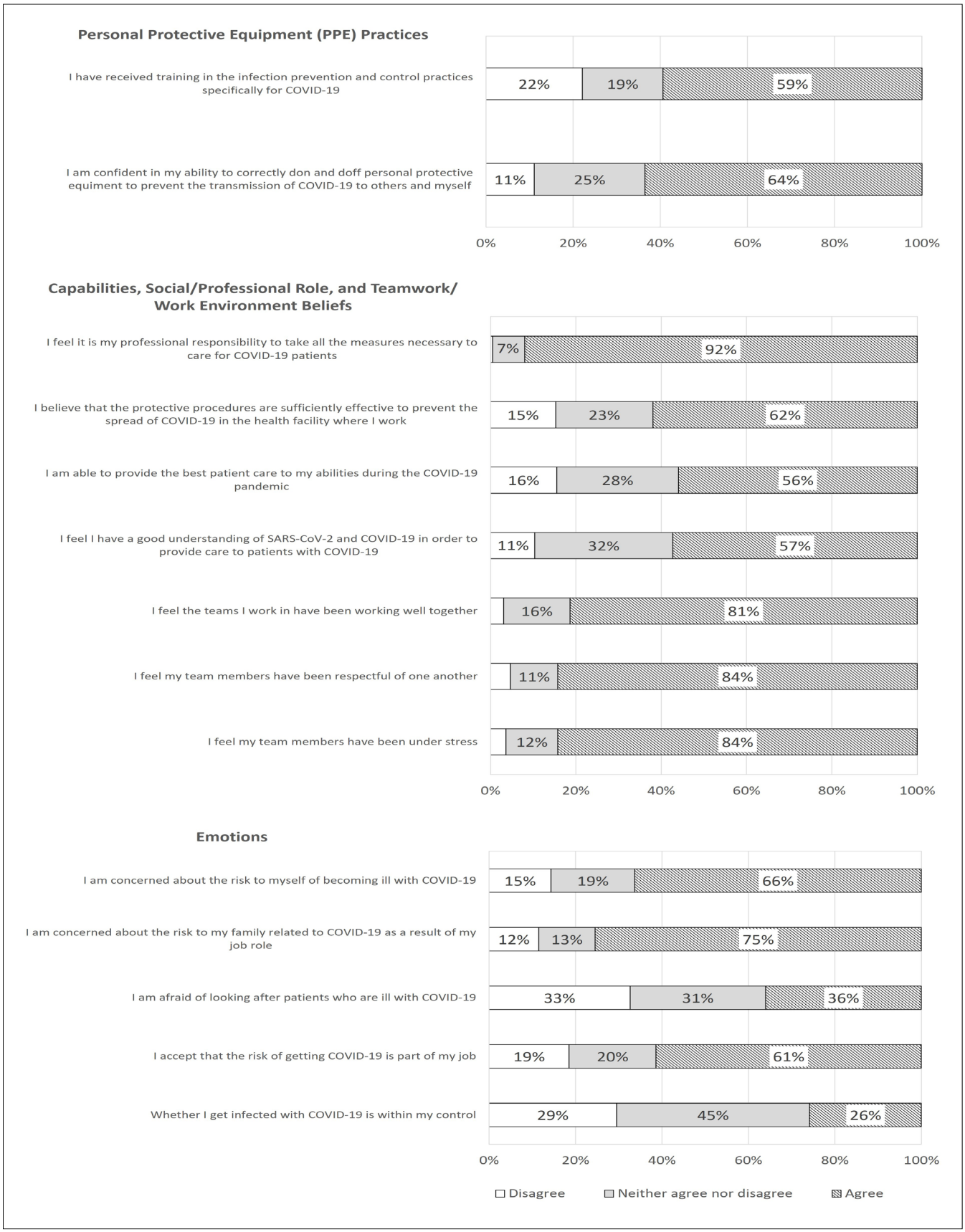

FIGURE 1 (PART 2 OF 2). Pharmacists' perceptions, based on responses to Likert-type questions. Percentages are based on the number of respondents for each question, which ranged from 383 to 394. SARS-CoV-2 = severe acute respiratory syndrome coronavirus 2.

Services Provided during the COVID-19 Pandemic

More than three-quarters of respondents (78%) continued to identify and resolve medication-related problems during the pandemic (Table 2). Furthermore, medication reconciliation was still provided by two-thirds (67%) of respondents, while discharge counselling and other services were provided by 57%.

Resources Accessed

Although 75% of respondents reported accessing resources to help understand and manage patients with COVID-19, only about half (57%) felt they had a good understanding of SARS-CoV-2 and COVID-19. Resources related to COVID-19 that were utilized by survey respondents are listed in Table 3. Only 14% of respondents reported accessing mental health resources or services for their own support (Figure 2).

Emotions

At least two-thirds of respondents (66%–75%) expressed concerns about contracting COVID-19 themselves and passing it along to their families (Figure 1). Although 61% of respondents accepted that the risk of getting infected was part of their job, more than one-third (36%) reported they were afraid to care for COVID-19 patients.

Warwick-Edinburgh Mental Well-being Scale

The mean WEMWBS score, based on data supplied in Part B of the survey questionnaire, was 48.9 (standard deviation 8.6) (Figure 3), which suggests average mental well-being. For this cohort, the cut points for low, average, and high mental well-being were determined to be 40 or below, 41 to 57, and 58 or above, respectively. When stratified by regions of Canada, hospital pharmacist respondents from the west coast, the Prairie provinces, and central Canada all showed average well-being, with no statistically significant differences ($F_{2,360} = 2.05$, $p = 0.13$) (Table 4); the sample sizes from the Atlantic and Northern regions were too small to be included in this analysis. However, respondents between the ages of 18 and 44 years had significantly lower scores than respondents aged 45 years or older; similarly, respondents who provided direct care to COVID-19

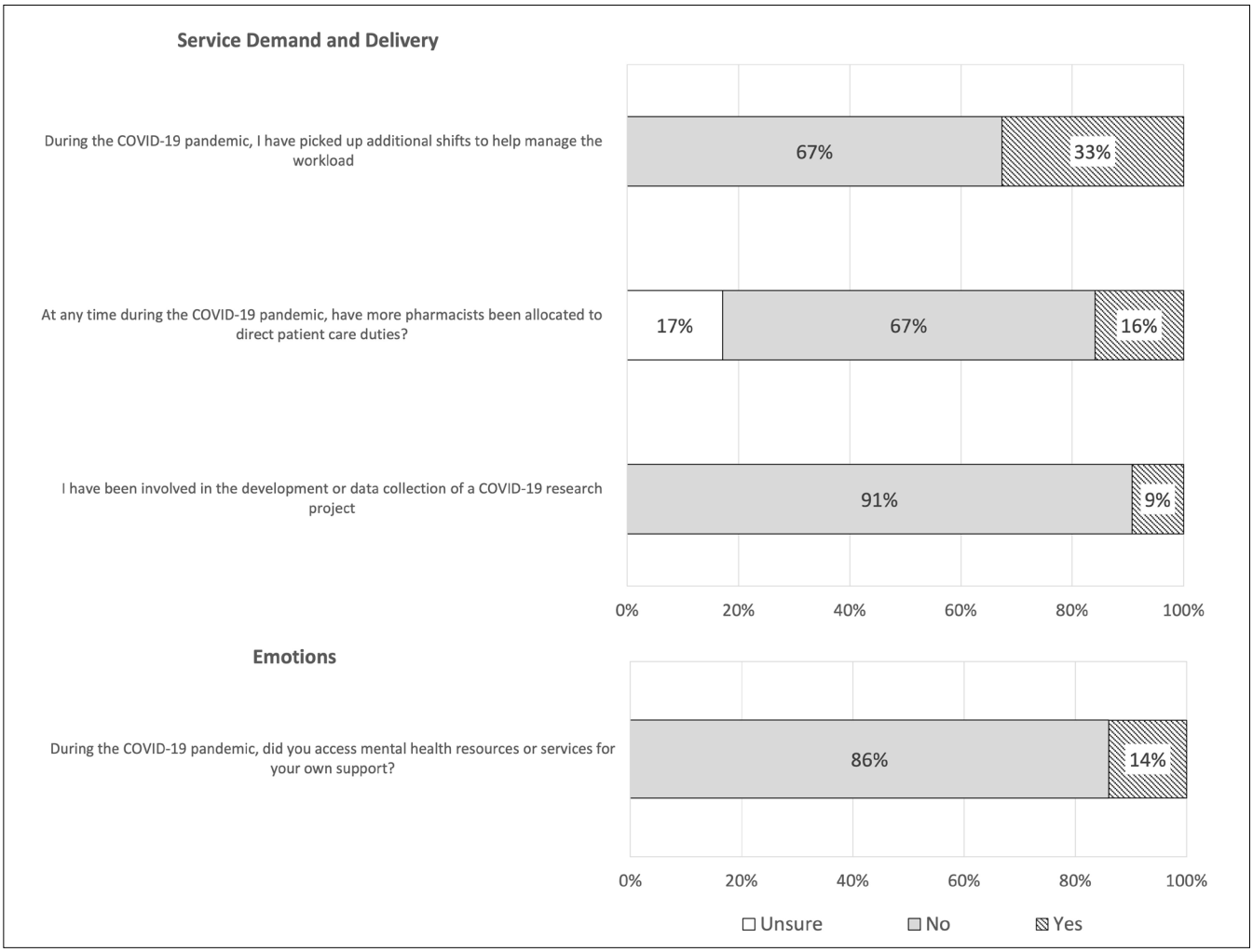

FIGURE 2. Pharmacists' perceptions, based on responses to closed-ended questions. Percentages are based on 389 respondents for each question.

patients had significantly lower scores than those who did not directly care for COVID-19 patients (Table 4).

DISCUSSION

This study investigated Canadian hospital pharmacists' perceptions of their workplace preparedness and personal well-being during the early period of the COVID-19 pandemic. Although most respondents felt that they were supported by their leadership and were able to express their questions and concerns, one-third of pharmacists did not feel this way. To improve this situation, leadership might consider providing more comprehensive support to address any workplace or personal concerns among pharmacy staff members. Studies investigating burnout in pharmacists during the COVID-19 pandemic have suggested various strategies to reduce long-term sequelae of the pandemic. These interventions, including crisis management training, increased staffing, and implementation of self-care practices to promote psychological wellness, could be more widely adopted.[1,2]

At the time the survey was administered, most respondents felt confident that their workplace was managing the pandemic effectively. This finding may be the result of how information was distributed at different institutions across Canada. Austin and Gregory[3] characterized occupational factors that influenced resilience in pharmacy

TABLE 2. Services Provided during the COVID-19 Pandemic

Service Provided by Respondent	No. (%) of Respondents[a] (*n* = 432)
Multidisciplinary rounds	268 (62)
Identification and resolution of medication-related problems	337 (78)
Best possible medication histories	265 (61)
Medication reconciliation	291 (67)
Discharge counselling and/or other discharge services	248 (57)
Medication order entry, checking, and/or supply	287 (66)
COVID-19 service planning and/or development of local guidelines or services	147 (34)

[a]Multiple selections were permitted.

TABLE 3. Resources Accessed to Aid in the Management of Patients with COVID-19

Resource	No. (%) of Respondents[a] (*n* = 432)
Institutional guidelines	250 (58)
Primary literature	218 (50)
National guidelines	206 (48)
Canadian Society of Hospital Pharmacists COVID-19 resources	204 (47)
Podcasts/webinars	174 (40)
International guidelines	154 (36)
Media sources	138 (32)
Social media	84 (19)
Other	41 (9)

[a]Multiple selections were permitted.

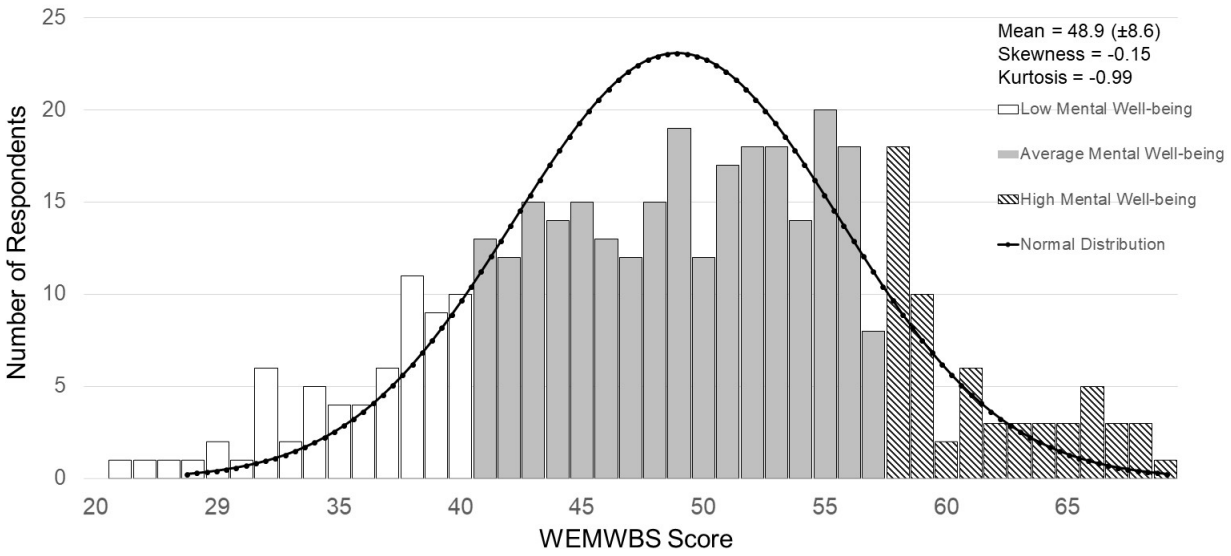

FIGURE 3. Distribution of scores on the Warwick-Edinburgh Mental Well-being Scale (WEMWBS). The cut points were defined on the basis of 1 standard deviation above and below the mean, as outlined by the WEMWBS analysis guidelines.[13]

TABLE 4. Warwick–Edinburgh Mental Well-being Scale (WEMWBS) Scores by Demographic and Clinical Characteristics

Variable	No. of Respondents	WEMWBS Score (Mean ± SD)	*p* Value[a]
Age (years) (*n* = 377)			0.01
18–44	260	48.2 ± 8.4	
≥ 45	117	50.6 ± 9.0	
Sex (*n* = 373)			0.56
Male	77	49.5 ± 8.8	
Female	296	48.8 ± 8.6	
Region[b] (*n* = 363)			0.13
West coast	108	48.2 ± 8.5	
Prairie provinces	167	48.6 ± 8.4	
Central Canada	88	50.6 ± 9.5	
Leadership type (*n* = 377)			0.55
Management	58	49.5 ± 7.8	
Non-management	319	48.8 ± 8.8	
Provided direct care to COVID-19 patients (*n* = 371)			0.006
Yes	187	47.7 ± 8.8	
No	184	50.1 ± 8.4	

SD = standard deviation.
[a]Comparisons were completed by the Student *t* test or one-way analysis of variance (ANOVA), as appropriate.
[b]West coast = British Columbia; Prairie provinces = Alberta, Saskatchewan, Manitoba; central Canada = Ontario, Quebec. For the regional analysis, $F_{2,360} = 2.05$, $p = 0.13$.

practices, including organizational and managerial strategies, and found that the ways in which information was delivered directly affected its utility. Clear, practical guidelines and directives instructing pharmacists on how to practise and what to do in specific situations were most valuable in managing occupational issues contributing to stress and burnout.[3] In contrast, when guidance was simply "sent" to pharmacists, the lack of communication supporting interpretation of this guidance affected recipients' ability to utilize it.[3] In contrast to those who lacked confidence in their workplace's management of the pandemic, respondents who expressed such confidence may have received unambiguous guidance in relation to medication management and safe practices during the pandemic. However, this possibility was not explicitly explored, and future studies are warranted to identify areas for improvement to support health care workers in subsequent waves of COVID-19 or other public health crises.

Many respondents did not feel confident that, as the pandemic progressed, their workplace would continue to manage the situation effectively. The lack of published, peer-reviewed literature and the lack of availability of definitive treatment at the time this survey was conducted, coupled with the looming winter season, may have affected respondents' perceptions that their workplace would continue to manage patient demands during the pandemic. Especially early in the pandemic, guidelines were constantly evolving on the basis of new knowledge, and national guidelines were often slow to incorporate recommendations set out by the WHO. One such controversy was whether the virus was airborne and whether the use of face masks was warranted for infection control purposes.[15] Although the use of face masks has now been mandated in many health care facilities across Canada, the lack of clarity in the initial stages likely resulted in confusion and stress.

Many respondents indicated that during the COVID-19 pandemic they were not able to complete their usual role within regular working hours, and almost half felt they were not able to provide the best patient care possible. Many institutions implemented new policies to prevent transmission by reducing direct patient interactions and limiting family visits.[16,17] Pharmacists frequently conduct medication reconciliation upon admission and at transitions of care, including discharge, and have had to find alternative modes of communication.[17] In the absence of easy and direct interaction with patients and their families, communication can be difficult and the delivery of these services can be a challenge.[17] Furthermore, many respondents indicated there was simply not enough staffing to complete the work involved in providing usual pharmacy services during the pandemic. Future studies are needed to determine which aspects of their roles require more support and to develop structured protocols to manage the provision of this support.

In this study, approximately 1 in 5 respondents felt they did not receive training for infection prevention and control practices specific to COVID-19. This was especially concerning given that proper PPE use and hand hygiene have been the main modes of preventing transmission and protecting hospital staff.[18] Furthermore, many respondents did not believe that the protective procedures in place were sufficient to prevent the spread of COVID-19. Commonly, institutions direct PPE training mainly to nurses and physicians; however, given these results, making such measures mandatory for pharmacists is also warranted. In this regard, management might consider designing training modules specific to pharmacists and their roles. Whether the specific role is conducting medication reconciliation through patient interviews or performing physical examinations, it is imperative that pharmacists be aware of the proper practices to safely complete their tasks.

Although community pharmacists have reported increased reliance upon regulatory bodies and professional associations as their primary sources of information about COVID-19, they have also noted that communications from these sources were often ambiguous and not focused

on actual guidance.[3] The most popular resource accessed by hospital pharmacists who participated in this study was institutional guidelines, which are often more pragmatic and direct in the way they communicate information to front-line workers, because they pertain specifically to the individual's work environment. Surprisingly, despite public service announcements and other accessible resources about preventing transmission and disease contraction, most respondents felt that getting infected with COVID-19 was not within their control. Furthermore, a portion of the respondents were afraid to look after patients with COVID-19, which reinforces the need for additional provisions regarding COVID-19 education and PPE training.

Several studies have described the prevalence of mental health issues among pharmacists during the COVID-19 pandemic,[1-3] but this was the first to measure mental well-being itself, rather than the determinants of mental well-being. Given that the COVID-19 pandemic has affected all facets of life, including workplace experiences and personal lives, measuring well-being was an important element of this study as it represents the culmination of all these factors.

Although the WEMWBS scores in this study were numerically lower than those reported for physicians working during the COVID-19 pandemic in Pakistan[19] and published population norms,[20] all subgroups were deemed to have average mental well-being. Given the lack of well-being data for pharmacists, it is difficult to determine if these numerically lower scores were due to the pandemic itself or if they were representative of pharmacists working in Canadian hospitals. Despite statistically significant differences between younger and older respondents (< 45 years versus ≥ 45 years) and, similarly, between respondents who provided direct care to COVID-19 patients and those who did not, all of the numeric values were within range for average well-being. As such, it is uncertain whether these statistically significant differences are clinically meaningful. Although a portion of pharmacists in this study had below-average mental well-being, it was interesting to observe that many more expressed concerns about contracting COVID-19 themselves and passing it along to their families. These results suggest that although pharmacists may have had significant concerns relating to COVID-19, they seemed to be able to cope without experiencing severe impacts on their well-being. This characteristic, known as resilience, is the ability to adapt during strenuous circumstances—such as the sudden onset of a global pandemic—and may explain these results.[3] As discussed above, workplace support programs and clear guidelines were most effective in reducing occupation-related stress and ensuring resilience, which emphasizes the need to provide workplace and psychological support during the pandemic.[3]

This study had several limitations. The small sample size captured only about 6% of practising hospital pharmacists within Canada. This falls below a typical survey response rate, but can be explained by the challenges of disseminating the survey across Canada. Furthermore, those who chose to participate in the study may have been more likely to demonstrate better mental well-being and positive perceptions than those who did not respond, potentially biasing the results. Interprovincial variation in pharmacy practices and the effect that the pandemic had on different provinces may also limit interpretation of the results, with the Prairie provinces and central Canada sometimes reporting more than double or triple the number of active cases relative to the east and west coast regions.[21] In addition, this survey was conducted before the occurrence of more severe waves of COVID-19 in many areas across Canada. As such, the results may not reflect the perceptions or mental well-being of pharmacists during peak times of the COVID-19 pandemic, which limits the reliability of the data gathered and conclusions drawn.

As with all other mental health scales, the WEMWBS is subject to response bias. More specifically, impression management is a phenomenon whereby individuals may tailor their responses to be perceived in a certain way; when an individual remains unaware of their true mental state, this is known as self-deception.[10] Importantly, the WEMWBS shows low correlation with these factors; therefore, respondents' true mental well-being scores are minimally affected when the evaluation is conducted at the group or population level.[10]

CONCLUSION

To our knowledge, this is the first study to explore the perceptions and mental well-being of Canadian hospital pharmacists during the COVID-19 pandemic. It has demonstrated that, during the early stages, pharmacists perceived their hospital, departments, and teams as being able to manage the pandemic. Ensuring that all hospital pharmacists receive training for effective COVID-19 infection prevention and control practices is crucial. According to the WEMWBS, participants had average mental well-being. However, it is not known how pharmacists' perceptions and well-being have changed with the continued evolution of the pandemic.

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Prevalence of Venous Thromboembolism and Anticoagulant Use in Patients with COVID-19 in Alberta, Canada

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ABSTRACT

Background: COVID-19 causes a hypercoagulable state and increases the risk of venous thromboembolism (VTE).

Objectives: The primary objective was to identify VTE prevalence among patients with COVID-19 in one Canadian province. Secondary objectives were to identify the prevalence of bleeding, describe anticoagulation prescribing practices, and identify factors contributing to VTE in these patients.

Methods: Adult patients admitted to Alberta hospitals between March and December 2020 with COVID-19 who had a length of stay of at least 72 hours were included in this retrospective study. VTE, bleeding events, and comorbidities were defined by *International Classification of Diseases and Related Health Problems, 10th Revision* codes. Cases of VTE and controls (no VTE) were matched on the basis of age older than 60 years, active cancer, and length of stay for the full cohort, as well as for a subgroup of patients with D-dimer data available, to assess for factors associated with VTE.

Results: A total of 2544 patients were included. Median age was 66 years, 1461 patients (57.4%) were male, median weight was 77.7 kg, and median D-dimer level on admission was 1.00 mg/L. The prevalence of VTE was 3.7% (n = 93) and that of major and clinically relevant non-major bleeding was 4.9% (n = 125). Of the total population, 1224 patients (48.1%) had standard prophylactic-dose anticoagulation, 460 (18.1%) received only higher-dose anticoagulation, 248 (9.7%) received both prophylactic- and higher-dose anticoagulation, and 612 (24.1%) had no anticoagulation data. Logistic regression showed that only the presence of D-dimer above 3 mg/L was associated with a significant odds ratio for VTE (7.04, 95% confidence interval 2.43–20.84).

Conclusions: VTE prevalence among patients with COVID-19 was higher than baseline prevalence in Alberta. Analysis of prescribing practices demonstrated that a large proportion of patients received higher-dose anticoagulation.

Keywords: COVID-19, venous thromboembolism, D-dimer

RÉSUMÉ

Contexte : La COVID-19 provoque un état d'hypercoagulabilité et augmente le risque de thromboembolie veineuse (TEV).

Objectifs : L'objectif principal de cette étude consistait à identifier la prévalence de la TEV chez les patients atteints de COVID-19 dans une province canadienne. Ses objectifs secondaires consistaient, quant à eux, à identifier la prévalence des saignements, décrire les pratiques relatives à la prescription d'anticoagulants et à identifier les facteurs contribuant à la TEV chez ces patients.

Méthodes : Cette étude rétrospective a été menée auprès de patients adultes atteints de COVID-19 admis dans les hôpitaux de l'Alberta entre mars et décembre 2020 avec une durée de séjour d'au moins 72 heures. La TEV, les événements hémorragiques et les comorbidités étaient définis par les codes de la *Classification internationale des maladies et des problèmes de santé connexes, 10e révision* (CIM-10). Les cas de TEV et les témoins (sans TEV) ont été appariés sur les bases suivantes afin d'évaluer les facteurs associés à la TEV : âge de plus de 60 ans, cancer actif et durée de séjour pour l'ensemble de la cohorte, ainsi que pour un sous-groupe de patients dont les données sur les D-dimères étaient disponibles.

Résultats : Au total, 2544 patients ont été inclus. L'âge médian était de 66 ans; 1461 patients (57,4 %) étaient des hommes; leur poids médian était de 77,7 kg et le taux médian de D-dimères à l'admission était de 1,00 mg/L. La prévalence de la TEV était de 3,7 % (n = 93) et celle des saignements majeurs et non majeurs cliniquement pertinents était de 4,9 % (n = 125). Sur la population totale, 1224 patients (48,1 %) ont reçu un anticoagulant à dose prophylactique standard; 460 (18,1 %) n'ont reçu qu'un anticoagulant à dose plus élevée; 248 (9,7 %) ont reçu à la fois un anticoagulant à dose prophylactique et à dose plus élevée; et 612 (24,1 %) ne disposaient pas de données relatives à la prescription d'anticoagulant. La régression logistique a montré que seule la présence de D-dimères au-dessus de 3 mg/L était associée à un rapport de cotes significatif pour la TEV (7,04, intervalle de confiance à 95 % 2,43-20,84).

Conclusions : La prévalence de la TEV chez les patients atteints de COVID-19 était plus élevée que la prévalence de référence en Alberta. L'analyse des pratiques de prescription a montré qu'une grande proportion de patients recevait un anticoagulant à plus forte dose.

Mots-clés : COVID-19, thromboembolie veineuse, D-dimères

INTRODUCTION

COVID-19 frequently causes a hypercoagulable state in hospitalized patients, likely as a result of multiple mechanisms, including the systemic inflammatory response, immobilization leading to venous stasis, and direct endothelial damage from viral injury.[1] Significant coagulopathy is present in many patients with COVID-19, including elevated D-dimer and fibrinogen.[2-6] The level of D-dimer appears to be correlated with disease severity.[4,7-9] Multiple studies have demonstrated a higher rate of venous thromboembolism (VTE) among patients hospitalized with COVID-19 than seen in typical acute care and critical care populations; however, there is some variability in incidence rates across these studies.[10] Several meta-analyses of patients hospitalized with COVID-19 have shown a rate of VTE ranging from 20% to 30%, which is nearly twice the rate of VTE among hospitalized medical patients who do not have COVID-19.[11-19] The risk of VTE increases in patients who are critically ill, which is evidenced by their need for admission to an intensive care unit (ICU) and/or mechanical ventilation, as well as in those with prior VTE, active cancer, or obesity.[9]

On the basis of this literature, it is clear that all patients hospitalized with COVID-19 should receive thromboprophylaxis in the absence of contraindications. However, there is some concern that with the elevated risk of VTE in this patient population, the standard prophylactic doses of anticoagulation may be insufficient.[20] In fact, practices related to anticoagulant regimens have changed over the course of the pandemic. During the period when this study was conducted, most Canadian and international organizations continued to recommend standard-dose thromboprophylaxis, although several organizations recommended intermediate or therapeutic doses for patients with COVID-19 in the absence of diagnosed or suspected VTE.[21,22]

The primary objective was to identify VTE prevalence among patients admitted to hospital with COVID-19 in Alberta (Alberta Health Services). Secondary objectives were to identify the prevalence of bleeding, to describe anticoagulation prescribing practices, and to identify factors contributing to VTE in these patients.

METHODS

Study Design and Data Sources

This cross-sectional and nested case–control study was conducted in Alberta, Canada, from March 1 to December 31, 2020. Ethics approval was obtained from the Health Research Ethics Board – Health Panel (Pro00104825). Eligible patients were identified retrospectively by the Data Integration, Management, and Reporting service, which then extracted and linked the data. The Communicable Disease Outbreak Management data set was used to identify the date when each patient recovered from COVID-19. Data were collected from the provincial Discharge Abstract Database regarding prevalence of VTE, bleeding, and comorbidities using codes from the *International Statistical Classification of Diseases and Related Health Problems, 10th Revision* (ICD-10; see Appendix 1, available from https://www.cjhp-online.ca/index.php/cjhp/issue/view/211). Prescribing practices for anticoagulation were collected using Anatomical Therapeutic Chemical codes (Appendix 2, available from https://www.cjhp-online.ca/index.php/cjhp/issue/view/211) in the Drug Optimization, Sustainability, and Evaluation dashboard (the provincial data set for in-hospital medications). Sunrise Clinical Manager, the electronic charting software used in the Calgary zone, was the only database that could provide height and weight data; as a result, these variables were inaccessible for most of the patients in our study. Laboratory data were obtained from the LAB database but were available only for patients admitted to Alberta hospitals other than those that use Epic software, another electronic charting platform to which we did not have access.

Patient Population

Adult patients hospitalized for 72 hours or longer who tested positive for COVID-19 were included in this study. Positivity for COVID-19 was defined as a positive test result while the patient was in hospital or admission to hospital after testing positive but before the recovery date. To allow for a broad picture of this patient population, no other exclusion criteria were applied.

Outcome Measures

The primary outcome was the prevalence of VTE, including deep vein thrombosis (DVT), pulmonary embolism, and other venous clots, among hospitalized patients with COVID-19. VTE was defined on the basis of ICD-10 codes for the index hospitalization, in any diagnosis code field (Appendix 1).

Secondary outcomes were the prevalence of bleeding among hospitalized patients with COVID-19, as defined by ICD-10 codes (Appendix 1), description of anticoagulants used in hospital for this population, comparison of anticoagulant dose between patients with and without VTE, and identification of risk factors for VTE by matching patients with and without VTE. Anticoagulation dose was classified as the standard prophylactic dose, only a higher dose, both prophylactic and higher doses, or no documentation of anticoagulant found (Appendix 3, https://www.cjhp-online.ca/index.php/cjhp/issue/view/211). Given lack of access to weight data for the entire population, it was assumed that tinzaparin up to 4500 units was the standard prophylactic dose, and any greater dose in patients without weight data was considered to be a higher dose. Where weight data were available, the Alberta Health Services anticoagulant weight-banding guidelines for tinzaparin

and enoxaparin were used to classify the dose as prophylactic or higher (Appendix 3).

Data Analysis

Data were collected by the Data Integration, Management, and Reporting service and were provided to the researchers in an Excel spreadsheet (Microsoft Corporation). Statistical analyses were performed using Excel and R. Normality of continuous variables was tested using the Shapiro–Wilk test. Normally distributed continuous variables were tested for significance of difference between groups using the χ^2 test, and non-normally distributed variables were tested with the Kruskal–Wallis test. Categorical variables were tested for significance of difference using 1-way analysis of variance or, if the number of outcomes was low (< 10), the Fisher exact test.

A nested case–control analysis and logistic regression were performed to assess for risk factors associated with development of VTE during the hospital stay using the full cohort, as well as the cohort limited to patients for whom D-dimer data were available. An exploratory logistic regression was first performed to identify factors that might have contributed to VTE that could be used for matching. The cases were patients in whom VTE developed, and the controls were those with no VTE. Given the association found between D-dimer and VTE in the exploratory regression, the exposure of interest for the D-dimer subgroup was D-dimer above 3 mg/L at any point during the hospital admission (where normal D-dimer level is below 0.5 mg/L). For both analyses, each case of VTE was matched 1:2 with non-VTE controls on the basis of factors shown by the exploratory regression to be associated with VTE. The matching and conditional logistic regressions were run 1000 times in the D-dimer subgroup to increase the robustness of the findings. Odds ratios and 95% confidence intervals (CIs) were determined for the outcome of VTE.

RESULTS

Of the 3679 patients admitted to hospital in Alberta with COVID-19 during the study period, 2544 (69.1%) were included in the study, with most exclusions being related to length of stay less than 72 hours (56.7%) and repeat hospitalizations (28.9%) (Figure 1). In addition, 92 patients were excluded because they were transferred to another hospital and discharge data were therefore not available. At the time of admission, median age was 66 years, 57.4% of the patients were male, 34.9% had diabetes mellitus, 3.8% had active cancer, and 8.0% had atrial fibrillation (Table 1). Median admission estimated glomerular filtration rate was 81 mL/min/1.73m^2, median weight was 77.7 kg, and median admission D-dimer was 1.00 mg/L. Almost 20% of patients were admitted to the ICU, and 21.2% of patients died during the hospital stay.

Overall, 93 patients (3.7%) had a VTE, of which the majority were pulmonary embolisms (76.3%) (Table 2). Bleeding occurred in 125 patients (4.9%), and these events consisted primarily of gastrointestinal bleeds (74.4%) (Table 2).

Of the total population, 1224 patients (48.1%) were given standard prophylactic-dose anticoagulation during the admission, 460 patients (18.1%) received only higher-dose anticoagulation, 248 patients (9.7%) received both prophylactic and higher-dose anticoagulation, and for 612 patients (24.1%), no anticoagulation data were found (Figure 2). Among the higher doses administered, the most common were tinzaparin 8000 units, tinzaparin 10 000 units, or a direct oral anticoagulant (Appendix 4, available from https://www.cjhp-online.ca/index.php/cjhp/issue/view/211). Anticoagulant prescribing practices were compared between patients with and without VTE (Figure 2). Among the 2451 patients without VTE, 1220 (49.8%) received a prophylactic dose during the admission, 427 (17.4%) received only higher-dose anticoagulation, 204 (8.3%) had both prophylactic and higher doses, and no anticoagulant was found for 600 (24.5%) patients. Among those with VTE, 4 (4.3%) remained on a prophylactic dose throughout their admission, 33 (35.5%) received only higher-dose anticoagulation, 44 (47.3%) received both prophylactic and higher-dose anticoagulation, and for 12 (12.9%) patients, no anticoagulant data were found. Of the 4 patients who had VTE but remained on a prophylactic dose (1 with DVT, 3 with pulmonary embolism), 1 had low hemoglobin and a bleeding event, and 1 died in the ICU. For the other 2 patients, there was no clear reason for remaining on prophylactic anticoagulation.

Anticoagulation prescribing practices were also determined for the subgroup of patients for whom weight data were

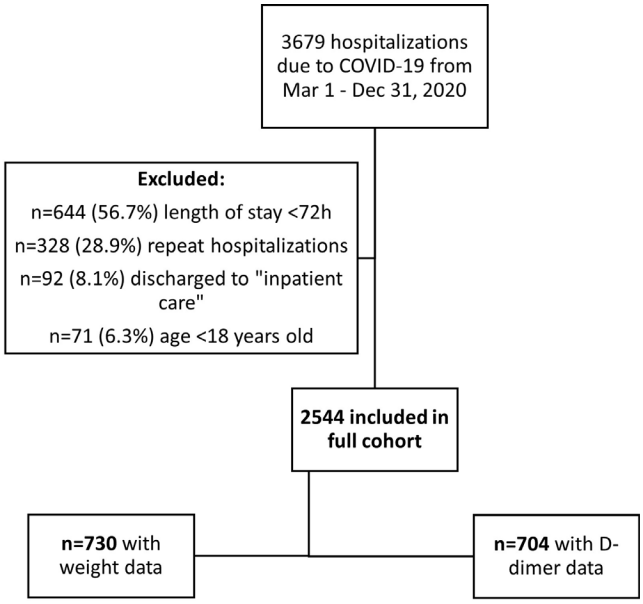

FIGURE 1. Flow chart of patient inclusion.

available (n = 730) (Figure 3). In this subgroup, 468 (64.1%) patients were receiving prophylactic-dose anticoagulation, 101 (13.8%) were receiving a higher dose, 89 (12.2%) were receiving both prophylactic- and higher-dose anticoagulation, and 72 (9.9%) had no anticoagulant documented.

Table 1 compares comorbidities, laboratory values, and hospitalization factors between patients with and without VTE. The median level of D-dimer on admission was significantly higher in the VTE group than the group without VTE (2.14 mg/L versus 0.99 mg/L). Patients with VTE had longer lengths of stay and higher risks of being admitted to the ICU, of needing mechanical ventilation or extracorporeal membrane oxygenation, and of dying than those without VTE. Additionally, patients with VTE had a higher prevalence of bleeding (15.1% versus 4.5%).

Nested case–control analysis of the D-dimer cohort (n = 704) involved 34 patients who had a VTE and 670 who did not have a VTE. Based on the exploratory logistic regression, cases and controls were matched using age older than 60 years, active cancer, and length of stay. The odds ratio for D-dimer level above 3 mg/L was 7.04 (95% CI 2.43–20.84) for the outcome of VTE.

A nested case–control analysis of the total cohort (n = 2544) was performed with variables for which complete data were available. After matching on age older than 60 years, presence of active cancer, and length of stay, none

TABLE 1. Baseline Characteristics and Comparison between Patients with and without VTE

Factor	Available Data[a]	Study Group; No. (%) of Patients[b] All Patients (n = 2544)	No VTE (n = 2451)	VTE (n = 93)	p Value
Age (years) (median and IQR)		66 (51–79)	66 (51–79)	66 (56–74)	0.72
Sex, male		1461 (57.4)	1404 (57.3)	57 (61.3)	0.51
Weight (kg) (median and IQR)	n = 730	77.7 (65.5–92.8)	77 (65.1–92.7)	85.5 (77.3–94.3)	< 0.001
BMI (median and IQR)	n = 414	27.8 (23.8–32.7)	27.8 (23.8–32.7)	27.8 (25.5–32.4)	0.66
Concurrent conditions					
Chronic respiratory disease		278 (10.9)	268 (10.9)	10 (10.8)	> 0.99
Heart failure		197 (7.7)	187 (7.6)	10 (10.8)	0.36
Hypertension		432 (17.0)	418 (17.1)	14 (15.1)	0.72
Hyperlipidemia		29 (1.1)	29 (1.2)	0 (0.0)	0.62
Diabetes mellitus		889 (34.9)	859 (35.0)	30 (32.3)	0.66
Renal disease		147 (5.8)	143 (5.8)	4 (4.3)	0.82
Active cancer		97 (3.8)	90 (3.7)	7 (7.5)	0.09
Atrial fibrillation		204 (8.0)	197 (8.0)	7 (7.5)	> 0.99
Laboratory results on admission					
eGFR (mL/min/1.73 m^2) (median and IQR)	n = 1560	81 (53–100)	80 (53–100)	87 (57.5–100)	0.38
Hemoglobin (g/L) (median and IQR)	n = 2003	128 (113–140)	128 (113–140)	127 (115–142)	0.71
Platelets (× 10^9/L) (median and IQR)	n = 2003	211 (160–273)	210 (159.3–272.3)	221 (162–278)	0.37
D-dimer (mg/L) (median and IQR)	n = 704	1.00 (0.58–1.96)	0.99 (0.57–1.90)	2.14 (0.83–6.16)	0.002
Maximum D-dimer (mg/L) (median and IQR)	n = 704	1.17 (0.64–2.29)	1.12 (0.62–2.15)	4.88 (1.70–10.00)	< 0.001
Fibrinogen (g/L) (mean ± SD)	n = 299	5.55 ± 1.92	5.56 ± 1.87	5.49 ± 2.45	0.86
LDH (U/L) (median and IQR)	n = 796	311.5 (227.75– 423.25)	291 (213–391)	358 (272.5–441.0)	0.017
Length of stay (days) (median and IQR)		9 (6–16)	9 (5.5–15)	19 (10–35)	<0.001
ICU admission		483 (19.0)	434 (17.7)	49 (52.7)	<0.001
Mechanical ventilation		308 (12.1)	267 (10.9)	41 (44.1)	<0.001
APACHE score (median and IQR)	n = 363	17 (13–23)	17 (13–22)	21 (15–24)	0.06
ECMO		7 (0.3)	5 (0.2)	2 (2.2)	0.025
Bleed		125 (4.9)	111 (4.5)	14 (15.1)	<0.001
Died before discharge		540 (21.2)	508 (20.7)	32 (34.4)	0.002

APACHE = Acute Physiology and Chronic Health Evaluation, BMI = body mass index, ECMO = extracorporeal membrane oxygenation, eGFR = estimated glomerular filtration rate, LDH = lactate dehydrogenase, ICU = intensive care unit, IQR = interquartile range, SD = standard deviation.
[a]If cell is blank, data were available for total cohort.
[b]Except where indicated otherwise.

of these variables were significantly associated with VTE (Table 3).

DISCUSSION

In this study, the prevalence of VTE was 3.7% among hospitalized patients with COVID-19. Although this is lower than what has been cited by some other studies, it is higher than the typical Alberta prevalence of VTE among all hospitalized patients, which was 2.3% in June 2021 and previously about 2.0%, before the COVID-19 pandemic (according to internal organizational data obtained from the AHS VTE DVT PE dashboard). This is consistent with COVID-19 itself causing a hypercoagulable state. There are several possible reasons for the VTE prevalence in this study to be lower than the rates in other studies. Critically ill patients are more likely to have VTE than more stable hospitalized patients.[11] Less than 20% of patients in this study required admission to the ICU, so it can be surmised that most patients were relatively stable. In addition, several studies with a higher rate of VTE included the use of systematic screening for DVT, which may identify asymptomatic DVTs that are not clinically significant.[14] Lastly, in Alberta, accreditation standards and provincial protocols support evidence-based thromboprophylaxis, whereby

TABLE 2. VTE and Bleeding Events in Total Population

Event Type or Location	No. of Patients (n = 2544)
VTE	93 (3.7%)
DVT	20
PE	71[a]
Other VTE[b]	6
Bleeding, by location[c]	125 (4.9%)
GI tract	93
Urinary tract	17
CNS	14
Uterine/vaginal	3
Other	24
Total no. of bleeds	151

CNS = central nervous system, DVT = deep vein thrombosis, GI = gastrointestinal, PE = pulmonary embolism, VTE = venous thromboembolism.
[a]Of the 71 people who experienced a PE, 4 also experienced a DVT.
[b]Other VTE consisted of 3 cases of portal vein thrombosis and 3 cases of embolism and thrombosis of other specified veins.
[c]The total number of bleeds is greater than the number of people who experienced bleeds because some people had more than 1 bleeding event.

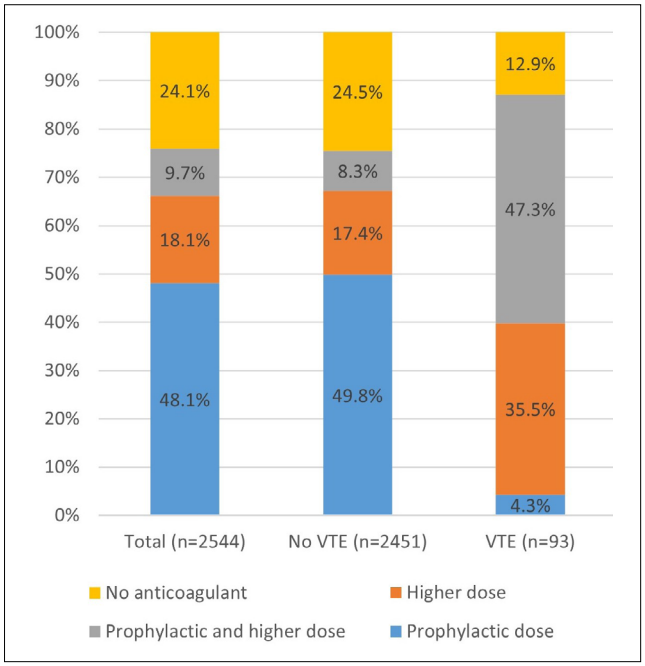

FIGURE 2. Anticoagulation prescribing practices for the total population and for patients with and without venous thromboembolism.

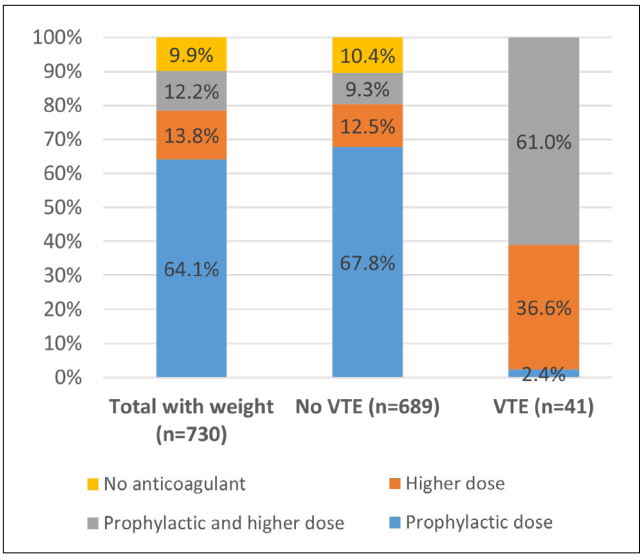

FIGURE 3. Anticoagulation prescribing practices for the subgroup of patients with weight data available (n = 730).

TABLE 3. Nested Case–Control Analysis of Total Cohort (n = 2544)[a] for Prediction of Venous Thromboembolism

Characteristic	Odds Ratio (95% CI)
Sex, male	1.34 (0.77–2.34)
Chronic respiratory disease	0.78 (0.35–1.72)
Heart failure	1.87 (0.74–4.70)
Hypertension	0.70 (0.32–1.49)
Diabetes	0.63 (0.36–1.11)
Renal disease	0.42 (0.12–1.50)
Atrial fibrillation	1.04 (0.34–3.12)

CI = confidence interval.
[a]Cases and controls were matched on the basis of age > 60 years, active cancer, and length of hospital stay.

most hospitalized medical patients would receive prophylactic anticoagulation, which has likely resulted in lower VTE prevalence compared with studies from other countries that have lower usage of thromboprophylaxis.[11] From the logistic regression analysis, a D-dimer level greater than 3 mg/L during hospitalization was identified as a significant predictor of VTE, which is consistent with what has been observed in other studies.[14,23]

The prevalence of clinically significant bleeding in this study (4.9%) was slightly higher than what has been seen in other studies. For example, a meta-analysis of studies of hospitalized patients with COVID-19 found a 3.9% incidence of major bleeding.[18] The bleeding prevalence in the present study may be higher because the ICD-10 codes that were used (Appendix 1) capture both major and clinically relevant non-major bleeding. The bleeding rate was higher among patients with VTE than those without VTE, likely because of the increased proportion of patients in the VTE group who were receiving higher-dose anticoagulation. Similar results were obtained in a propensity score–matched study of about 1000 patients, in which the researchers found that the incidence of major bleeding was higher among patients who received therapeutic anticoagulation.[24] Additionally, about half of the patients with VTE in our study were in the ICU, and thus were critically ill and at increased risk of bleeding, as evidenced by the bleeding prevalence of 9.3% (45/483) among patients in the ICU compared with 3.9% (80/2061) among those not in the ICU.

Specific to anticoagulation prescribing practices, almost 50% of patients received only a prophylactic dose, about 18% of patients received only higher-dose anticoagulation, and about 10% received a higher dose along with a prophylactic dose at some point during admission. Possible reasons for the overall proportion of patients receiving higher-dose anticoagulation include 8.0% of the population having atrial fibrillation, which may warrant long-term anticoagulation. In addition, there are other indications for anticoagulation that we did not capture in our study, including presence of a prosthetic heart valve and prior VTE. It is likely that for a certain percentage of patients receiving higher-dose anticoagulation, the elevated doses were prescribed solely on the basis of severity of their COVID-19, as well as standard weight-based prophylaxis for those for whom we did not have access to a documented weight. This is evidenced by the 193 patients who received a "higher dose" of tinzaparin 8000 units and the 116 patients who received tinzaparin 10 000 units, which may represent weight-adjusted prophylaxis for patients with body weight 100–150 kg. However, given that the median weight of patients in this study was 78 kg, the observed rate of higher-dose anticoagulation likely reflects a combination of weight-based prophylactic, intermediate, and therapeutic dosing (Appendix 4).

At the time of this study, prophylactic dosing of anticoagulation was recommended by Alberta Health Services. Since then, several randomized controlled trials have investigated empiric higher dosing of anticoagulation in patients hospitalized with COVID-19. An open-label randomized controlled trial comparing intermediate with standard-dose thromboprophylaxis in 562 ICU patients with COVID-19 found that intermediate dosing had no benefit.[25] Similar results were obtained in an open-label, adaptive, randomized trial in which investigators found no benefit, and likely harm, of therapeutic anticoagulation in about 1000 patients with severe COVID-19.[26] A study involving both stable and unstable patients with COVID-19 found no benefit of therapeutic anticoagulation (primarily rivaroxaban) relative to prophylactic anticoagulation, and increased rates of bleeding.[27] In a study of patients with moderate COVID-19, with or without elevated D-dimer, therapeutic-dose anticoagulation in the absence of VTE was associated with fewer days requiring organ support and an increased but not statistically significant rate of major bleeding.[28] Given the benefit of therapeutic-dose anticoagulation for patients with moderate COVID-19 in this large trial,[28] Alberta now considers therapeutic anticoagulation for 14 days or until discharge for patients who are at low risk of bleeding.[11]

This study had several limitations. First, because of legislation concerning COVID-19, a chart review was not possible, which limited the analysis to administrative data linkages. Consequently, we were unable to capture some data elements (e.g., those needed to calculate a Padua Prediction Score, specifically complete weight and laboratory data). Because body weight was not available for most patients, our ability to accurately describe anticoagulation dosing was limited. Tinzaparin doses above 4500 units in patients without weight data were classified as "higher-dose" anticoagulation, which likely resulted in an overestimation of the number of patients in this group. To help mitigate this potential problem, anticoagulation prescribing practices were also assessed in the subgroup for whom weights were available, where the main differences were a higher proportion of patients receiving prophylactic dosing, as expected, and a lower proportion not receiving any anticoagulation. This subgroup may be a more accurate representation of anticoagulation prescribing practices for patients with COVID-19. We found that 25% of patients had no anticoagulation data, a higher proportion than expected. This group of patients may have been receiving nonpharmacological VTE prophylaxis, which we were unable to capture. In addition, there may be gaps in the medication data because of our reliance on administrative data, and some portion of this group was likely not truly on anticoagulation. Additionally, the dates of VTE events and of anticoagulant orders were not available, so we were unable to establish a timeline for those switched to weight-based prophylaxis or conversion to full-dose anticoagulation because of a documented or suspected VTE.

CONCLUSION

This study revealed an increased prevalence of VTE among hospitalized patients with COVID-19 relative to the baseline local VTE prevalence, with elevated D-dimer found to be a predictor of VTE. Prescribing practices for anticoagulation demonstrated that a large proportion of patients were receiving higher-dose anticoagulation. Studies published since initial preparation of this article (and summarized in the Discussion, above) have now shown a modest degree of benefit from therapeutic-dose anticoagulation in patients with moderate COVID-19 and a low risk of bleeding.

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Hospital Pharmacists' Experiences with Medical Assistance in Dying: A Qualitative Study

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ABSTRACT

Background: Pharmacists in many countries have long been involved in some aspect of assisted dying. Since 2016, when Canada enacted legislation permitting medical assistance in dying (MAiD), the number of patients seeking the procedure has increased yearly. Despite the global nature of pharmacists' involvement, little is known about how they experience MAiD practice.

Objective: To study how pharmacists experience the practice of caring for patients who seek MAiD.

Methods: This qualitative study used semistructured interviews with pharmacists who had cared for patients seeking MAiD. Interviews, conducted between June 2019 and October 2020, were audio-recorded and transcribed verbatim. Data were examined using a modified framework analysis approach. Data were coded and sorted using Quirkos and Microsoft Excel software. Themes were defined through an iterative process involving constant comparison.

Results: Nineteen hospital pharmacists representing a range of practice settings in Alberta participated in the study. The experience of caring for patients seeking assistance in dying brought to light 3 themes: finding a place in the process, serving in a caring role, and bearing emotional burdens. Pharmacists' experiences were personal, relational, emotional, and dynamic.

Conclusions: Each of the pharmacists experienced MAiD practice in a unique way. Although their roles in MAiD were primarily medication-focused, their experiences highlighted the centrality of patient choices, autonomy, and needs. The results of this study will inform pharmacists (including those not yet engaged in MAiD practice) about the role, and will also be valuable for pharmacy organizations and educators seeking to support pharmacists and the profession, as well as policy-makers seeking to expand pharmacists' roles in MAiD.

Keywords: medical assistance in dying, assisted suicide, qualitative research, pharmacists, professional role

RÉSUMÉ

Contexte : Les pharmaciens de nombreux pays participent depuis longtemps à certains aspects de l'aide médicale à mourir (AMM). Depuis que le Canada a adopté une loi l'autorisant en 2016, le nombre de patients qui demandent l'intervention a augmenté chaque année. Malgré la nature mondiale de l'implication des pharmaciens, on sait peu de choses sur la façon dont ils vivent la pratique de l'AMM.

Objectif : Étudier comment les pharmaciens vivent la pratique de la prise en charge des patients qui sollicitent l'AMM.

Méthodes : Cette étude qualitative a utilisé des entretiens semi-structurés avec des pharmaciens qui avaient pris en charge des patients ayant fait une demande d'AMM. Un enregistrement sonore des entretiens, menés entre juin 2019 et octobre 2020, a été effectué et ils ont été transcrits mot à mot. Les données ont été examinées en adoptant une approche d'analyse du cadre modifié. Les données ont été codées et triées à l'aide des logiciels Quirkos et Microsoft Excel. Les thèmes ont été définis par un processus itératif impliquant une comparaison constante.

Résultats : Dix-neuf pharmaciens d'hôpitaux représentant un éventail de milieux de pratique en Alberta ont participé à l'étude. L'expérience de la prise en charge de patients cherchant à recevoir l'aide médicale à mourir a mis en lumière 3 thèmes : trouver sa place dans le processus; jouer un rôle de proche aidant; et supporter des charges émotionnelles. Les expériences des pharmaciens étaient personnelles, relationnelles, émotionnelles et dynamiques.

Conclusions : Chaque pharmacien a vécu la pratique de l'AMM d'une manière unique. Bien que leurs rôles dans l'AMM étaient principalement axés sur la médication, leurs expériences ont mis en évidence la centralité des choix, de l'autonomie et des besoins des patients. Les résultats de cette étude informeront les pharmaciens (y compris ceux qui ne sont pas encore engagés dans la pratique de l'AMM) sur le rôle. Ils seront également précieux pour les organismes pharmaceutiques et les éducateurs cherchant à soutenir les pharmaciens et la profession, ainsi que pour les décideurs politiques qui cherchent à élargir les rôles de pharmaciens dans l'AMM.

Mots-clés : aide médicale à mourir, suicide assisté, recherche qualitative, pharmaciens, rôle professionnel

INTRODUCTION

Since 2016, when Canada enacted legislation permitting medical assistance in dying (MAiD), other jurisdictions around the world have introduced similar laws.[1,2] For example, in Australia, numerous states have recently passed voluntary assisted dying laws or are at different stages of active parliamentary consideration.[3] This increased implementation of assisted dying practice by many nations or their subjurisdictions demonstrates the effects of changing societal views and needs over time.[4-6] Such developments

motivate parallel changes in pharmacy practice on a global scale,[7-10] including in hospitals.[11,12]

Pharmacists have been involved in some aspect of assisted dying since the late 1990s, including in the Netherlands, where their involvement was common even before MAiD was fully legalized.[13] In Alberta, the number of MAiD provisions has increased each year since the practice became legal.[14] By the end of 2020, MAiD had been provided in a total of 1507 cases in the province, 60% of them in Alberta Health Services (AHS) facilities, including hospitals.[14] However, little is known about pharmacists' roles in MAiD[15] or how pharmacists experience MAiD practice. Most published research regarding roles and practice experiences has focused on physicians and nurses.[16,17] In a recent mapping review, Woods and others[2] demonstrated the absence of studies exploring pharmacists' lived experiences in assisted dying practice, a finding noted by others.[16,18] In Canada, pharmacists' roles,[19] knowledge and attitudes,[11,20] perceptions,[21,22] and positions on conscientious objection[23] have been explored. Few pharmacists have been included in research exploring perceptions of allied health care professionals participating in MAiD,[24] their roles,[15] and the meaning of their roles.[18] Given the increase in legalized assisted dying practices globally and the number of pharmacists involved in this practice, research that explores and reveals the experiences of pharmacists participating in MAiD is overdue.

This study is part of a multiphase international project seeking to explore the lived experiences of pharmacists in assisted dying practice. The first phase was conducted in Australia, where researchers gathered the perspectives of pharmacists *anticipating* implementation of MAiD.[25] These data were developed into a theoretical framework of inquiry to study the perspectives of pharmacists *experiencing* MAiD practice.[25] The objective of the study reported here was to explore how pharmacists experience the practice of caring for patients who seek MAiD.

METHODS

Qualitative research methodology was used. The study processes closely adhered to the 32 consolidated criteria for reporting qualitative research (see Appendix 1, available at https://www.cjhp-online.ca/index.php/cjhp/issue/view/211).[26] This study was approved by the University of Alberta, Research Ethics Board 1 (Pro00085742).

Study Context

In 2016, the province of Alberta implemented a comprehensive MAiD program that requires a consistent, compassionate, patient-centred approach.[27] Within this program, the Care Coordination Service provides a single point of contact for families and health care providers. A care navigator supports the process for practitioners, including the pharmacy team, linking them to education, resource materials, and grief and bereavement services. Pharmacists' responsibilities touch on all steps of preparation for the procedure, which may include checking medications prepared by a pharmacy technician, dispensing medications, reviewing medications with the physician or nurse practitioner who will be providing MAiD, arranging for the preparation and delivery of medications and necessary supplies, meeting with providers to review standardized prescriptions and protocols, and documenting that legal requirements have been met.[28] Pharmacists may support MAiD at their usual AHS practice sites or may need to travel to other AHS sites.

Study Sample and Recruitment

Hospital pharmacists in Alberta were eligible to participate if they had provided care for patients requesting, contemplating, or receiving MAiD (without necessarily participating in the MAiD procedure). A convenience sample[29] was recruited by means of newsletters and social media of the Canadian Society of Hospital Pharmacists, Alberta Branch, as well as through information sessions presented at various AHS hospital sites. All participants provided written informed consent and received no compensation for their participation in the study.

Data Collection

One team member (T.J.S.) and a trained research assistant conducted the interviews in person at a location of each participant's choice or remotely (by Skype teleconferencing software) using a predefined semistructured interview guide (Appendix 2, available at https://www.cjhp-online.ca/index.php/cjhp/issue/view/211). All interviews were audio-recorded and transcribed verbatim.

Analysis

We applied a 2-phase constructivist approach to analyze the interview data.[30,31] In the first phase, a modified version of the framework method described by Gale and others[32] was utilized. In this study, the framework included 8 dimensions of inquiry previously designed by Woods and others[25] (Appendix 3, available at https://www.cjhp-online.ca/index.php/cjhp/issue/view/211). Two researchers (T.J.S., J.N.) independently coded and sorted the data using Quirkos[33] (v.2.4.28) and Excel spreadsheet software (v.16.47.1; Microsoft Corporation), then discussed the coding and interpretation of the data with a third team member (P.W.) until consensus was reached and saturation[34] of the dimensions had been achieved. The second phase involved thematic analysis[35] and constant comparison across participants and dimensions of inquiry.[25] Reviewing, discussing, and writing activities facilitated reflexivity as team members considered their own views of MAiD practice at every stage of the research (see Appendix 1).[36]

RESULTS

Nineteen pharmacists participated in the study between June 2019 and October 2020. Interviews lasted 30–78 minutes (average 47 minutes). Variety was evident in participants' practice experiences and career durations, practice settings, and amount of experience with MAiD (Table 1). All participants were involved in some way with patients who were seeking MAiD. One participant objected to MAiD and did not participate in provision of this service. The analysis brought to light 3 themes representing pharmacists' experiences: finding a place, serving in a caring role, and bearing emotional burdens. Additional supporting data are presented in Table 2.

Finding a Place

> I thought okay, do I want to? … I thought about it a bit … if they [patients] have been approved, and it is appropriate, and they have made this big hard decision for themselves, and it is going to affect their family, I didn't want it to be a barrier. (Participant 6)

Participants in this study considered their place personally and professionally within MAiD. Finding a place was an evolutionary process with respect to how participants viewed MAiD and experienced their role in relation to themselves; the patients; the pharmacy and health care teams; and their family, friends, and community. This process began with deciding if they would participate in MAiD provisions and how the role might evolve over time.

When MAiD was first implemented, participants contemplated adding their names as potential contacts for MAiD provision. Some participants decided unequivocally yes or no, whereas others felt uncertain. Several considerations influenced participants' decisions to participate in MAiD, including personal values, beliefs about MAiD, experiences with the death of a patient or family member, and legal responsibilities of pharmacists. Patients' stories were also important in participants' decision-making. Other factors included compassion and respect for patients' wishes and autonomy, knowledge of the clinical context, and familiarity with the patient through a previous relationship or current involvement with their care.

Organizational momentum created by the MAiD process itself contributed to the decision-making process for some participants, especially those in management positions or those who were the only consenting pharmacists at their practice sites. Some perceived a lack of choice and an obligation to participate when others were unavailable or unwilling. Others revisited the decision-making process each time they were contacted with a request to participate in a MAiD provision.

Serving in a Caring Role

> I guess most of our role as medical professionals is we want to treat things, we want to cure things, we want to fix things. In some cases we want to relieve things. But I mean ultimately and every time we are doing something it is because we are trying to get closer to a goal of therapy. And sometimes the goal of therapy or the goal of the patient is "I just want to feel better this way", and in this case it is, "I just want it to end". (Participant 3)

Caring in the context of MAiD represented a role in service of another, without sharing in the decision-making process. Pharmacists perceived themselves in a caring, patient-centred role, regardless of whether they had served in a MAiD provision. All MAiD activities were focused on serving the patients' choices, autonomy, and needs.

Pharmacists' roles are specified in the AHS MAiD policy,[28] which outlines legal requirements, responsibilities, and expectations related to dispensing. Participants described their medication supply activities as being more

TABLE 1. Participant Characteristics

Characteristic	No. (%) of Participants (n = 19)
Sex	
Female	17 (89)
Male	2 (11)
Time in practice (years)	
1–5	7 (37)
6–10	3 (16)
11–20	3 (16)
21–30	1 (5)
≥ 31	5 (26)
Practice area	
Internal or general medicine	8 (42)
Management	3 (16)
Palliative care	1 (5)
Critical care	1 (5)
Psychiatry	1 (5)
Oncology	1 (5)
Emergency	1 (5)
Other (combination of practice areas)	3 (16)
Population centre[a]	
Small (population 1000–29 999)	5 (26)
Medium (population 30 000–99 999)	2 (11)
Large urban (population ≥ 100 000)	12 (63)
No. of MAiD provisions	
0	1 (5)
1–5	7 (37)
6–10	5 (26)
≥ 11	6 (32)

MAiD = medical assistance in dying.
[a]Based on the Population Centre and Rural Area Classification of Statistics Canada (https://www.statcan.gc.ca/eng/subjects/standard/pcrac/2016/introduction).

TABLE 2. Participant Quotations by Theme

Theme	Quotation
Finding a place	I am a very deep supporter of MAiD because I have watched my grand[parent] pass away ... and [they] suffered for a long time at the end. So I believe that it is helpful with lessening the amount of suffering that they are going through, which I think is a part of patient advocacy. (Participant 18)
	I do have a very strong faith background, and so [my decision to provide MAiD] really surprised me … I always thought that my personal belief was that [death] would have to happen naturally … When that time comes for me, I will have to have that private conversation with whoever I see as my God. And at that point, when I feel that I've made a decision, it may or may not be going that direction. (Participant 8)
	So when Alberta Health Services sent out an initial [email asking] … "Would you be willing to be involved in MAiD?" I answered that "no", emphatically no. Does that mean that I don't have to deal with it in my practice? No, I do [have to deal with it in my practice]. (Participant 10)
	I sat on it for a little bit, actually. I wasn't sure if I wanted to be involved. (Participant 6)
	But I think some of my uncertainties with it really had to do with the fact that I wasn't familiar with the process, not necessarily that it was an ethical/moral thing because I think I dealt with enough. I think my own personal experiences as a pharmacist dealing with palliative patients, I do think that there is a role for MAiD. (Participant 19)
	I'm somewhat conflicted and don't know whether I would conscientiously object. But I feel a little bit like I don't have a choice because it is, I think, something we need to provide to our patients, and it does require a pharmacist as a provider. And I, as a manager, feel if I don't have a pharmacist willing, able to do that, then I feel it does have to be me. (Participant 5)
Serving in a caring role	You are just a lot more focused on making sure you have got the right med and the right strength and, you know, it is a different level of making sure you are right. (Participant 8)
	Thinking about the little things ... unwrapping [syringes] for them and priming those syringes so that they are ready to go … you don't want them unwrapping these extremely noisy wrappers while they are providing the MAiD. (Participant 4)
	That's how I want to view it, view providing MAiD as a clinician … recognizing at least for me that it is just as important as any other care we provide and if we can make it as—if we can facilitate the process to make it as smooth as possible, then we should. (Participant 3)
	I was in the room with the patient, I was there to support the physician. So then that was our first one. And then I have been—actually all of the cases I have been directly involved with, like in the room supporting the physicians, helping with the prescriptions. (Participant 15)
	It was the first time I was involved from beginning to end and actually going through the checklist with the provider and [determining] yes, the patient still consents and yes, she still has capacity to consent and all the questions. I came back to my office and … I didn't dive into work … I wanted to just take time and acknowledge how they might be feeling. It's not all about me, right? (Participant 9)
	My patient with a debilitating [disease] … requested MAiD, but Dr. x diagnosed her with severe depression. We treated her with ECT and an antidepressant… Upon discharge she was brighter and no longer considered MAiD as an option. (Participant 10)
Bearing emotional burdens	It is a very weighted emotional experience but there [have] been ones where it has been a very positive experience for everybody in there. And then there [are] ones where it does go much, much, much more towards the very sad, emotional experience for everybody. (Participant 4)
	It doesn't really hit you right away. You are kind of okay. But then you get home, and you start thinking about it afterwards. That is my experience from it. Like this past time I woke up in the middle of the night and I was wondering what did he eat for breakfast in the morning? … It just hits you at different times. (Participant 15)
	The first time was hard ... when you get home at the end of the day you are like yeah, I dispensed medications that killed somebody, right? And that was a little hard to take. (Participant 2)
	We treated it, sort of, as a very separate, almost secretive kind of a thing. And I think that's because we didn't sort of know how to deal with it. So we treated it as a very separate process … even for instance the technicians preparing it, they didn't really want other people to know what they were preparing and that they had chosen [to participate]. (Participant 5)
	One of the physicians I know does it [debrief] more as a formal thing … We all sit down and he just lets everybody kind of talk about it a bit. So it at least lets you process it after it has happened like, oh, that was really sad. And it is nice to kind of hear the person who is providing the MAiD is mirroring what you are experiencing with it. So I think just acknowledging that. (Participant 4)
	I feel like the primary promise that I made when I became a pharmacist was to do no harm, right? So now you are asking me to contribute to not just harm, but the death of a patient. And I find that incredibly difficult, and I am sometimes asked to justify myself with the [physicians] who are so pro. (Participant 10)

ECT = electroconvulsive therapy, MAiD = medical assistance in dying.

technical and transactional than their other patient care responsibilities. Although supplying medications for MAiD was familiar in some ways, it felt different because pharmacists were authorizing unfamiliar doses and were performing repeated checks to ensure the medications were ready for the provision. Kits were carefully curated to contribute to a smooth and peaceful experience for patients and providers, for example, by sequencing medications according to protocols and including additional labelling or supplies.

Some participants supported MAiD provision from a distance—working in a location separate from patients, families, providers, and other team members (for example, at an adjacent location in the hospital). Some participants felt isolated and removed from the patients and team members. Others felt distanced from the provision, but not removed from the process; these participants emphasized and acknowledged their role as integral to the MAiD process and team effort.

Participants had opportunities to expand their involvement in MAiD beyond the responsibilities outlined by AHS.[28] For example, they could choose to be physically present at the provision to support the patient and the provider. Some participants desired to contribute more directly to patient care throughout the MAiD process. As they gained experience with MAiD, their familiarity and confidence grew, as did their understanding of their own role and place in MAiD. It was a dynamic and evolving role. With each additional MAiD provision, the focus on the patient was more significant than the focus on the logistics associated with supplying medication.

Bearing Emotional Burdens

> I don't even know if I would describe it as discomfort. I was just [unusually] affected. Did I cry? I think I did. It was sad … We are ending a life here even though imminently life is going to end. And you know that there are several ways it can end, and it can be very, very sad. It could be very traumatic, it could go very wrong, and this patient has the option to end it the day she wants and the way she wants and peacefully, painlessly, peacefully pass on and [I'm] happy for her. But it just kind of surprised [me] that I would have [gone] through the same emotions. (Participant 1)

Participants described their experiences with MAiD as involving a range of emotions. They highlighted paradoxical feelings that were difficult to reconcile: accepting the inevitability of death while confronting the emotions associated with the end of a life. Negative emotions were described as sad, heavy, exhausting, and draining. Some participants experienced positive emotions associated with knowing that they had supported a patient's last wish or alleviated suffering.

Participating in MAiD affected pharmacists' emotions at various points in the process, including before the procedure and while preparing, delivering, and returning medication kits, as well as during the MAiD provision itself. Many participants recalled the first provision as the most difficult, especially when they realized the gravity of their role in MAiD at some crystallizing moment. Some participants experienced a delayed emotional response in the hours and days following the provision, although emotional burdens eased over time with subsequent provisions.

Emotional burdens felt greater in certain situations, such as when participants had pre-existing relationships with patients or their family members. The emotions of others also affected participants' experiences. Witnessing others' struggles and experiences of grief as they participated in MAiD and observing family dynamics or disagreements contributed to a heightened emotional state. The confidentiality and sensitivity related to MAiD created a sense of secrecy. Conversations around assisted dying were often restricted to those directly involved in the provisions. Many of the participants felt they could not openly discuss their experiences with nonparticipating colleagues. Thus, some concealed their involvement, suppressed emotions, or both.

Collaborative working relationships with physicians or nurse practitioners promoted sharing of information about patients. Hearing patients' stories from these professionals, to learn more about their conditions and clinical status, was reassuring for participants. However, the extent to which they could develop these relationships varied according to the particular work environment. Some participants were unfamiliar with other team members and patients, especially when supporting a provision at an unfamiliar site or unit. Providing and receiving support from other pharmacists and team members influenced their experiences in a positive way.

Participants took action to ease their emotional burdens. Diverting focus to a required task, such as documentation or the preparation of medication kits, helped them in the moment. To alleviate the emotional burden, some created physical distance from the provision, while others chose to participate closely in the provision. They processed their emotions following a MAiD provision through informal conversations with team members or their managers. During formal debrief sessions, they shared experiences and honoured patients. Some spoke with family members. Talking about the experience helped participants feel they were part of the provision from beginning to end and provided some closure.

DISCUSSION

We explored pharmacists' experiences of caring for patients seeking assistance in dying. Participants revealed their experiences to be personal, relational, emotional, and

dynamic. Previous qualitative research exploring other health care providers' experiences has yielded similar findings.[15] Within the theme of "finding a place", participants' realizations about themselves and their beliefs merged with the influences of their practice contexts as they helped care for patients seeking an assisted death. Their understanding of patients' stories was interwoven with reflections on their own beliefs about MAiD, their personal values, and their own experiences with death. The role of personal beliefs and values in pharmacists' decisions to participate in assisted dying was highlighted by Isaac and Chaar[23] and by Peters and others.[37] Realizations are shaped by contextual factors, including changes in public culture[38]; legal, policy, and procedural requirements[28]; professional ethical codes[39]; and practice environments.

The theme of "serving in a caring role" was related to participants' commitment to care for patients seeking an assisted death. The role was unique, in that caring was experienced as "a way of helping people by entering their world".[40] Whether participants were physically and emotionally distant or felt integral to the provision of MAiD, they felt connected to their patients. However, an adjustment from their experience of everyday pharmacy practice was required in terms of how to provide care in the context of MAiD. The pharmacy profession has evolved, and pharmacists must now find a balance between medication supply and patient care.[9] Both roles rely on collaboration and relationships with patients and other members of the health care team. The primary responsibility of pharmacists in the context of MAiD, as reported by study participants, was to supply medications. Zworth and others[19] emphasized a dispensing role for pharmacists in this context. By contrast, pharmacist participants in the study by Selby and others[15] emphasized clinical relationships with patients, minimizing their dispensing role. In our study, participants gave extraordinary attention to their dispensing tasks, thoroughly checking, carefully arranging, and thoughtfully transporting MAiD kits, to facilitate a smooth provision and thereby to enable a peaceful death. The dispensing role associated with MAiD stood out as a unique and meaningful experience, an active manifestation of the caring role and separate from previous experiences with medications for other purposes. In contrast, Selby and others[15] reported that the 3 pharmacists in their study, all of whom had previous clinical relationships with the patients receiving MAiD, did not perceive dispensing as a part of a genuine MAiD experience.

Despite the focus on medication, participants in the current study experienced their involvement in MAiD as a caring, patient-centred role, similar to findings reported by Mills and others[18] and Selby and others.[15] Pharmacists provided support to others and helped to mitigate distress. Some attended provisions to support other team members, patients, and families. Participants' roles in MAiD evolved with experience, suggesting that in the future, pharmacists may expand their roles to encompass direct interaction with patients and other responsibilities associated with MAiD.

The theme of "bearing emotional burdens" captured the emotional side of participants' experience in MAiD practice. Emotions are fundamental to an individual's personal and social engagement with the world.[41] Emotions were described variously as out of the ordinary, both positive and negative, greater in some circumstances but less in others, sometimes immediate but at other times delayed. Emotions enable individuals to determine the gravity of an experience for themselves.[42] As a unique service, MAiD has a weightiness that must be borne by those whose practice incorporates it. This theme revealed what mattered most for each participant. They spoke of their emotions easing over time as their familiarity with MAiD practice increased. Some spoke of how this change in emotional intensity drew their attention away from themselves and toward the patients and others. Verweel and others[22] highlighted concerns regarding professional distress in the context of MAiD. For participants, emotional burdens were reconciled through relational means: talking with other involved caregivers, acknowledging shared experiences of active MAiD participation, and connecting with patients' stories regarding their journeys toward a desired death. Mills and others[24] reported that pharmacists found value in discussing their experiences with others involved in MAiD.

Support for professionals caring for patients seeking MAiD may be provided through carefully planned formal or informal conversations, including debriefing in an open environment where opinions and feelings may be discussed.[15,24] Further consideration of ways to enhance education and training related to MAiD is warranted.[2,11,15,22,42] Including MAiD in health sciences curricula and professional development programs provides opportunities for students and practising pharmacists to reflect on their roles, ponder their place in the MAiD process, and increase their preparedness.

This study contributes to the understanding of pharmacists' roles in MAiD and the lived experiences of pharmacists, addressing previously identified gaps in the literature.[2,15,22] A unique theoretical framework, based on interviews with expert and senior Australian pharmacists anticipating their experiences with assisted dying practice,[25] enabled exploration of the actual roles and experiences of pharmacists. Deployment of this framework delivered new and insightful understandings of MAiD practice, including the gravity associated with the dispensing role and the emotional aspect of these experiences.[22]

The limitations of this study relate to the sample and the context. Participants were self-referred, all were practising in hospitals, and 1 had chosen not to participate in the provision of MAiD. While the themes embodied the experiences of all participants in this study, the sample

may not have adequately captured the experiences of all pharmacists participating in the care of patients requesting MAiD. Future research would benefit from including pharmacists practising in different settings (specifically community pharmacies), those of different genders, and those objecting to MAiD.

Several changes to MAiD that came into effect with the assisted dying legislation of March 2021, including removal of the requirement that natural death be foreseeable and elimination of the 10-day reflection period in some situations,[43] occurred after this study was complete. Pharmacists' experiences with MAiD practice in situations where death is not imminent warrant investigation. Research to study the roles and experience of other pharmacy team members, including pharmacy technicians, in other jurisdictions will also facilitate deeper understanding of the influence of practice context, education, roles, and cultural norms on MAiD practice.

CONCLUSION

This study explored how hospital pharmacists experience the practice of caring for patients who seek MAiD. The experience involved an active, iterative, and reflective process concerning pharmacists' decisions to participate in MAiD. The role focused on medication supply and documentation, yet it was experienced as a caring role in service of another's decision and needs. Pharmacists experienced a range of emotions, both positive and negative. The results of this study will inform pharmacists about their role in MAiD and the range of experiences associated with assisted dying practice. Pharmacy educators, leaders, and policy-makers may apply these results to their own contexts to further support pharmacists and potentially expand their roles in MAiD. Further research will deepen understanding of the possibilities for pharmacists' roles within MAiD practice.

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Evaluating a Pharmacist-Initiated Care Bundle for Patients with Chronic Obstructive Pulmonary Disease

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ABSTRACT

Background: Chronic obstructive pulmonary disease (COPD) is a cause of significant morbidity and mortality, and management of patients with this complex disease remains a challenge. Pharmacists work within an interdisciplinary health care team to coordinate services and ensure that standards of care are met. A pharmacist-initiated care bundle provided in the outpatient setting has shown promising results in improving COPD management.

Objective: To evaluate, in the acute care setting, the effectiveness of a pharmacist-initiated COPD care bundle in improving compliance with health care measures known to improve outcomes in patients with COPD.

Methods: This retrospective chart review included patients with acute exacerbation of COPD admitted from May 14, 2019, to February 29, 2020. Completion rates for the 6 individual components of the COPD care bundle were compared between patients who did and did not receive the pharmacist-initiated intervention. A subgroup of 22 patients received the following additional interventions: documentation of the modified Medical Research Council score, assessment of COPD medications, and vaccination review and administration.

Results: A total of 106 patients were included in the analysis, 53 patients in each of the control and intervention groups. The pharmacist-initiated intervention increased completion rates for the overall COPD care bundle from 2% to 17% ($p = 0.003$), for provision of the COPD flare-up action plan from 4% to 79% ($p < 0.001$), and for provision of smoking cessation education from 0% to 36% ($p = 0.04$); however, there was no significant difference in assessment by a respiratory therapist. For the subgroup that received additional interventions, vaccination reviews were conducted for 21 (96%) of the 22 patients, which led to 9 (41%) receiving a guideline-recommended vaccine.

Conclusions: Pharmacist involvement in initiation of the care bundle significantly increased completion rates for the activities included in the care bundle.

Keywords: chronic obstructive pulmonary disease, acute exacerbation, pharmacist-initiated care, interdisciplinary health care team

RÉSUMÉ

Contexte : La maladie pulmonaire obstructive chronique (MPOC) est une cause d'une morbidité et d'une mortalité importantes, et la prise en charge des patients atteints de cette maladie complexe demeure un défi. Les pharmaciens travaillent au sein d'une équipe interdisciplinaire de soins de santé pour coordonner les services et s'assurer du respect des normes de soins. Un ensemble de soins initié par le pharmacien en milieu ambulatoire a donné des résultats prometteurs dans l'amélioration de la prise en charge de la MPOC.

Objectif : Évaluer, dans le cadre des soins aigus, l'efficacité d'un ensemble de soins pour la MPOC initié par un pharmacien pour améliorer le respect des mesures de soins de santé connues pour améliorer les résultats chez les patients atteints de MPOC.

Méthodes : Cet examen rétrospectif des dossiers comprenait des patients présentant une exacerbation aiguë de la MPOC admis du 14 mai 2019 au 29 février 2020. Les taux de réussite pour les 6 composantes individuelles de l'ensemble de soins pour la MPOC ont été comparés entre les patients ayant reçu et ceux n'ayant pas reçu l'intervention initiée par le pharmacien. Un sous-groupe de 22 patients a reçu des interventions supplémentaires : documentation du score modifié du Medical Research Council (mMRC), évaluation des médicaments pour la MPOC, et examen et administration de la vaccination.

Résultats : Au total, 106 patients ont été inclus dans l'analyse : 53 patients dans le groupe de contrôle et 53 dans le groupe d'intervention. L'intervention initiée par le pharmacien a augmenté les taux d'adhésion à l'ensemble de soins pour la MPOC de 2 % à 17 % ($p = 0,003$), de 4 % à 79 % ($p < 0,001$) pour l'offre du plan d'action en cas de poussée de MPOC et de 0 % à 36 % ($p = 0,04$) pour l'éducation au sevrage tabagique; cependant, l'évaluation par un inhalothérapeute n'a permis de déceler aucune différence significative. Dans le sous-groupe ayant reçu des interventions supplémentaires, des examens de vaccination ont été menés chez 21 (96 %) des 22 patients; 9 patients (41 %) ont ainsi reçu un vaccin recommandé par les lignes directrices.

Conclusions : La participation du pharmacien à l'initiation de l'ensemble de soins a augmenté de manière significative les taux de réussite des activités incluses dans l'ensemble de soins.

Mots-clés : maladie pulmonaire obstructive chronique, exacerbation aiguë, soins initiés par le pharmacien, équipe interdisciplinaire de soins de santé

INTRODUCTION

It is estimated that 328 million people have chronic obstructive pulmonary disease (COPD) worldwide.[1] These patients are at an increased risk of premature death, with more than 3 million deaths from COPD every year,[2] significant morbidity resulting in frequent hospitalizations, and reduced quality of life.[3]

A care bundle is a tool used to improve patient care and outcomes. Specifically, it is a set of evidence-based practices, generally 3 to 5 in number, that, when performed collectively and reliably, have been shown to improve patient outcomes.[4,5] Measures known to improve outcomes in the management of patients with COPD include education about adherence to guideline-recommended medications and proper inhaler technique, quality measures such as smoking cessation and vaccination,[6] and outpatient follow-up with a respirologist.[7] Despite the known benefits of these interventions, not all patients receive them during hospital admissions. In the outpatient setting, having pharmacists initiate a care bundle for patients with an acute exacerbation of COPD has been shown to increase bundle compliance by 97.1% (relative to relying on other care providers to complete the care bundle).[6] Pharmacists have specialized training to optimize pharmacotherapy, recognize nonadherence, implement strategies to improve adherence, and assess and educate patients on proper inhaler use.[8] Pharmacists also help to coordinate services within the health care team to ensure that standards of care are met. For these reasons they remain an integral part of the health care team for optimal COPD management.

A multidisciplinary COPD Working Group (including M.K., T.W., and D.C.) was formed at Burnaby Hospital to address the issue of COPD admissions and the overall burden of COPD on the acute care system. The members of this working group collaborated to develop a COPD care bundle consisting of interventions that have been demonstrated to improve health outcomes of patients with acute exacerbation of COPD. Historically, care bundles at Burnaby Hospital have had poor uptake; therefore, the working group decided to implement this COPD care bundle on a more limited basis to assess whether compliance could be improved. The COPD care bundle, to be initiated by clinical pharmacists, was introduced in May 2019.

The objective of this quality improvement study was to evaluate, within the acute care setting, the effectiveness of the pharmacist-initiated COPD care bundle in improving compliance with measures known to improve outcomes in patients with COPD.

METHODS

Study Design

This study was a retrospective chart review of patients admitted to Burnaby Hospital with acute exacerbation of COPD. For this quality improvement study, an exemption from ethics review was granted by the Fraser Health Research Ethics Board.

Study Population

The Burnaby Hospital electronic database was searched, using codes from the *International Classification of Diseases, Ninth Revision* (ICD-9), to identify all patients 18 years of age or older who were admitted between May 14, 2019, and February 29, 2020, for acute exacerbation of COPD. If a patient had 2 or more admissions for COPD during the study period, only the first admission was included for analysis. Patients were excluded if they died during their hospital stay, were admitted to or discharged from the intensive care unit (ICU) without being transferred to a lower-acuity ward, had a diagnosis of lung cancer, were enrolled in palliative care, or were pregnant. Patients in the control group must not have received the COPD care bundle within the 6 months following the index admission.

Intervention

The working group developed a COPD care bundle consisting of the following 6 measures: referral to a respiratory therapist (RT) for assessment of inhaler use at the time of discharge (including inhaler technique and medication adherence), bedside spirometry, and smoking cessation education (if applicable); speech language pathologist referral for dysphagia/reflux screening; outpatient respirologist referral (if the patient had 2 or more hospital admissions in the past 12 months); and pharmacist provision of a COPD flare-up action plan at discharge (including antimicrobial stewardship recommendations for antibiotic selection and duration).

A training meeting was held before commencement of the study period, during which clinical pharmacists were trained on how to identify eligible patients and how to implement the COPD care bundle. The pharmacists then identified patients on their respective assigned medical wards who had been admitted with acute exacerbation of COPD and who fit the criteria to receive the defined care bundle. Clinical pharmacists working on any of the 5 main medicine wards and in other wards such as surgery, neurology, and cardiology were involved in identifying patients and initiating the care bundle. A standardized note was placed in the patient's chart to remind the attending physician to order the appropriate referrals (as set out in the care bundle). Given resource constraints, not all wards at Burnaby Hospital have a dedicated clinical pharmacist, and thus some patients would not have received the care bundle before discharge, despite their eligibility, yielding a de facto control group. For a subgroup of patients, referred to as the "bundle^{PLUS} group" and derived from patients on medicine units with consistent clinical pharmacist coverage, pharmacists conducted the following 3 additional interventions:

a vaccination review, documentation of the modified Medical Research Council (mMRC) score, and assessment of medications to ensure prescribing in accordance with the current guidelines of the Global Initiative for Chronic Obstructive Lung Disease (GOLD).[9]

For purposes of this study, a retrospective chart review was conducted, as described above. All hospital admissions for COPD during the study period were reviewed by 2 investigators (J.K. and M.K.) to identify patients who received the COPD care bundle as initiated by a pharmacist (intervention arm) and patients for whom a pharmacist did not initiate the care bundle (control arm); patients in the control group might have received some or all elements of the bundle, but without pharmacist involvement. Each chart in the control arm was assigned a random number, and charts were selected, in ascending order, until an equal number of control patients had been identified.

The primary objective was to compare the overall rate of completion for all components of the COPD care bundle between the intervention and control groups. The secondary objectives were to compare the completion rates for each individual component of the care bundle, the rates of emergency department visits or readmission to hospital for acute exacerbation of COPD in the 6 months after discharge from the index admission, the average time to repeat hospital admission or emergency department visit, and the rate of 30-day hospital readmission for acute exacerbation of COPD. For patients in the bundle^{PLUS} subgroup, the secondary outcomes were the number (and percentage) with documentation of mMRC score, review of medications in accordance with GOLD guidelines, vaccination review, and vaccine administration.

Statistical Analysis

Given that this COPD care bundle was the first at this institution to include a flare-up action plan, the baseline incidence for completion of all bundle components was expected to be zero. It was determined that a total of 45 patients in each group would yield 90% power to detect an incidence of 20% for completion of all care bundle components with 2-sided α of 0.05. Descriptive statistics (means, medians, and ranges) were calculated and reported. All data were analyzed using Excel spreadsheet software (Office 365, Microsoft Corporation). The primary outcome is presented as a proportion (percentage), and secondary outcomes are presented as either proportions (percentages) or medians (with interquartile ranges). Categorical data were analyzed using the χ^2 or Fisher exact test, and continuous data were analyzed with the Student *t* test.

RESULTS

On the basis of ICD-9 codes, a total of 231 admissions for acute exacerbation of COPD were identified during the study time frame (May 14, 2019, to February 29, 2020), and 161 patients met the inclusion criteria. Of the 161 eligible patients, 53 received the pharmacist-initiated COPD care bundle and of those patients, 22 received the additional "bundle^{PLUS}" intervention. Random numbers were assigned to the remaining 108 charts, which were reviewed in ascending order until there were 53 patients in the control arm (an equal number to the intervention arm) (Figure 1). Therefore, a total of 106 patients were included in the analysis, and baseline characteristics were similar in the 2 groups (Table 1).

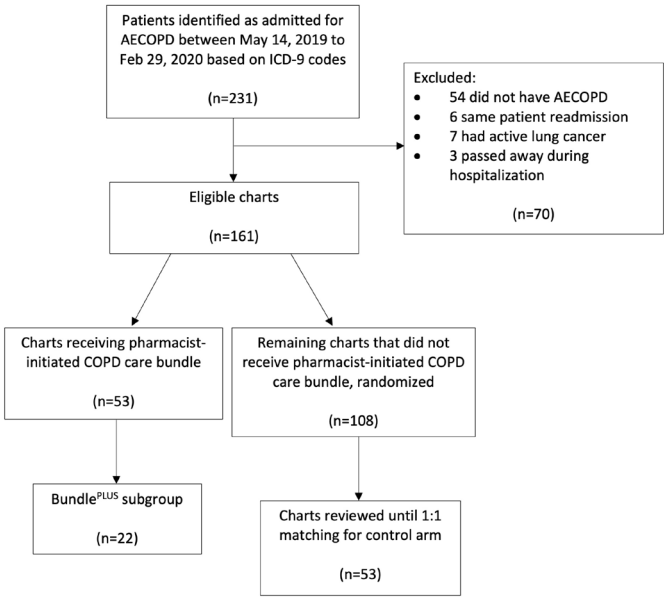

FIGURE 1. Sample selection. AECOPD = acute exacerbation of chronic obstructive pulmonary disease, COPD = chronic obstructive pulmonary disease, ICD-9 = *International Classification of Diseases, Ninth Revision*.

TABLE 1. Baseline Characteristics

Characteristic	Group; No. (%) of Patients[a]	
	Pharmacist-Initiated Bundle (n = 53)	Control (n = 53)
Age (years) (mean ± SD)	76 ± 10.6	75 ± 12.1
Sex, male	24 (45)	26 (49)
Length of hospital admission (days) (median and IQR)	7 (4–11)	4 (3–9)
≥ 2 hospital admissions for COPD in past 12 months	9 (17)	5 (9)
Current smoker	14 (26)	12 (23)
Spirometry		
FEV_1 (%) (n = 41)	52	54
FEV_1/FVC (n = 44)	0.5	0.5
Comorbidities		
Asthma	11 (21)	5 (9)
GERD	15 (28)	9 (17)
Dysphagia	3 (6)	1 (2)
Cognitive impairment	7 (13)	8 (15)
Nonadherence with therapy[b]	2 (4)	0

COPD = chronic obstructive pulmonary disease, FEV_1 = forced expiratory volume in the first second, FVC = forced vital capacity, GERD = gastroesophageal reflux disease, IQR = interquartile range, SD = standard deviation.
[a]Except where indicated otherwise.
[b]Patients were deemed to be nonadherent with medication therapy if nonadherence was documented anywhere in the physician's consult note or was indicated in the assessment notes of the respiratory therapist.

Pharmacist intervention increased the completion of all components of the main COPD care bundle relative to those who did not receive the pharmacist intervention (17% versus 2%, p = 0.003). Additionally, there was a statistically significant difference in completion of individual bundle components between the intervention and control arms, except for RT assessment of inhaler technique and RT provision of spirometry (Figure 2). Among eligible patients, the proportion of those who received smoking cessation education was significantly greater for those receiving the pharmacist-initiated care bundle (5 of 14) than for those not receiving the pharmacist-initiated care bundle (0 of 12) (Figure 2). There were no statistically significant differences in terms of repeat hospital admission, emergency department visits, or 30-day readmissions (Table 2).

Of the 22 patients who received the bundle^{PLUS} interventions, 20 (91%) had documentation of mMRC score and subsequently received assessment of their COPD medications

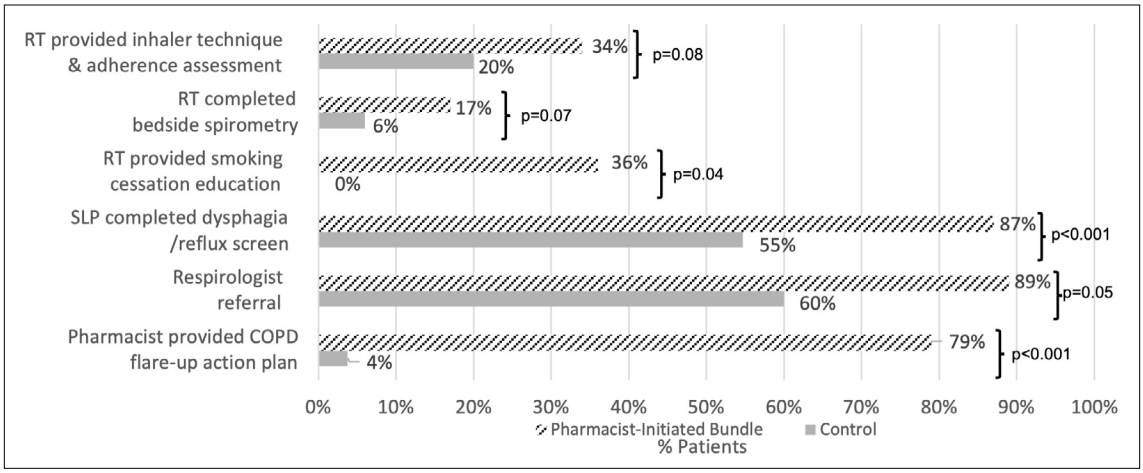

FIGURE 2. Secondary outcomes: completion of each individual component of the chronic obstructive pulmonary disease (COPD) care bundle. For each component, the intervention and control groups had 53 patients each, except for smoking cessation education, which was based on numbers of patients eligible for such education (n = 14 for intervention group, n = 12 for control group). RT = respiratory therapist, SLP = speech language pathologist.

TABLE 2. Secondary Outcomes: Clinical End Points

Outcome	Group; No. (%) of Patients[a]		*p* Value
	Pharmacist-Initiated Bundle (*n* = 53)	Control (*n* = 53)	
Repeat hospital admission			
No. (%) of patients	14 (26)	7 (13)	0.14
Time to repeat admission (days) (median and IQR)	50 (39–106)	55 (6–156)	0.70
Repeat emergency department visit			
No. (%) of patients	8 (15)	3 (6)	0.20
Time to repeat visit (days) (median and IQR)	81 (9–116)	29 (29–77)	0.35
No. (%) of patients with 30-day hospital readmission	2 (4)	2 (4)	> 0.99

IQR = interquartile range.

to determine appropriateness, based on recommendations in the GOLD guidelines.[9] Five (25%) of these 20 patients were deemed to be receiving suboptimal therapy, and their medications were modified accordingly at the time of discharge. A vaccination review was conducted for 21 (96%) of the 22 patients who received the bundle^{PLUS} interventions, and 9 (41%) of these subsequently received a guideline-recommended vaccine during their hospital stay (Table 3). Six patients received the pneumococcal vaccine, 2 patients received the seasonal influenza vaccine, and 1 patient received both (Table 3).

DISCUSSION

COPD care bundles have been shown to improve patient outcomes in various settings. Despite the known benefits, measures such as RT referral for assessment of inhaler technique and adherence, bedside spirometry, and smoking cessation education, completion of dysphagia/reflux screening by a speech language pathologist, respirologist referral, and provision of a COPD flare-up action plan are still not being provided consistently to inpatients. In this study, a COPD care bundle was developed for patients admitted with acute exacerbation of COPD. Clinical pharmacists working on certain wards identified patients eligible for the care bundle and coordinated the provision of care bundle activities. For eligible patients admitted to wards without clinical pharmacist coverage, provision of care bundle activities relied on other health care professionals (e.g., physicians).

TABLE 3. Secondary Outcomes: Bundle^{PLUS}

Outcome	No. (%) of Patients (*n* = 22)
Documentation of mMRC score	20 (91)
Assessment of COPD medications	20 (91)
Vaccination review	21 (96)
Vaccine administration	
Received any vaccine[a]	9 (41)
No. of pneumococcal vaccines administered	7
No. of influenza vaccines administered	3

Bundle^{PLUS} = additional pharmacist interventions (documentation of modified Medical Research Council [mMRC] score, review of medications for appropriateness, vaccination review), COPD = chronic obstructive pulmonary disease.
[a]One patient received both pneumococcal and influenza vaccines.

Patients receiving the pharmacist-initiated intervention were compared with patients who did not have a clinical pharmacist coordinating their care. There was a 15% absolute increase in the provision of all care bundle activities within the intervention arm. By comparison, a previous study in an outpatient pulmonary clinic showed that pharmacist provision of COPD care bundles increased bundle compliance by 97.1%.[6] The much greater improvement in bundle compliance in the outpatient setting compared with the inpatient setting may be due to the quick turnover and discharge of patients treated in hospital, with some patients leaving hospital before receiving all care bundle components. Furthermore, the outpatient setting may allow for the completion of bundle components over the course of multiple appointments. Follow-up in the inpatient setting may be more challenging, and for patients with multiple admissions, only the first was included in this study. However, the interventions provided by pharmacists in the current study had completion rates similar to that of Smith and others,[6] including provision of a COPD flare-up action plan (79%), documentation of mMRC score (91%), assessment of COPD medications (91%), and provision of a vaccination review (96%). Bundle completion rates might be further improved by having pharmacists share certain responsibilities with RTs, such as providing education about inhaler technique, assessing inhaler adherence, and providing smoking cessation education. Overall, this study demonstrated that pharmacist involvement has a positive effect on integrating bundle components into practice.

Another previous study with a physician-led COPD care bundle demonstrated a reduction in 30-day readmission

rates.[10] Such a reduction was not seen in our study, which may have been due to differences in patients' baseline characteristics. Specifically, in the earlier study by Parikh and others,[10] the control group had a significantly lower forced expiratory volume in the first second (FEV_1) than the care bundle group (41% and 53.9%, respectively), whereas FEV_1 was similar in the intervention and control arms of our study. Furthermore, we were unable to capture readmissions to hospitals other than our site, which might have resulted in underrepresentation of the readmission rate.

Although other studies have conducted immunization reviews,[6] our study was the first to include vaccination administration as a bundle component. All but one of the patients in the bundle^{PLUS} subgroup received a vaccination review, and 41% of these patients went on to receive the seasonal influenza or pneumococcal vaccine before discharge from hospital. This intervention has the potential to significantly improve patient outcomes. Patients with COPD are particularly vulnerable to viral and bacterial pulmonary infections.[11] Complications of influenza infection include progression to secondary bacterial infections, resulting in bronchitis, sinusitis, and otitis media.[12] Streptococcal pneumonia may also be more aggressive and affect the lungs, brain, joints, and blood stream.[12] Influenza and pneumococcal vaccines were found to reduce the risk of hospitalization and death from these infections, particularly in those with lung disease.[11] Therefore, being able to improve vaccination compliance in the inpatient setting is essential. With our relatively short 6-month follow-up period, these long-term benefits might not have been captured in our results.

In this study, 91% of patients in the bundle^{PLUS} subgroup received assessment of their COPD medications to determine appropriateness, relative to recommendations in the GOLD guidelines. This assessment resulted in medication changes for 5 patients (25%). The literature has shown that treatment regimens compliant with GOLD recommendations were associated with a reduction in exacerbations, as well as decreases in COPD-related health care resource utilization and COPD-related medical costs.[9,13] Therefore, continued pharmacist involvement in provision of these care bundle interventions could potentially improve long-term health outcomes for patients with COPD at our institution.

This study had several limitations. It is unknown whether the study was sufficiently powered to detect a difference between the 2 groups, given that the observed difference was lower than expected (15% versus the 20% used in the sample size calculation). The lower-than-expected difference was partly due to prescribers becoming aware of the bundle over the course of the study and incorporating aspects of the bundle into their standard of care. This is evidenced by the fact that 2% of the control patients met the primary outcome of completion of all COPD care bundle components, despite one of those components (the flare-up action plan) having never before been part of the standard of care for patients with COPD at this institution. The control group also had a shorter length of stay than the intervention group (median of 4 days and 7 days, respectively; Table 1). As a result, the increase in provision of all activities in the intervention arm may have been confounded by the longer length of stay. The extent to which this affected the results is unknown. Conversely, some patients were discharged before receiving all bundle components, which may have dampened the effect of our intervention. The authors determined a priori that awaiting provision of COPD care bundle components would not pose a barrier to discharge, considering the costs and risks associated with prolonged hospitalization. The short duration of follow-up was also a limitation of this study. The authors were unable to capture year-to-year variations in COPD exacerbations or the long-term benefits that the bundle might have had on clinical outcomes. Given the current lack of standardized electronic medical record documentation across British Columbia's health care system, readmissions to other hospital sites were not captured. Furthermore, for many patients, COPD is diagnosed without formal spirometry testing; as a result, not all patients included in this study had spirometry-confirmed COPD. As an observational, nonrandomized, retrospective chart review, this study relied primarily on accurate documentation in chart notes prepared by the physician, the RT, and the speech language pathologist. Consequently, confounding cannot be ruled out. Of the 6 bundle components, only RT assessment did not show a statistically significant difference between the intervention and control groups. The limited availability of RT services to cover tertiary hospital demands may be a contributing factor.

CONCLUSION

Clinical pharmacists play an essential role in increasing compliance with the components of a COPD care bundle. Pharmacists are equipped with the training and skills to provide instructions on inhaler technique and assessment of inhaler adherence, vaccination review, and smoking cessation education. As part of a multidisciplinary care team, they could share these responsibilities with RTs to improve overall completion rates for care bundle components. In this study, clinical pharmacists had a positive effect on compliance with all bundle interventions, and the clinical pharmacist–initiated COPD care bundle could be implemented in all wards of the hospital. Patients not being followed by an outpatient clinic after discharge might derive benefit from improved COPD management if they were to receive the care bundle components during their acute care encounter. Future directions include pharmacists assisting in the provision of these activities to fill the gap in care for patients with COPD, increasing engagement, and optimizing management of patients with COPD in the acute care setting.

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Trends in Use of Combination Antiretroviral Therapy and Treatment Response from 2000 to 2016 in the Canadian Observational Cohort (CANOC): A Longitudinal Cohort Study

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ABSTRACT

Background: Advances in treatment have turned HIV from a terminal illness to a more manageable condition. Over the past 20 years, there have been considerable changes to HIV treatment guidelines, including changes in preferred antiretrovirals and timing of initiation of combination antiretroviral therapy (cART).

Objective: To examine real-world trends in cART utilization, viral control, and immune reconstitution among people living with HIV in Canada.

Methods: Data were obtained from the Canadian Observational Cohort (CANOC). CANOC participants were eligible if they were antiretroviral therapy–naive at entry and initiated 3 or more antiretrovirals on or after January 1, 2000; if they were at least 18 years of age at treatment initiation; if they were residing in Canada; and if they had at least 1 viral load determination and CD4 count within 1 year of CANOC entry. Baseline and annual mean CD4 counts were categorized as less than 200, 200–350, 351–500, and more than 500 cells/mm^3. Annual mean viral loads were reported as suppressed (< 50 copies/mL), low (50–199 copies/mL), or high detectable (≥ 200 copies/mL). The cART regimens were reported yearly.

Results: All CANOC participants were included (n = 13 040). Over the study period, the proportion of individuals with an annual mean CD4 count above 500 cells/mm^3 increased from 16.3% to 65.8%, while the proportion of individuals with an undetectable mean viral load increased from 10.6% to 83.2%. As of 2007, the most commonly prescribed 2-agent nucleoside reverse transcriptase inhibitor backbone was tenofovir disoproxil fumarate and emtricitabine. In terms of third agents, non-nucleoside reverse transcriptase inhibitors were the most common class in the periods 2000–2003 and 2014–2015, protease inhibitors were most common in the period 2004–2013, and integrase inhibitors were most common in 2016.

Conclusions: Concordance with treatment guidelines was demonstrated over time with respect to cART prescribing and immunologic and virologic response.

Keywords: HIV, antiretroviral therapy utilization, CD4 count

RÉSUMÉ

Contexte : Les progrès effectués dans le domaine des traitements ont transformé le VIH. Celui-ci est passé d'une maladie en phase terminale à une maladie plus gérable. Au cours des 20 dernières années, des changements considérables ont eu lieu dans les directives de traitement du VIH, y compris des changements dans les antirétroviraux privilégiés et le moment de l'initiation de la thérapie antirétrovirale combinée (TARc).

Objectif : Examiner les tendances réelles de l'utilisation de la TARc, du contrôle viral et de la reconstitution immunitaire chez les personnes vivant avec le VIH au Canada.

Méthodes : Les données ont été obtenues auprès de la Canadian Observational Cohort (CANOC). Les participants à la CANOC étaient admissibles s'ils n'avaient jamais reçu de traitement antirétroviral à l'entrée et avaient commencé la prise de 3 antirétroviraux ou plus le 1er janvier 2000 ou après cette date; s'ils avaient au moins 18 ans au moment du début du traitement; s'ils résidaient au Canada; et s'ils avaient au moins 1 charge virale et un nombre de CD4 dans l'année suivant l'entrée à la CANOC. Les numérations initiales et annuelles moyennes de CD4 ont été classées comme inférieures à 200, 200 à 350, 351 à 500, et supérieures à 500 cellules/mm^3. Les charges virales moyennes annuelles ont été signalées comme supprimées (< 50 copies/mL), faibles (50 à 199 copies/mL) ou élevées détectables (≥ 200 copies/mL). Les régimes de la TARc ont été rapportés chaque année.

Résultats : Tous les participants à la CANOC ont été inclus (n = 13 040). Au cours de la période d'étude, la proportion de personnes ayant une numération CD4 moyenne annuelle supérieure à 500 cellules/mm^3 est passée de 16,3 % à 65,8 %, tandis que la part de personnes ayant une charge virale moyenne indétectable est passée de 10,6 % à 83,2 %. En 2007, la bithérapie de base d'inhibiteurs nucléosidiques de la transcriptase inverse la plus couramment prescrite était le fumarate de ténofovir disoproxil et l'emtricitabine. En matière de troisièmes agents, la classe la plus courante dans les périodes 2000-2003 et 2014-2015 était les inhibiteurs non nucléosidiques de la transcriptase inverse; les plus courants dans la période 2004-2013 étaient les inhibiteurs de protéase; et les inhibiteurs de l'intégrase étaient les plus courants en 2016.

Conclusions : La concordance avec les directives de traitement a été démontrée au fil du temps en ce qui concerne la prescription de la cART et la réponse immunologique et virologique.

Mots-clés : VIH, utilisation de la thérapie antirétrovirale, nombre de CD4

INTRODUCTION

Treatment with antiretroviral therapy is recommended to improve quality of life, to achieve virologic suppression and immune reconstitution, and to prevent disease progression, mortality, and transmission among people living with HIV (PLWH).[1-4] Advances in antiretroviral therapy over the past few decades have turned HIV into a chronic, more manageable disease, and PLWH may now have a life expectancy comparable to those living without HIV.[5] Currently available antiretroviral drugs include nucleoside reverse transcriptase inhibitors (NRTIs), non-nucleoside reverse transcriptase inhibitors (NNRTIs), protease inhibitors (PIs), and integrase inhibitors (INSTIs), and the ideal treatment regimen will induce viral suppression while minimizing toxicity, viral resistance, pill burden, and drug interactions.[1,6-9] Although today it is commonly accepted that antiretroviral therapy should be initiated as soon as possible after a diagnosis of HIV has been made, historically this was not always the case.

In 1996, treatment with 2 NRTIs plus either a PI or NNRTI—known as highly active antiretroviral therapy or combination antiretroviral therapy (cART)—revolutionized care for PLWH by reducing viral load, progression to AIDS, hospitalizations, and morbidity and mortality.[2,3,10] However, early treatment regimens were characterized by serious toxicities, complicated dosing, and food and drug interactions that contributed to complexity in weighing the benefits and risks associated with the decision to initiate and continue treatment with antiretrovirals. Although the decision to treat was less controversial for symptomatic individuals and those with high viral loads (e.g., > 50 000 copies/mL), there existed some heterogeneity in the timing of treatment initiation among asymptomatic PLWH according to the available guideline recommendations.[6,11,12] Since the introduction of cART, there have also been considerable developments with regard to antiretroviral therapy in terms of potency, tolerability, and dosage forms (e.g., combination pills).

According to the 2002 recommendations of the International AIDS Society-USA Panel, initiation of any cART regimen was encouraged for symptomatic PLWH and those with CD4 counts below 200 cells/mm^3, although there was less consensus regarding optimum timing of treatment among asymptomatic individuals with higher CD4 counts.[6] Over the next 2 years, clinical trials would provide evidence for the NRTIs zidovudine or tenofovir disoproxil fumarate and lamivudine or emtricitabine, the NNRTIs efavirenz and nevirapine, and the boosted PIs lopinavir, atazanavir, saquinavir, and indinavir.[7,13-18] Also in 2004, observational studies demonstrated an association between treatment initiation at CD4 counts below 200 cells/mm^3 and higher rates of disease progression and mortality when compared with individuals initiating therapy at CD4 counts between 200 and 350 cells/mm^3.[7] Until 2008, cART was typically not considered for asymptomatic individuals with CD4 counts above 350 cells/mm^3.[7,8,19]

In spring 2009, the first INSTI—raltegravir—was marketed in Canada, and shortly after, NA-ACCORD investigators demonstrated an increased risk of death associated with delaying antiretroviral therapy among those with a CD4 cell count of 351 to 500 cells/mm^3 *and* among those with a CD4 cell count above 500 cells/mm^3.[3,20,21] By 2010, randomized controlled trials had demonstrated that raltegravir was non-inferior to efavirenz with respect to achieving viral suppression while simultaneously being associated with fewer adverse events.[9,22,23] In 2010 and 2014, the International AIDS Society-USA Panel revised its recommendations by adding raltegravir as a possible third agent[9] and by recommending cART for all PLWH, respectively.[24] Around the same time, the HPTN 052, INSIGHT START, and TEMPRANO trials concluded that cART should be initiated for all PLWH, regardless of CD4 count.[25-27]

Using data from the Canadian Observational Cohort (CANOC), the objective of this study was to describe antiretroviral therapy use, viral load, and immune reconstitution among PLWH in Canada from 2000 to 2016.

METHODS

Study Design, Settings, and Participants

The CANOC study is a longitudinal cohort of PLWH receiving antiretroviral therapy in Canada. Included in CANOC are 11 sites across 5 provinces (British Columbia [BC], Saskatchewan, Ontario, Quebec, and Newfoundland and Labrador), and data are available from January 1, 2000, to December 31, 2016. To be eligible for inclusion in CANOC, individuals living with HIV must have been antiretroviral therapy–naive at entry into cohort and must have initiated cART with at least 3 antiretroviral medications on or after January 1, 2000; had to be 18 years or older at treatment initiation; had to be a resident of Canada; and had to have at least 1 measurement of viral load and 1 CD4 cell count within the first year of entry.[28] Participating sites extracted demographic and clinical data, including cART regimen data, from medical files, and the data were aggregated at the BC Centre for Excellence in HIV/AIDS. Study participants were followed from the time of entry into the cohort until either the end of the study period or they were lost to follow-up. Additional information about CANOC is available elsewhere.[29]

Definitions of Variables

In alignment with historical treatment initiation thresholds, participants' baseline and annual mean CD4 cell count were calculated and classified as below 200, 200–350, 351–500, or above 500 cells/mm^3.[6-9,24] Similarly, baseline and annual mean viral load of included PLWH was calculated and classified as suppressed (<50 copies/mL), low (50–199 copies/mL), or high detectable (≥ 200 copies/mL).

The cART regimens were classified according to the third-agent class (e.g., either NNRTI, PI, or INSTI, in addition to the 2-agent NRTI backbone) and according to the specific medication within each class (e.g., among NNRTI, either efavirenz, nevirapine, rilpivirine, etravirine). The NRTI backbone was described in 2 separate tabulations, first by single agent and then categorized according to both drugs contained in the regimen (e.g., the latter category could combine emtricitabine and tenofovir disoproxil fumarate as one group). If multiple cART regimens were prescribed for a patient in a given year, the regimen that accounted for the highest proportion of days in that year was used. More specifically, our cART regimen data could include either the first prescribed regimen or later regimens, depending on the length of time for which a regimen was prescribed. A regimen switch would only be covered in the sense that a patient's regimen type would change from one year to the next. Any 2-drug regimens, any regimens with a third agent other than NNRTI, PI, or INSTI, and regimens consisting of 3 or more classes of antiretroviral therapy were coded as "other". Any given year could have contained a mixture of both treatment-experienced individuals and those initiating cART for the first time. A small number of CANOC participants were receiving investigational antiretroviral therapy during the study period. All categories were mutually exclusive.

Ethics Approval

This research was conducted in alignment with the Helsinki Declaration, and ethics approval was obtained at participating sites and from the harmonized University of British Columbia – Simon Fraser University Research Ethics Board at the Providence Health Care Research Institute (H07-02684). Research ethics boards waived the need for participants to provide informed consent.

RESULTS

This study included all CANOC participants (n = 13 040; Table 1). The majority of the study population were males (82.8%) and did not report ever injecting drugs (58.0%). The median age was 40 years (interquartile range [IQR] 32–47), and individuals had a median follow-up time of 70 months (IQR 32–113 months). The largest proportion of PLWH in this study had not experienced an AIDS-defining illness at baseline (85.9%) and initiated cART in the period 2008 to 2011 (31.1%). The most represented province among PLWH in this study was BC (45.8%), followed by Ontario (27.9%) and Quebec (21.4%). Individuals from Saskatchewan and Newfoundland and Labrador accounted for less than 5% of our study population.

Immune Reconstitution and Viral Control

In general, our results showed an increase in both baseline and mean CD4 counts over the duration of the study. Most individuals who initiated cART from 2000 to 2007 had a baseline CD4 count below 200 cells/mm^3 (Figure 1A). In the periods 2008–2012 and 2014–2016, there was a shift, with most individuals entering CANOC having a baseline CD4 count of 200–350 cells/mm^3 and more than 500 cells/mm^3, respectively. Of note, the largest proportion of individuals initiating cART in 2013 had a CD4 count below 200 cells/mm^3. Improvements were also demonstrated in the mean annual CD4 count, as the overall percentage of individuals with a CD4 count above 500 cells/mm^3 increased from 16.3% in 2000 to 65.8% in 2016 (Figure 1B).

Our results also showed a decrease in mean annual viral load over the study period (Figure 1C). The proportion of PLWH with high detectable viral loads (≥ 200 copies/mL) decreased from 67.1% to 10.9% from 2000 to 2016, while the proportion of individuals considered suppressed (< 50 copies/mL) increased from 10.6% to 83.2%.

Trends in cART Utilization

Among the drugs potentially used as an NRTI backbone, lamivudine was the most commonly prescribed in the early years of the study, ranging from 93.6% to 95.4% of all regimens from 2000 to 2005 (Figure 1E). Its usage dropped in subsequent years, to 40.4% by 2009 and then remaining between 32.3% and 39.2% until the end of the study period. Other NRTIs common at the start of the study period were stavudine and zidovudine, which in 2000 were present in 45.7% and 45.5% of regimens, respectively. Zidovudine use remained steady until 2005 (40.2%) then declined to 1.8% of all regimens by 2016. Stavudine use was reduced to 30.4% of all regimens in 2002, then dropped to 1.5% by 2008; from 2009 to 2016, stavudine was included in less than 1.0% of regimens.

The decline in utilization of zidovudine and stavudine coincided with the growth in utilization of tenofovir disoproxil fumarate and emtricitabine (combined) and abacavir. In 2006, the combination of tenofovir disoproxil fumarate and emtricitabine was utilized in 8.4% of all regimens, rising to 57.2% in 2009. Overall, tenofovir disoproxil fumarate and emtricitabine was the most-used NRTI combination from 2007 to 2016 (ranging from 31.1% to 65.3% of all regimens). Abacavir, usually used in combination with lamivudine, grew from 3.7% of all regimens in 2000 to 27.5% in 2005, then remained between 27.5% and 36.0% of all regimens in the period 2005–2016.

In the periods 2000–2003 and 2014–2015, NNRTI was the most common third-agent class prescribed, with a peak in 2000 at 55.6% and a low in 2016 at 27.0% (Figure 1D). A shift occurred in 2004, as PIs transitioned to become the most popular class, with the highest uptake in 2007 at 57.9%. In 2016, for the first time, INSTIs became the most popular agent used in addition to an NRTI backbone.

In terms of specific third agents, efavirenz was the most common NNRTI for the study period, except in 2000 and

TABLE 1. Sociodemographic and Clinical Characteristics of Included CANOC Participants at Time of cART Initiation (*n* = 13 040)

Characteristic	Province; No. (%) of Participants[a,b,c]				
	BC	SK	ON	QC	NL
No. of participants (% of total)	5970 (45.8)	533 (4.1)	3637 (27.9)	2793 (21.4)	107 (0.8)
Sex					
Female	1110–11 120	210–220	610–620	260–270	10–20
Male	4848 (81.2)	318 (59.7)	3020 (83.0)	2523 (90.3)	93 (86.9)
Unknown	0–10	0–10	0–10	0–10	0–10
Ever injected drugs					
No	2072 (34.7)	217 (40.7)	2731 (75.1)	2455 (87.9)	89 (83.2)
Yes	1959 (32.8)	308 (57.8)	371 (10.2)	207 (7.4)	5–15
Unknown	1939 (32.5)	8 (1.5)	535 (14.7)	131 (4.7)	0–10
MSM					
No	2245 (37.6)	473 (88.7)	1117 (30.7)	565 (20.2)	25–35
Yes	1784 (29.9)	52 (9.8)	1985 (54.6)	2153 (77.1)	71 (66.4)
Unknown	1941 (32.5)	8 (1.5)	535 (14.7)	75 (2.7)	0–10
Baseline ADI					
No	5160 (86.4)	514 (96.4)	2928 (80.5)	2510 (89.9)	85 (79.4)
Yes	800–810	10–20	350–360	240 (8.6)	10–20
Unknown	0–10	0–10	0–10	43 (1.5)	0–10
Era of cART initiation					
2000–2003	1132 (19.0)	10 (1.9)	587 (16.1)	464 (16.6)	9 (8.4)
2004–2007	1378 (23.1)	33 (6.2)	818 (22.5)	566 (20.3)	15 (14.0)
2008–2011	1790 (30.0)	139 (26.1)	1181 (32.5)	920 (32.9)	27 (25.2)
2012–2016	1670 (28.0)	351 (65.9)	1051 (28.9)	843 (30.2)	56 (52.3)
Age (years) (median and IQR)	41 (33–48)	37 (30–45)	38 (31–46)	39 (32–46)	41 (33–47)
Follow-up time (months) (median and IQR)	70 (31–115)	43 (17–68)	75 (37–117)	70 (34–109)	40 (15–86)

ADI = AIDS-defining illness, BC = British Columbia, cART = combination antiretroviral therapy, CANOC = Canadian Observational Cohort, IQR = interquartile range, MSM = men who have sex with men, NL = Newfoundland and Labrador, ON = Ontario, QC = Quebec, SK = Saskatchewan.
[a]Except where indicated otherwise.
[b]To protect participants' privacy in cases of small cell counts, the number of individuals is presented as a range in some instances.
[c]Percentages may not sum to 100 because of rounding.

2001, when nevirapine was prescribed to more than half of PLWH receiving NNRTI (Figure 1G). There was slightly more variability among specific agent choice within the PIs, with nelfinavir being most typically prescribed in 2000 and 2001, lopinavir from 2002 to 2005, and atazanavir from 2006 to 2016 (Figure 1F). There was also steady growth in darunavir utilization beginning in 2009. Lastly, raltegravir was the most utilized INSTI from market entry in 2009 until 2014 (Figure 1H). In 2015 and 2016, most PLWH receiving INSTIs were taking dolutegravir.

DISCUSSION

In general, our study demonstrated concordance with historical treatment guidelines, in addition to considerable improvements in viral suppression and immune reconstitution among PLWH included in CANOC from 2000 to 2016.[3,6-9,11,19,20,24] Our results are in line with those of other large cohort studies from the United States and the United Kingdom, which demonstrated an increase in viral suppression and CD4 cell counts among PLWH over time.[30-32]

Before cART was generally recommended for all PLWH, regardless of symptoms or CD4 count, the decision to begin treatment included weighing the potential morbidity and mortality benefits with the possible harms, such as toxicity and viral resistance. Until 2008, cART was generally recommended for PLWH with CD4 counts below 200 cells/mm^3, and this is the CD4 count threshold where we saw the largest proportion of CANOC participants initiating cART throughout this period.[6,7,19] As of 2008 and in line with our findings, cART initiation was recommended for individuals with a CD4 count below 350 cells/mm^3 regardless of other clinical factors such as symptoms and viral load.[8] However, initiating cART for PLWH with CD4

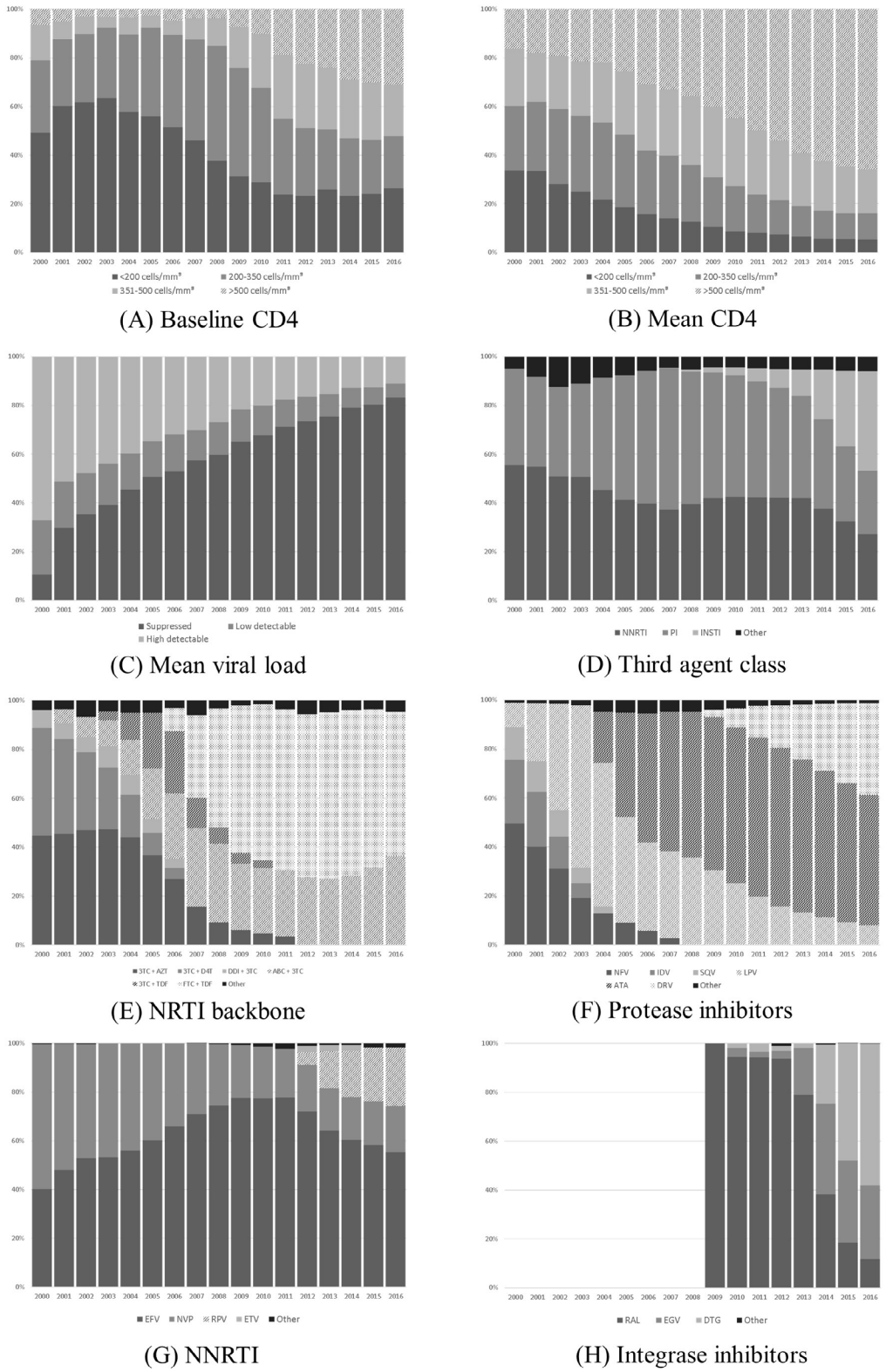

FIGURE 1. Yearly percent distribution of (A) baseline and (B) mean CD4, categorized as < 200, 200–350, 351–500, and > 500 cells/mm^3; (C) mean viral load, categorized as suppressed (< 50 copies/mL), low (50–199 copies/mL), or high detectable (≥ 200 copies/mL); (D) combination antiretroviral therapy (cART) regimen type by third-agent class; (E) nucleoside reverse transcriptase inhibitor (NRTI) backbone; (F) protease inhibitors (PIs); (G) non-nucleoside reverse transcriptase inhibitors (NNRTIs); and (H) integrase inhibitors (INSTIs). Other definitions: 3TC = lamivudine, ABC = abacavir, ATA = atazanavir, AZT = zidovudine, D4T = stavudine, DDI = didanosine, DRV = darunavir, DTG = dolutegravir, EFV = efavirenz, EGV = elvitegravir, ETV = etravirine, FTC = emtricitabine, IDV = indinavir, LPV = lopinavir, NFV = nelfinavir, NVP = nevirapine, RAL = raltegravir, RPV = rilpivirine, SQV = saquinavir, TDF = tenofovir disoproxil fumarate.

counts below 500 cells/mm^3 was recommended beginning in 2010, although our results do not align with this recommendation until 2014.[9,24,33]

Timing of initiation of cART is important, as studies have suggested that individuals who initiate cART later (i.e., at lower CD4 counts) recover with a reduced absolute CD4 count, relative to those who initiate early, and lower CD4 cell counts have been associated with disease progression and death among PLWH.[25,26,34,35] Although purely descriptive, our study demonstrated both earlier initiation of cART as well as large improvements in the proportion of cohort participants with a mean CD4 count above 500 cells/mm^3.

HIV viral load has also been associated with disease progression and death, and achieving viral suppression is therefore one of the main goals of treatment among PLWH and the third target in the 90-90-90 strategy of the United Nations Programme on HIV and AIDS (UNAIDS) to end HIV by 2020.[34-36] Our study suggests that CANOC participants were making strides toward the 2020 goal, with a large increase in viral suppression among those included, from 10.6% in 2000 to 83.2% in 2016.

The 2000 and 2002 consensus statements from the International AIDS Society-USA Panel indicated that there was no single preferred cART regimen; however, by 2004, there was emerging evidence of the efficacy of certain combinations, for example, the combination of zidovudine or tenofovir disoproxil fumarate with lamivudine or emtricitabine plus efavirenz, boosted lopinavir, or atazanavir.[6,7,37] Given that emtricitabine was not approved in Canada until 2006, lamivudine was most often utilized in combination with zidovudine or tenofovir disoproxil fumarate in our study (Figure 1E).[21] Approved 3 years after lopinavir, atazanavir entered the Canadian market in 2004 and quickly gained popularity as a once-daily PI that showed comparable efficacy to lopinavir with reportedly less hyperlipidemia (Figure 1F).[7,38] By 2010, boosted lopinavir was no longer recommended as part of initial cART regimens because of the high pill burden and concerns about adverse events (e.g., moderate to severe diarrhea, insulin resistance, hyperlipidemia, cardiovascular events).[9] Commonly used within CANOC, emtricitabine and tenofovir disoproxil fumarate or abacavir and lamivudine plus efavirenz or boosted atazanavir were recommended as first-line treatments until the end of the study period.[7-9,19,24,33] In 2016, guidelines changed to recommend an INSTI as the third agent of choice, given that the SINGLE, FLAMINGO, and other trials had demonstrated that INSTIs were more efficacious and/or safer than other third agents (e.g., darunavir, efavirenz).[39-42] In the same year, INSTIs became the most popular third agent in CANOC.

Although there was no information available about dosage forms used within CANOC, the increasing popularity of certain regimen combinations coincided with the market approval date of certain combination pills. As an example, the combined formulations of abacavir–lamivudine and of tenofovir disoproxil fumarate–emtricitabine were first approved in Canada in 2005 and 2006, respectively, which roughly corresponds to their increased utilization reported here.[21] It is worth mentioning that increased utilization of certain combinations could be due to more convenient dosage forms, but the reverse may also be true (i.e., manufacturers may have created more convenient dosage forms for combinations that were gaining popularity).

The analysis presented here had a number of limitations. Although CANOC contains data for the 3 most populous provinces in Canada (BC, Ontario, Quebec), it does not contain data from all Canadian provinces and territories. Furthermore, CANOC does not capture data for all PLWH within the included provinces. CANOC does not contain sufficient information to consider individual patients and their circumstances that may have contributed to the decision to initiate cART. No information was available on viral resistance, comorbidities, concomitant medications, or other conditions (e.g., pregnancy) that might have affected the choice of antiretroviral therapy, and no information was available to assess adherence to the presented regimens. We did not have information on medication tolerability, side effects, or dosage forms. Lastly, this analysis presents a reductive view of cART utilization, given that only one regimen was presented per person per year; it is possible that other cART regimens were prescribed for some individuals for a lesser amount of time that would not be captured here.

CONCLUSION

Our study provides important insights into real-world HIV treatment patterns and clinical markers over time in Canada. In general, we found that PLWH in CANOC received cART in alignment with contemporary treatment guidelines. In addition, we detected large increases in the proportion of individuals with viral suppression, as well as in the proportion of individuals with a mean CD4 cell count greater than 500 cells/mm^3 during the study period.

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The Time is Now for Mental Health Care: Evaluating the Impact of a Clinical Pharmacist on an Acute Mental Health Unit

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ABSTRACT

Background: Clinical pharmacists have a significant role in optimizing pharmacotherapy for patients admitted to acute care settings. Patients with mental health disorders are especially vulnerable to polypharmacy, adverse drug effects, medication nonadherence, and misconceptions about medication use. The Royal University Hospital in Saskatoon, Saskatchewan, currently lacks resources to provide optimal clinical pharmacy coverage for mental health inpatients.

Objectives: To determine the optimal clinical role for a pharmacist providing specialized care to mental health inpatients and to evaluate the potential impact of the pharmacist on medication use and patient care.

Methods: A pharmacist with 5 years of mental health–related pharmacy practice experience was temporarily assigned to the Mental Health Short Stay Unit as a practical component of a Master's program in pharmacy. Clinical activities to be completed by the pharmacist were defined on the basis of available evidence, existing performance and quality assurance indicators, and prior experience. The pharmacist's activities and recommendations during each shift were tracked and reported.

Results: The pharmacist saw 94 patients over a total of 88 hours. The pharmacist made a total of 61 recommendations, of which 55 (90%) were accepted by the psychiatrist, and initiated 42 medication changes. Forty-one patients (44%) received a thorough medication assessment, and individualized, often specialized, education was provided to patients 39 times. The pharmacist was consulted by the psychiatrist 19 times.

Conclusions: Pharmacists have an important role in medication management and patient education for psychiatric inpatients, and the health care team values pharmacists' unique expertise. Additional resources dedicated to defining and expanding clinical pharmacy services on inpatient psychiatry units could further optimize patient care.

Keywords: mental health, clinical pharmacy, pharmacy services, psychiatric inpatients, medication management

RÉSUMÉ

Contexte : Les pharmaciens cliniciens jouent un rôle important dans l'optimisation de la pharmacothérapie pour les patients admis en milieu de soins aigus. Les patients souffrant de troubles de la santé mentale sont particulièrement vulnérables à la polypharmacie, aux effets indésirables des médicaments, au non-respect de la médication et aux idées fausses circulant sur leur utilisation. L'hôpital Royal University, à Saskatoon (Saskatchewan), manque actuellement de ressources pour offrir une couverture pharmaceutique clinique optimale aux patients hospitalisés en santé mentale.

Objectifs : Déterminer le rôle clinique optimal du pharmacien fournissant des soins spécialisés aux patients hospitalisés en santé mentale et évaluer son impact potentiel sur l'utilisation des médicaments et les soins aux patients.

Méthodes : Un pharmacien ayant 5 ans d'expérience dans la pratique de la pharmacie liée à la santé mentale a été temporairement affecté à l'unité de séjours de courte durée en santé mentale dans le cadre de la composante pratique d'un programme de maîtrise en pharmacie. Les activités cliniques qu'il devait réaliser ont été définies sur la base des données probantes à disposition, des indicateurs de performance et d'assurance de la qualité existants, ainsi que sur la base de son expérience antérieure. Les activités et les recommandations du pharmacien au cours de chaque quart de travail étaient suivies et signalées.

Résultats : Le pharmacien a visité 94 patients sur un total de 88 heures. Au total, il a fait 61 recommandations, dont 55 (90 %) ont été acceptées par le psychiatre, et il a amorcé 42 changements de traitement. Quarante et un patients (44 %) ont reçu une évaluation approfondie concernant le traitement, et des patients ont reçu une explication individualisée, souvent spécialisée, 39 fois. Le psychiatre a consulté le pharmacien 19 fois.

Conclusions : Les pharmaciens jouent un rôle important dans la gestion des médicaments et l'éducation des patients hospitalisés en psychiatrie, et l'équipe de soins de santé apprécie leur expertise unique. Des ressources supplémentaires consacrées à la définition et à l'élargissement des services de pharmacie clinique dans les unités de psychiatrie pour patients hospitalisés pourraient optimiser davantage les soins aux patients.

Mots-clés : santé mentale, pharmacie clinique, services de pharmacie, patients hospitalisés en psychiatrie, gestion des médicaments

INTRODUCTION

Mental illness affects as many as 1 in 5 North Americans each year.[1,2] The incidence of mental illness has been increasing in recent years, and the complexity of mental health care and an associated call to action have been gaining much attention in multiple spheres of society.[3-5] Clinical pharmacists can have a significant role in providing care to people living with mental illness and play an important part in patients' journeys to recovery. In particular, pharmacists are experts in identifying drug therapy problems, resolving medication discrepancies, providing patient education, and making recommendations to optimize pharmacotherapy for patients admitted to acute care settings. Patients with mental health disorders are especially vulnerable to polypharmacy, adverse drug effects, and misconceptions about medication use.[6,7] There is also a high rate of medication nonadherence among patients taking psychotropic medication, which can be improved by pharmacists providing education and/or performing various interventions.[6-8] Involvement of pharmacists in mental health care has been shown to improve safe and effective medication use, reduce hospitalizations, decrease costs, improve adherence, and increase patient satisfaction.[6-12]

The complex and sensitive nature of mental health disorders, combined with the ambiguity of clinical psychiatric practice guidelines, often requires that clinicians have specialized knowledge and skills to have the greatest impact in this practice area. To meet this need, the Board of Pharmacy Specialties (US) has recognized psychiatric pharmacists since 1992, and the American Association of Psychiatric Pharmacists (formerly the College of Psychiatric and Neurologic Pharmacists) advocates internationally for specialized certification and provides high-level education to support pharmacists in this area.[13-15] Evidence suggests a greater degree of positive health outcomes and patient satisfaction when the foundational skills of pharmacists are coupled with training and expertise in mental health.[15,16]

Despite the complex treatment and medication management needs of psychiatric inpatients, the increasing prevalence of mental health disorders, and the known impact of pharmacists, clinical pharmacy services for this patient population are often suboptimal. For example, the 2016/17 Hospital Pharmacy in Canada Survey revealed that only 65% of inpatient mental health programs had a dedicated pharmacist.[17] The Royal University Hospital is a tertiary teaching hospital in an urban centre (Saskatoon, Saskatchewan). One of the acute psychiatric units is the Mental Health Short Stay Unit. This unit has 7 beds for adults needing acute mental health care, has an average length of stay of 7 days, and operates at full capacity most of the time. The patient population has primarily consisted of people with acute psychosis, mood disorders, and substance use disorders, with high rates of suicidal ideation and psychosocial stressors. There was no clinical pharmacist coverage for the Mental Health Short Stay Unit before this pilot project, except for urgent consultations for high-risk patients. All pharmacy services were provided through the centralized hospital pharmacy order entry and medication distribution system. Inpatient psychiatrists provided coverage to the Mental Health Short Stay Unit on a rotating basis.

To address unmet patient needs at the Royal University Hospital, and to conduct an initial exploration of the value and feasibility of increased clinical pharmacy coverage for psychiatric inpatients, a clinical pharmacist with experience in mental health was temporarily assigned to the Mental Health Short Stay Unit as a practical component of a Master's program in pharmacy. The researchers sought to answer the following questions: What clinical services can be offered, and how might they affect optimization of medication use and create opportunities to provide patient-centred care? More specifically, the study objective was to determine the optimal clinical role for a pharmacist providing specialized care to mental health inpatients and to evaluate the potential impact of the pharmacist on medication use and patient care.

METHODS

A pharmacist (A.S.) with 5 years of mental health–related pharmacy practice experience was scheduled to work on the Mental Health Short Stay Unit on Wednesday and Friday mornings, from 0800 to 1200 (noon), between September 16, 2020, and April 9, 2021 This single-centre pilot project involved the provision of comprehensive pharmaceutical care to psychiatric inpatients, prospective data collection, and data analysis using descriptive statistics. The frequency of provision of various mental health clinical activities was reported, medication- and patient-related outcomes of these interventions were described, and the potential for associated impact was determined by extrapolating from the existing literature. Because this study involved evaluation of a quality improvement program, rather than systematic research, ethics approval was not required.

The clinical activities of the mental health pharmacist were identified and prioritized on the basis of available evidence, expert consultation, professional judgment, and prior experience. The descriptions of clinical activities were adapted from the Canadian Society of Hospital Pharmacists' consensus guideline,[18] established pharmacy quality metrics,[19] and existing activity tracking used by the Royal University Hospital general pharmacists. Data collection during the first term (September to December 2020) served as a preliminary phase to track various activities completed by the mental health clinical pharmacist, and there was an ongoing attempt to define appropriate metrics and document related patient impact. Medication discrepancies with potential for patient harm were defined as those that could

cause significant morbidity or mortality, either acutely or chronically, as determined by the clinical pharmacist (e.g., long-term medical or psychiatric medication not ordered on admission or ordered at a dose different from the outpatient prescription). Cases were discussed after each shift with the supervising Board-certified psychiatric pharmacist (K.H.), and the therapeutic care process and prioritization of activities were regularly reviewed for improvement.

In December 2020, the initial data were thoroughly evaluated by the authors (i.e., the clinical pharmacist and the supervising pharmacist), pharmacy directors and clinical managers were consulted, and further adjustments were made in selecting and defining the clinical activities to be performed and focusing the documentation process. This process led to a defined list of clinical activities for the mental health pharmacist (Table 1) and a corresponding tracking tool (Figure 1). During the second term (January to April 2021), the tracking tool was used to document the specific clinical activities performed during each shift. The data were recorded in an Excel spreadsheet (Microsoft Corporation), and the frequency of occurrence of each clinical activity was totalled for each month and for the entire term. Additional information pertaining to individual activities was also recorded (Figure 1). This report focuses on the data collected during the second term.

RESULTS

Patient Care and Data Summary

From January to April 2021, the clinical pharmacist spent a total of 88 hours on the Mental Health Short Stay Unit, which consisted of 23 shifts with an average time of 3.8 hours per shift. Ninety-four patients were seen over these 23 shifts, with an average of 4 patients seen per shift. During the 4-month study period, at least 37 patients requiring admission assessment or subsequent follow-up were not seen by the clinical pharmacist because of a lack of time. Patients were prioritized on the basis of input from the psychiatrist and assessment of level of acuity and complexity by the pharmacist. Additionally, every patient who was admitted was targeted for at least a basic medication reconciliation.

Individual mental health clinical activities were performed a total of 131 times. The frequency of occurrence of each activity is summarized in Figure 2. The most frequent activities were the provision of education (39 times) and medication reconciliation on admission (34 patients). From the sample of 94 patients, 23 (24%) received a medication assessment as a part of the medication reconciliation, an additional 18 (19%) received a comprehensive medication assessment (CMA), and 39 (41%) were provided with individualized and often psychiatric-specific education; these 3 categories of activity are described in more detail in the following sections. The pharmacist was consulted 19 times to perform medication assessments.

In connection with the focused clinical activities, the pharmacist made a total of 61 medication- or monitoring-related recommendations (Figure 3), including 38 recommendations as a result of CMAs and an additional 19 as a result of medication reconciliation. There was an overall recommendation acceptance rate of 90% (55/61), and a total of 42 documented medication changes were initiated by the pharmacist. In particular, 12 medications were eliminated because they were deemed to be unnecessary or had risks that outweighed their benefits. More than half (57%) of the

TABLE 1. Definitions of Clinical Activities for Mental Health Pharmacists

Clinical Activity	Definition
Medication reconciliation on admission	Performing medication reconciliation, including best possible medication history, reconciliation with current orders, and brief review for appropriateness
Medication reconciliation on admission with medication assessment	Performing medication reconciliation on admission with additional comprehensive medication assessment (as defined below)
Medication reconciliation on transfer/discharge	Ensuring completeness of discharge prescription, including reconciliation with preadmission medications
Discrepancies resolved on medication reconciliation	Resolving unintentional discrepancy between medication orders at transfers of care (e.g., outdated dosing instructions, missing medications, medication listed when patient no longer taking)
Seamless care activities	Ensuring required coverage (i.e., exceptional drug status) is in place; performing written/verbal transfer of care
Pharmacy consult requested by psychiatrist	Responding to psychiatrist's request to review medication history and current medications and/or to provide recommendations for adjusting pharmacotherapy
Education provided to patient during hospital stay or at discharge	Providing education to patient about mental health diagnosis, medication, or substance use (either proactively or in response to patient questioning)
Comprehensive medication assessment	Performing deeper review of past medication/psychiatric history, with thorough assessment for optimization of efficacy and safety (including incorporation of patient views where possible)

recommendations resulted in changing to a more suitable dose or formulation to improve efficacy or safety.

Medication Reconciliation on Admission

Of the 34 medication reconciliations completed on admission (with or without further assessment), 11 revealed one or more discrepancies; of these, 2 could have resulted in patient harm (Table 2). Of the 23 medication reconciliations completed on admission with a subsequent medication assessment, 18 had an impact through resolution of discrepancies that could have resulted in patient harm, provision of potentially behaviour-changing education, or identification of drug therapy problems that led to further assessment and intervention. Only 11 of the medication reconciliations on admission were done without taking a more detailed history or doing a more thorough assessment, either because of

Date: _____

ACTIVITY	QUANTITY	TIME SPENT/COMMENTS
Number of patients seen		
Number of patients missed		On admit: ____ For potential education or review: ____ For follow up: ____
Med Rec on admission		# having ≥ 1 minor discrepancy: ____ *(discrepancy that would likely not result in harm)* Time spent on each: ____
Med Rec on admission with medication assessment		# having impact: ____ *(≥ 1 discrepancy that could have resulted in patient harm, resulted in potentially behaviour changing education, identified drug therapy problems)* # with interventions or education requiring specialized psychopharmacology knowledge*: ____ Time spent on each: ____
Med Rec on transfer/discharge		
Discrepancies resolved on med rec		
Seamless care activities		Written transfer of care: ____ Verbal transfer of care: ____ Obtained outpatient medication coverage: ____ Additional coverage support: ____
Pharmacist consult requested by psychiatrist		
Education provided to patient during hospital stay		General: ____ Specialized*: ____
Education provided to patient at discharge		General: ____ Specialized*: ____ Medication list or calendar provided: ____
Comprehensive medication assessment (CMA)		# done because of consult: ____ # resulted in ≥ 1 recommendations: ____ # requiring specialized psychopharmacology knowledge*: ____ Time spent on each: ____

	Specific Recommendations	Quantity	From Med Rec or CMA	Accepted/Resolved
Medication Related	Recommended additional medication			
	Recommended dose change			
	Recommended deprescribing			
	Recommended alternative medication			
Monitoring Related	Recommended therapeutic drug monitoring			
	Recommended lab monitoring			

*Examples:

FIGURE 1. Mental health pharmacist clinical activity tracking tool. CMA = comprehensive medication assessment, Med Rec = medication reconciliation. © 2020 Pharmacy Department, Saskatchewan Health Authority (Saskatoon Area). Reproduced by permission.

time constraints or because the patient had a simple medication history and regimen.

Comprehensive Medication Assessment

The clinical pharmacist performed a CMA for 18 of the patients (Table 3). Thirteen of the CMAs were done following a psychiatrist consult, and the rest were undertaken by the Mental Health Short Stay Unit clinical pharmacist at the time of admission based on a possibility of benefit or potential harm. Of all the CMAs completed, 13 led to at least one recommendation, and a total of 38 recommendations were made. A significant amount of the pharmacist's time was spent performing CMAs, with an average of 76 minutes per patient for the initial assessment, interview, and documentation. Many of these patients also required ongoing follow-up. Data for CMAs primarily reflected

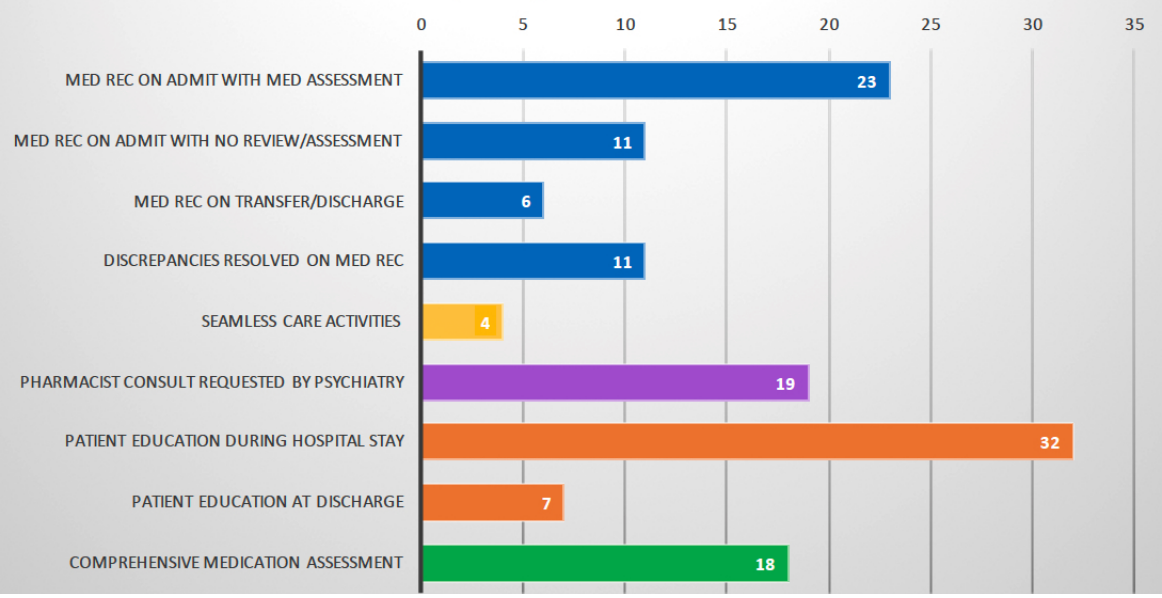

FIGURE 2. Mental health pharmacist clinical activities and the frequency of occurrence.

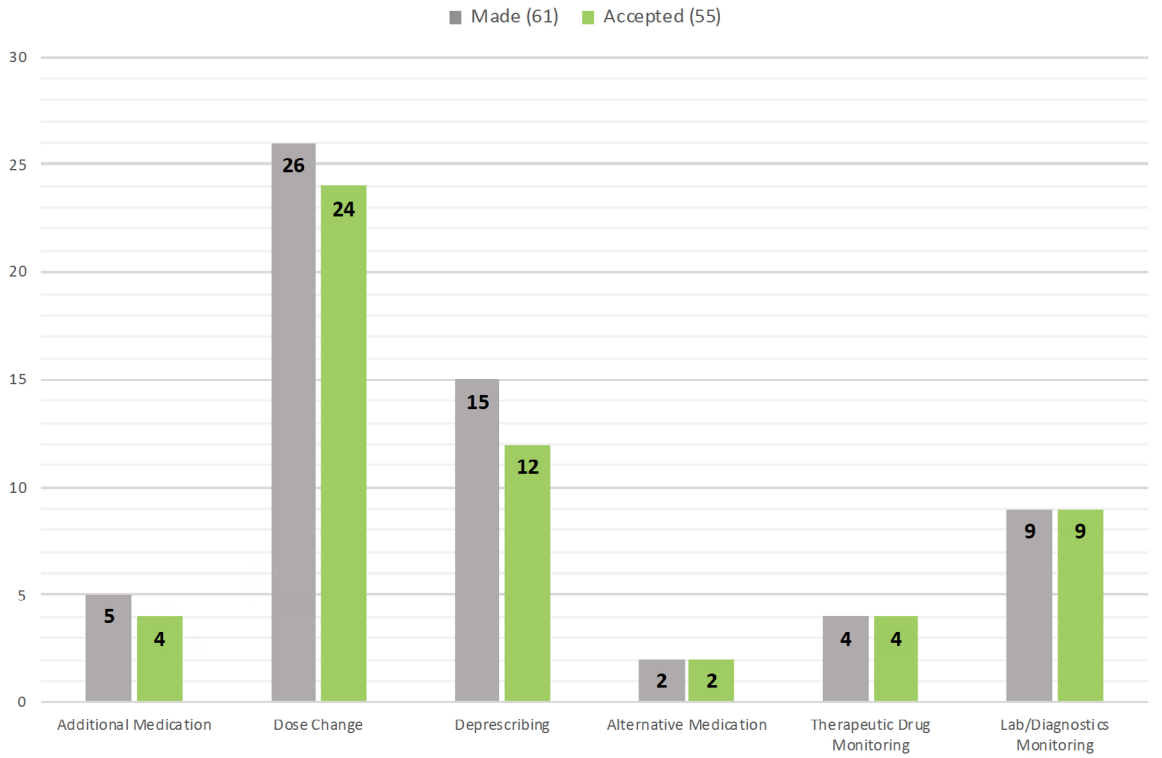

FIGURE 3. Clinical pharmacist's recommendations.

TABLE 2. Analysis of Medication Reconciliations

Characteristic	No. (%) of Medication Reconciliations
Total no. completed	34 (100)
No. with assessment	23 (68)
No. with potential impact	18 (53)
No. with ≥ 1 discrepancy	11 (32)
No. with potential for harm	2 (6)

TABLE 3. Analysis of Comprehensive Medication Assessments (CMAs) and Recommendations

Characteristic	No. (%)
CMAs	
Total no. completed	18 (100)
No. initiated after psychiatrist requested consult	13 (72)
No. with ≥ 1 recommendation	13 (72)
Recommendation summary	
Total no. of recommendations	38 (100)
No. of recommendations accepted	34 (89)

activities independent of medication reconciliation with assessment, although there were some instances of overlap.

Provision of Patient Education

Education about mental health diagnosis, medications, or substance use was provided to patients 39 times. Medication education usually included information about the indication, mechanism of action, and expected onset/magnitude of benefits of the prescribed drug, along with an explanation of risks and adverse effects and information about proper administration and self-management. Many discussions with patients involved informing them about the negative effects of substance use (especially involving alcohol and cannabis) on mental health; some of these patients stated that they had never been cautioned sufficiently in the past. Other discussions provided an opportunity for shared decision-making after the patients were informed of their most promising medication options and common adverse effects. Patients often had questions about what their medications were being used for, and they shared feelings of concern or frustration because of the lack of information given to them previously. Education and support were consistently provided to encourage medication adherence and to empower patients to manage their care on discharge.

Mental Health Pharmacy Specialization

Using professional judgment, the clinical pharmacist determined that 39% (9/23) of the medication reconciliations with assessments, 89% (16/18) of the CMAs, and 51% (20/39) of the instances of provision of education required specialized mental health knowledge. Examples of the specialized mental health care provided by the pharmacist are listed in Box 1.

DISCUSSION

The various clinical activities performed and documented in this study provide insight into the positive impact that a clinical pharmacist can have on an acute mental health unit. One of the key findings that highlights the need for and value of a pharmacist on the interdisciplinary mental health team within the Mental Health Short Stay Unit is the number of recommendations resulting from medication assessments and the high rate of acceptance of recommendations by the most responsible physician. The seamless integration of the pharmacist into the interdisciplinary team was also apparent. During the 23 shifts when the pharmacist was present, the attending psychiatrists formally consulted pharmacy 19 times to request pharmacotherapy recommendations. The number of consultations requested by individual psychiatrists increased with the duration of the psychiatrist's assignment to the unit, indicating the development of trust and a professional alliance with the pharmacist. In addition to the clinical activities recorded on the tracking form, the pharmacist had numerous conversations with the psychiatrist or the patient to assess the efficacy and safety of the current medication regimen or to offer considerations for future medication adjustments.

The process of medication reconciliation on admission often functioned as the gateway to medication assessments,

BOX 1. Examples of Specialized Mental Health Care Provided by Pharmacist

- Shared decision-making based on individualized risk versus benefit of lithium
- Optimizing doses of antidepressants to target specific, most distressing symptoms
- Responding to patients' concerns and questions related to their mental health diagnosis and treatment
- Discussing overall mental health risks of cannabis use and motivational interviewing to improve lifestyle
- Performing comprehensive, evidence-based evaluations of psychotropic medications followed by appropriate deprescribing
- Initiating appropriate medication for alcohol use disorder based on patient preference and willingness to change
- Providing psychotropic medication–related education and support to newly practising psychiatrists and nursing staff upon request
- Ensuring safe use of medications during electroconvulsive therapy
- Screening for antipsychotic-induced movement disorders and other adverse effects, and implementing appropriate management strategies

patient education, and therapy recommendations, which highlights the importance of having a pharmacist available to review all patients' medication therapy on admission. Many encounters that began with the intention of only completing the medication reconciliation uncovered a need or opportunity to perform a more thorough assessment (23/34 [68%]) or to provide education to the patient (19/34 [56%]). Given the sensitive nature of psychiatric care, each interaction is an opportunity to build rapport with the patient and thereby to facilitate the development of a relationship in which the patient is comfortable disclosing information related to their medical and medication history and is open to hearing educational information. Additionally, the high rate of consequential impact, through the resolution of drug-related issues or the provision of education, underscores the necessity of performing medication reconciliation on admission for patients who are taking psychiatric medications. This finding is in alignment with the literature and health system priorities, and it supports medication reconciliation as a primary clinical role for pharmacy professionals. It may also suggest that for this patient population, this role is best served by a pharmacist, rather than a pharmacy technician. Furthermore, because the Mental Health Short Stay Unit pharmacist had experience in psychiatric pharmacy and was obtaining advanced mental health pharmacy training as part of a Master's program in pharmacy, the medication reviews were often more advanced than what would be expected of a pharmacist with an entry-to-practice degree without specialized mental health training and experience. With increased specialization in the area of mental health, pharmacists can provide more comprehensive and individualized patient care, as well as give valuable support to other health care professionals.

Although neither patients nor psychiatrists were formally asked for feedback or assessed for behaviour change, available evidence combined with clinical impressions of these patient interactions suggests that the provision of these pharmacy services positively contributed to patient care and the overall health care system.[6-8,10,12] In particular, it has been established that comprehensive medication management by clinical pharmacists improves clinical and humanistic outcomes, and it is the gold standard for Board-certified pharmacists.[8,10-12,15,20] Controlled trials have revealed that pharmacists' provision of medication education improves adherence, psychiatric symptoms, scores on the Clinical Global Impression scale, and patient satisfaction.[12,20,21] Observational studies of pharmacists' involvement in the care of patients with mental illness have shown rates of identified medication-related issues and accepted recommendations that are consistent with the findings presented here.[11,22] Specifically supporting the impact of pharmacist education, 2 meta-analyses[23,24] have reported pooled odds ratios of 2.50 and 1.64, respectively, for patients remaining adherent to antidepressant therapy 6 months after receiving pharmacist education and monitoring relative to those who received no pharmacist intervention. Based on existing literature about the impacts of pharmacists in providing care for patients with mental health conditions, the clear value of and appreciation for the pharmacist on this unit's interdisciplinary team was not surprising and reveals an urgent need for pharmacists to be assigned to these teams.

It is important to acknowledge that a minimum of 37 patients were not seen by the pharmacist because of time constraints. With a full-time pharmacist designated to the acute mental health unit, a conservative estimate based on the data collected would propose that for each 8-hour shift, all of the patients (n = 7) could be seen by the pharmacist, all required medication reconciliations on admission could be completed, and CMAs could be completed for 2 or 3 patients. With increased pharmacist time, the disproportionate lack of seamless care activities, including medication reconciliation on discharge and transfer, could also be addressed. While this may seem a low target relative to other medical specialties and acute care staffing ratios, the complexity of patient characteristics and drug regimens in this population must be considered.

There are several limitations to the evaluation and application of these data. The clinical activities captured were not formally validated, and the exact definitions and their application were adjusted slightly throughout the term. In particular, there was overlap between the categories of medication reconciliation, medication reconciliation with assessment, and CMA. However, care was taken to not double-count activities that fell within 2 overlapping categories. The data collected likely under-represent the number of clinical activities completed, as it can be difficult within a fast-paced environment to track every intervention within the provision of care and to categorize it precisely and consistently. Admittedly, the pharmacist's recommendations do not automatically correlate with patient or health system benefit, particularly in the area of psychiatry, where the rationale for and outcomes of drug therapy can have high subjectivity and variability.[25-27] Furthermore, although many attempts have been made to establish optimal, consistent methods for economic analysis and evaluation of patient outcomes, this has proven to be a difficult and resource-intensive undertaking.[28-31] It is necessary to recognize that patient impact cannot be objectively proven with these data, given that patient outcomes were not assessed, and there was no control group or baseline analysis; furthermore, the findings of this study may not be generalizable to other pharmacists or sites. There is a need for future studies to attempt to address these limitations by measuring benefit in validated ways (i.e., through the use of clinical scoring tools), categorizing clinical activities consistently and in close concordance with existing evidence, and incorporating the patient voice.

CONCLUSION

This report provides a timely example of clinical activities that can be performed by a pharmacist for mental health inpatients and an initial evaluation of a specialized clinical pharmacist's impact on medication use and patient care on an acute mental health unit. Consistent with the available literature, it is clear that clinical pharmacists have an important role in patient care through individualized medication optimization, the provision of meaningful education, and ongoing monitoring. In particular, having a pharmacist available for reconciling medications and responding to consults can provide immediate value to the interdisciplinary team. The extent of patient and health system benefit, the economic significance of short- and long-term patient outcomes, and the value threshold for input costs remains largely unknown. More work is needed to answer these questions and, subsequently, to identify core clinical activities and educational requirements for pharmacists covering acute mental health units (Box 2). Information about patients' attitudes and experiences following encounters with a pharmacist would also be valuable to help shape future directions for clinical pharmacy services in the area of mental health.

BOX 2. Future Needs and Considerations for Standardizing Clinical Pharmacy Services in Mental Health

- Evaluate existing literature and perform additional studies to better define clinical activities, core services, and measurable outcomes for clinical pharmacists working in acute inpatient psychiatry.
- Undertake qualitative and quantitative research regarding the role of clinical pharmacists in acute inpatient psychiatry that incorporates patient satisfaction and their perceptions related to quality of life.
- Explore innovative and cost-effective strategies for sustainable resource allocation for inpatient mental health pharmacy services, which align with national and international pharmacy staffing ratios.
- Continue advocacy efforts among health care professionals and the public to demonstrate the role of clinical pharmacists in mental health care.

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Burnout among Hospital Pharmacists in Canada: A Cross-Sectional Analysis

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ABSTRACT

Background: Burnout is a growing problem among health care professionals, with consequences for patient safety and personal satisfaction. The prevalence of burnout among hospital pharmacists in Canada is unknown; however, it has been documented at over 60% in other countries.

Objectives: To assess the prevalence of burnout and variables associated with burnout among hospital pharmacists in Canada.

Methods: This cross-sectional cohort study was based on a survey made available to more than 2600 Canadian hospital pharmacists from February 10 to April 2, 2020, through the Canadian Society of Hospital Pharmacists QID platform. The questionnaire collected data for the Maslach Burnout Inventory Human Services Survey for Medical Personnel (MBI-HSSMP), demographic data, employment characteristics, and workplace factors; it also included an open-ended question about burnout.

Results: A total of 171 respondents provided data suitable for analysis. Of these, only 13 (7.6%) met the criteria for burnout on all 3 subscales of the burnout inventory; however, 105 respondents (61.4%) surpassed the threshold for burnout on the emotional exhaustion subscale. In univariate analyses, not working to one's full scope of practice was associated with meeting the criteria for burnout on all 3 scales. Linear regression highlighted associations between scores on the emotional exhaustion subscale and gender identity, perceived excessive on-call duties, area of practice, and positivity of workplace culture. Content analysis of the open-ended question supported the quantitative findings and pointed to 3 major themes: workload quantity, workload quality, and workplace culture.

Conclusions: Results on the emotional exhaustion subscale of the MBI-HSSMP and responses to the open-ended question suggested a relatively high prevalence of burnout among Canadian hospital pharmacists, and indicated potential links between burnout and certain workplace characteristics.

Keywords: burnout, pharmacists, hospital pharmacy, emotional exhaustion

RÉSUMÉ

Contexte : L'épuisement professionnel est un problème croissant chez les professionnels de la santé qui entraîne des conséquences sur la sécurité des patients et la satisfaction personnelle des professionnels. La prévalence de l'épuisement professionnel chez les pharmaciens d'hôpitaux au Canada est inconnue; cependant, il a été documenté à plus de 60 % dans d'autres pays.

Objectifs : Évaluer la prévalence de l'épuisement professionnel et les variables associées à celui-ci chez les pharmaciens d'hôpitaux au Canada.

Méthodes : Cette étude de cohorte transversale se basait sur un sondage distribué à plus de 2600 pharmaciens d'hôpitaux canadiens entre le 10 février et le 2 avril 2020 via la plateforme QID de la Société canadienne des pharmaciens d'hôpitaux. Le questionnaire a permis de recueillir des données pour le Maslach Burnout Inventory Human Services Survey for Medical Personnel (MBI-HSSMP; un inventaire de l'épuisement professionnel chez les professionnels de la santé), des données démographiques, des caractéristiques professionnelles et des facteurs liés au lieu de travail; il comprenait également une question ouverte sur l'épuisement professionnel.

Résultats : Au total, 171 répondants ont fourni des données se prêtant à l'analyse. Parmi ceux-ci, seuls 13 (7,6 %) répondaient aux critères de l'épuisement professionnel des 3 sous-échelles de l'inventaire de l'épuisement professionnel; cependant, 105 répondants (61,4 %) ont dépassé le seuil d'épuisement professionnel de la sous-échelle d'épuisement émotionnel. Dans les analyses univariées, le fait de ne pas travailler dans l'ensemble de son champ d'exercice était associé au respect des critères d'épuisement professionnel sur les 3 sous-échelles. La régression linéaire a mis en évidence des associations entre les scores sur la sous-échelle d'épuisement émotionnel et l'identité de genre, les tâches de garde excessives perçues, le domaine de pratique et la positivité de la culture sur le lieu de travail. L'analyse du contenu de la question ouverte étayait les résultats quantitatifs et a souligné 3 thèmes principaux : la quantité et la qualité de la charge de travail, ainsi que la culture sur le lieu de travail.

Conclusions : Les résultats relatifs à la sous-échelle d'épuisement émotionnel du MBI-HSSMP et les réponses à la question ouverte suggèrent une prévalence relativement élevée d'épuisement professionnel chez les pharmaciens d'hôpitaux canadiens et indiquent des liens potentiels entre l'épuisement professionnel et certaines caractéristiques du milieu de travail.

Mots-clés : épuisement professionnel, burnout, pharmaciens, pharmacie hospitalière, épuisement émotionnel

INTRODUCTION

Burnout is defined as a "syndrome of emotional exhaustion, depersonalization, and reduced personal accomplishment that can occur among individuals who work with other people in some capacity" (p. 192).[1] Health care provider burnout and its association with negative outcomes has been confirmed in many health care professions, including pharmacy.[2-5]

Negative outcomes identified have included decreased quality of patient care,[6-8] decreased personal satisfaction,[5,9] increased medical errors,[8,10] and increased anticipated job turnover,[8,9] thus highlighting the potential of burnout to affect patient safety. Many variables have been specifically associated with burnout in pharmacists, including age, gender, years practising as a pharmacist, marital status, inadequate administrative and teaching time, too many nonclinical duties, difficult colleagues, and feelings that contributions are underappreciated.[3,8,11-13] Given the nature of burnout, it is not surprising that it has been positively correlated with anticipated job turnover; the implications of job turnover include compromised quality of care and financial consequences (e.g., cost to recruit new employees, costs associated with lower productivity of new hires).[9,14]

The percentage of hospital pharmacists in the United States,[3] Japan,[15] and Ontario (Canada)[12] who experience burnout has been documented at over 60%. There are also indications that rates of burnout have increased during the COVID-19 pandemic in Australia[16] and in the United States.[17] The primary objective of the present project was to identify the prevalence of burnout among hospital pharmacists across Canada. The secondary objective was to identify variables associated with burnout.

METHODS

This study involved a cross-sectional cohort survey of Canadian hospital pharmacists who had been practising for 1 year or more; pharmacy residents were excluded. The study was approved by the New Brunswick Horizon Health Network Research Ethics Board (file number 2019-2817). Potential participants first read the information about the study and indicated informed consent by choosing to answer the survey.

Survey

The 48-question survey consisted of 5 sections: the Maslach Burnout Inventory Human Services Survey for Medical Personnel (MBI-HSSMP), demographic information, employment characteristics, workplace factors, and an open-ended question about burnout.

The MBI-HSSMP is a tool consisting of 22 standardized questions used to investigate burnout syndrome among respondents, for which both validity and reliability have been established for medical personnel, including pharmacists.[18,19] A licence was obtained from Mind Garden, Inc, to use the MBI-HSSMP for this study. The MBI-HSSMP[20] is divided into 3 subscales—emotional exhaustion, depersonalization, and personal accomplishment—with 9, 5, and 8 statements, respectively.[20] For each statement, respondents are asked to describe their frequency of the feeling on a 7-point Likert scale ranging from 0 (never) to 6 (every day).[20] Scores were summed for each subscale, and a level of burnout—high, moderate, or low—was assigned according to the numeric score.

Two approaches were used to define burnout in this study. As a first step, burnout was deemed to be present when the respondent met the threshold for burnout in all 3 subscales, namely high scores for the subscales of emotional exhaustion (≥ 27) and depersonalization (≥ 14) and a low score for personal accomplishment (≤ 30), an approach that considers the 3 dimensions of burnout as originally described.[1,2,12,21,22] As the second step, we looked at the scores on each scale separately and used a high score on the emotional exhaustion subscale as an indicator that the respondent was at risk for burnout.[11,22]

Sections 2 to 4 of the survey contained a total of 26 questions developed by the study authors, based on previous research[3] and the authors' professional experience, to obtain information regarding potential variables associated with burnout, namely participant demographic characteristics, employment characteristics, and workplace factors. A final open-ended question about burnout provided a free-text area where respondents were encouraged to provide any additional comments regarding their feelings of exhaustion, negativism, and reduced professional efficacy that were not addressed or were insufficiently addressed in the other sections of the survey. Survey questions were pilot tested by 5 retired hospital pharmacists to elicit feedback regarding survey logic, terminology, and instructions. Questions were updated according to this feedback. The final survey was conducted with the online survey tool REDCap (Research Electronic Data Capture, version 6.16.8, 2016; Vanderbilt University).

The survey was open to hospital pharmacists from February 10 to April 2, 2020. An email invitation, including a link to the online survey, was distributed to more than 2600 pharmacists through the Canadian Society of Hospital Pharmacists (CSHP) *Interaction Newsletter* and the CSHP Pharmacy Specialty Network groups hosted on the QID platform, an information exchange messaging centre for pharmacists. Reminders were sent through the Pharmacy Specialty Network groups every 2 weeks until study closure. A sample size calculation showed that 337 participants (95% confidence interval [CI], 5% margin of error) were required to attain a sample representative of the population of Canadian hospital pharmacists.

Data Analysis

All results from the MBI-HSSMP and the additional survey questions were summarized using descriptive statistics. The following factors were of particular interest in identifying potential associations with burnout rate, through univariate or multivariate analysis, because of their presence in the literature or the authors' experience working as hospital pharmacists: gender, education level, years as a licensed pharmacist, marital status, care of dependents, number of responsibilities, area of practice, workplace culture, self-rated ability to work to full scope of practice, expectation to perform research and participate in committees without dedicated time, expectation to be a preceptor without dedicated time, and too many on-call, evening, or weekend shifts. The Mann-Whitney *U* nonparametric test and the Fisher exact test were used to identify differences between cohorts with and without burnout for continuous variables and categorical variables, respectively. Potential type I errors related to multiple comparisons were controlled by applying the Benjamini–Hochberg multiple-comparison correction with the false discovery rate set to 0.05. Surveys with missing MBI-HSSMP responses were deemed incomplete and were excluded from analysis, whereas missing data for questions outside the MBI-HSSMP were corrected using mean substitution for continuous variables (based on means for the groups with and without burnout) and recategorization as "nonresponse" for categorical variables (in cases of univariate analyses).

Hierarchical linear regression was performed to assess the association of the above-listed factors with the MBI-HSSMP emotional exhaustion subscale. Variables were divided into 4 blocks for entry into the linear regression model: block 1, demographic characteristics (gender, level of education, number of years as a licensed pharmacist, marital status, and care of dependents); block 2, work variables included in job descriptions (number of responsibilities and area of practice); block 3, factors that affect the respondent professionally (supportive workplace culture experienced, ability to work to one's full scope); and block 4, workplace factors (expectations to participate in research, to participate in administrative committees, or to be a preceptor to pharmacy learners without dedicated time for the specified activity; too many on-call shifts, evening shifts, or weekend shifts). Multicollinearity of the predictor variables was assessed using variance inflation factors (VIFs, where VIF > 5 was considered to represent collinearity). An α value of 0.05 was used for regression analysis.

Power analysis was performed (using G*Power 3.1.9.7, 2020; Heinrich-Heine-Universität Düsseldorf), with a minimum sample size of 193 required to power all univariate analyses (based on largest contingency table [2×13 χ^2 test of burnout related to clinical area of practice], with Cramer $V = 0.3$, $\alpha = 0.05$, power = 0.8, df = 12) and a minimum of 139 participants for linear regression (effect size $f^2 = 0.15$, $\alpha = 0.05$, power = 0.8, number of predictors = 15). All statistical analyses were performed using IBM SPSS subscription (build 1.0.0.1327), IBM SPSS version 27, and R version 4.1 (Companion to Applied Regression package version 3.0-11).

Content analysis was used for the open-ended question to identify frequently repeated responses. A deductive (directive) approach was used.[23] Two coders read a subsample of responses and identified a set of categories of responses informed by existing research on factors linked to burnout in hospital pharmacists. These initial categories were subsequently organized into themes through discussion and consensus. Next, the 2 coders independently categorized the responses of the entire sample into these themes, and inter-rater agreement was determined. Whenever disagreement on how to categorize an item was present, consensus was achieved through discussion.

RESULTS

Demographic and Workplace Characteristics

A total of 236 individuals accessed the survey (a 9.1% response rate, based on estimated number of recipients of the original invitation), with 171 respondents remaining after removal of incomplete responses. The mean age was 40.5 years (standard deviation [SD] 10.9 years), and responses were obtained from all Canadian provinces. Respondents had been licensed for an average of 15.9 years (SD 11.3 years), with a range of 1 to 50 years, and 31 individuals (18.1%) reported that they were completing further education. Additional demographic information is provided in Table 1.

In terms of work setting, most respondents (102/169, 60.4%) worked in teaching hospitals, with the others working in community hospitals (63/169, 37.3%) or other locations (4/169, 2.4%). Most respondents (150/168, 89.3%) had full-time positions. The number of job responsibilities per pharmacist ranged from 1 to 8 (mean 3.2, SD 1.6). Pharmacists reported an average of 7.5 hours (SD 9.1 hours) of overtime per week. The primary areas of practice and other key employment characteristics are presented in Table 2, and a summary of workplace experiences is presented in Table 3.

MBI-HSSMP Results

Scores for the individual subscales, defined according to the previously mentioned thresholds, are shown in Table 4. More than half of the respondents (61.4%, 105/171) met the burnout threshold on the emotional exhaustion subscale, 19.9% (34/171) met the burnout threshold on the depersonalization subscale, and 20.5% (35/171) met the burnout threshold on the personal accomplishment subscale. Internal consistency for the MBI-HSSMP subcategories was assessed using the Cronbach α and were found to be moderate to high (α = 0.92 for emotional exhaustion subscale,

α = 0.73 for depersonalization subscale, and α = 0.79 for personal accomplishment subscale).

We first determined the relationship between employment characteristics and burnout status using the small sample of individuals (n = 13) who met the cut-off for burnout on all 3 subscales of the MBI. The only significant variable was the frequency of working to full scope of practice (Fisher exact test, p = 0.001, Benjamini–Hochberg critical value = 0.003, Cramer V = 0.33 [95% CI 0.21 to 0.48]), and none of the pharmacists who reported that they "often" or "always" worked to their full scope of practice experienced burnout. No other demographic or employment characteristics were found to be associated with burnout in this analysis.

We then performed a hierarchical linear regression to identify factors associated with burnout on the emotional exhaustion subscale of the MBI. Demographic information was included in block 1, with pharmacy job factors, professional impacts, and workplace factors in blocks 2, 3, and 4, respectively. The final regression model to identify factors associated with scores on the emotional exhaustion subscale was significant (R^2 = 0.50, R^2_{adj} = 0.34, F(33, 105) = 3.12, p < 0.001). Not disclosing gender and indicating a greater self-reported negative personal impact of working too many on-call shifts were associated with higher scores on the emotional exhaustion subscale of the MBI-HSSMP (gender not disclosed: B = 13.89, 95% CI 2.22 to 25.56, standard error [SE] = 5.89, β = 0.19, p = 0.020, reference category = male gender; too many on-call shifts [with negative impact ranging from "not at all" to "extremely"]: B = 2.24, 95% CI 0.40 to 4.09, SE = 0.93, β = 0.24, p = 0.018). The pharmacist's clinical area of practice (specifically, working in critical care or in other [uncategorized] practice areas) and more frequently experiencing a supportive workplace culture were both associated with lower scores on the emotional exhaustion subscale of the MBI-HSSMP (working in critical care: B = –9.64, 95% CI –15.74 to –3.54, SE = 3.08, β = –0.29, p = 0.002, and working in practice areas classified as "other": B = –7.42, 95% CI –13.21 to –1.63, SE = 2.92, β = –0.24, p = 0.012, reference category = medicine; supportive workplace culture: B = –5.85, 95% CI –8.04 to –3.66, SE = 1.11, β = –0.47, p < 0.001). The addition of pharmacy

TABLE 1. Demographic Characteristics of Canadian Hospital Pharmacists Responding to the Survey[a]

Characteristic	No. (%) of Respondents
Gender (n = 169)	
Male	45 (26.6)
Female	119 (70.4)
Prefer not to disclose	5 (3.0)
Geographic location (n = 167)	
Pacific (British Columbia)	18 (10.8)
Prairie (Alberta, Saskatchewan, Manitoba)	43 (25.7)
Central (Ontario, Quebec)	51 (30.5)
Atlantic (New Brunswick, Nova Scotia, Prince Edward Island, Newfoundland and Labrador)	55 (32.9)
Level of education[b] (n = 169)	
BSc Pharmacy	64 (37.9)
PGY1 residency	54 (32.0)
PharmD	43 (25.4)
Other	8 (4.7)
Relationship status (n = 168)	
Married or in a relationship	141 (83.9)
Single	18 (10.7)
Divorced, separated, other	9 (5.4)
Care of dependents[c] (n = 169)	
None	96 (56.8)
Children (< 18 years)	60 (35.5)
Adult family member or others	13 (7.7)
Disability or chronic medical condition affecting work (n = 44)	
Never or rarely	26 (59.1)
Sometimes or often	18 (40.9)

[a]A total of 171 respondents were included in the analysis, but not all respondents answered questions in the section for demographic information.
[b]BSc = Bachelor of Science, PGY1 = Postgraduate Year 1, PharmD = Doctor of Pharmacy (with or without a BSc).
[c]For those who reported being a caregiver, hours of care per week ranged from 1 to 168, with a mean of 71.8 hours (standard deviation 46.0).

job factors, professional impacts, and workplace factors to the regression model (blocks 2–4) explained an additional combined 36.0% of the variance in the emotional exhaustion subscale beyond demographic information (block 1 $R^2 = 0.14$, $R^2_{adj} = 0.04$, $F(14, 124) = 1.39$, $p = 0.17$).

Responses to Open-Ended Question

In all, 56.7% of individuals (97/171) responded to the open-ended question about burnout, providing a total of 594 responses. Three main themes were identified through discussion and consensus: workload quantity, workload quality, and workplace culture (remaining items were labelled as "Other" in the scoring process). The 2 coders independently categorized each item into one of these themes, and 89% agreement was obtained. For all items where disagreement occurred, consensus was achieved through discussion.

Overall, 44.4% (264/594) of the responses were categorized in the theme of workplace culture, 28.6% (170/594) in the theme of workload quantity, and 17.3% (103/594) in the theme of workload quality. Of the 97 pharmacists who provided responses to the open-ended question, 78 made at least 1 statement regarding workplace culture, 58 made at least 1 statement regarding workload quantity, and 42 made at least 1 statement regarding workload quality. Details about the content of the themes and examples of responses provided are presented in Table 5.

DISCUSSION

To our knowledge, this is the first study to assess the prevalence of burnout among hospital pharmacists across Canada, although a recent study surveyed pharmacists in Ontario on this topic.[12] In the current study, we chose to look at burnout in 2 ways. First, we included all 3 subscales of the MBI-HSSMP (emotional exhaustion, depersonalization, personal accomplishment) when determining burnout, which yielded the relatively low burnout rate of 7.6%, a figure similar to those obtained by others[2,11] using a similar approach. Second, we used only the emotional exhaustion subscale, as others have done[22]; the percentage

TABLE 2. Employment Characteristics of Canadian Hospital Pharmacist Respondents

Characteristic	No. (%) of Respondents		
Primary area of clinical practice ($n = 146$)			
Cardiology	6 (4.1)		
Critical care	17 (11.6)		
Geriatrics	6 (4.1)		
Infectious disease	9 (6.2)		
Medicine	40 (27.4)		
Oncology	17 (11.6)		
Pediatrics	10 (6.8)		
Psychiatry	7 (4.8)		
Surgery	12 (8.2)		
Other	22 (15.1)		
	Never/Rarely	**Sometimes**	**Often/Always**
Scope and workplace culture			
Frequency working to full scope ($n = 169$)	24 (14.2)	63 (37.3)	82 (48.5)
Frequency supportive workplace culture experienced ($n = 155$)	21 (13.5)	67 (43.2)	67 (43.2)
	> 75% of Work Hours	**25%–74% of Work Hours**	**< 25% of Work Hours**
Self-reported time allotted to pharmacist job activities			
Inpatient direct care ($n = 132$)	32 (24.2)	66 (50.0)	34 (25.8)
Clinic-based direct patient care ($n = 59$)	8 (13.6)	21 (35.6)	30 (50.8)
Distribution ($n = 95$)	1 (1.1)	52 (54.7)	42 (44.2)
Leadership ($n = 82$)	9 (11.0)	24 (29.3)	49 (59.8)
Management ($n = 40$)	9 (22.5)	13 (32.5)	18 (45.0)
Drug information/use evaluation ($n = 50$)	2 (4.0)	8 (16.0)	40 (80.0)
Academic cross-appointment ($n = 20$)	1 (5.0)	3 (15.0)	16 (80.0)
Research ($n = 47$)	0 (0.0)	6 (12.8)	41 (87.2)
Pharmacy informatics ($n = 16$)	3 (18.8)	8 (50.0)	5 (31.3)

TABLE 3. Summary of Workplace Experiences of Canadian Hospital Pharmacists

Factor	Response; No. (%) of Respondents		
	Not At All	Somewhat/ Slightly	Extremely/ Moderately
Extent of negative impact over past 12 months from designated factor			
Research expectations without dedicated time (n = 165)	74 (44.8)	56 (33.9)	35 (21.2)
Teaching expectations without dedicated time (n = 165)	46 (27.9)	74 (44.8)	45 (27.3)
Committee work without dedicated time (n = 165)	41 (24.8)	77 (46.7)	47 (28.5)
Preceptor expectations without dedicated time (n = 164)	38 (23.2)	59 (36.0)	67 (40.9)
Underappreciated contributions (n = 155)	33 (21.3)	91 (58.7)	31 (20.0)
Too many on-call shifts (n = 163)	116 (71.2)	28 (17.2)	19 (11.7)
Too many evening shifts (n = 164)	116 (70.7)	26 (15.9)	22 (13.4)
Too many weekend shifts (n = 164)	106 (64.6)	40 (24.4)	18 (11.0)
Vacation (too little or requests not granted) (n = 165)	63 (38.2)	60 (36.4)	42 (25.5)
Extent that work–life balance is promoted by management[a] (n= 165)	25 (15.2)	95 (57.6)	45 (27.3)
	Rarely/Never	**Sometimes**	**Always/Often**
Frequency pulled away from patient care			
From direct patient care to technical activity (n = 154)	32 (20.8)	68 (44.2)	54 (35.1)
From direct patient care to distribution activity (n = 145)	40 (27.6)	46 (31.7)	59 (40.7)
From non-direct patient care to technical activity (n = 147)	52 (35.4)	57 (38.8)	38 (25.9)
From non-direct patient care to distribution activity (n = 137)	41 (29.9)	50 (36.5)	46 (33.6)

[a]For this item, high frequency is a positive experience for the pharmacists.

TABLE 4. Results for Canadian Hospital Pharmacists on Maslach Burnout Inventory Human Services Survey for Medical Personnel

Subcategory and Scores	Mean ± SD	Range	No. (%) of Respondents (n = 171)
Emotional exhaustion	28.4 ± 11.3	0.0–52.0	
Low (0–16)			26 (15.2)
Moderate (17–26)			40 (23.4)
High (≥ 27)			105 (61.4)
Depersonalization	8.3 ± 5.7	0.0–23.0	
Low (0–8)			99 (57.9)
Moderate (9–13)			38 (22.2)
High (≥ 14)			34 (19.9)
Personal accomplishment	36.1 ± 7.2	15.0– 48.0	
High (≥ 37)			89 (52.0)
Moderate (31–36)			47 (27.5)
Low (0–30)			35 (20.5)
Burnout[a]			
Yes			13 (7.6)
No			158 (92.4)

SD = standard deviation.
[a]Individuals were classified as having burnout when they had concurrently a high score (≥ 27) on the subscale of emotional exhaustion, a high score (≥ 14) on the subscale of depersonalization, and a low score (≤ 30) on the subscale of personal accomplishment.

TABLE 5. Content Analysis of Open-Ended Responses

Theme	Categories (No. of Statements)	Examples
Workplace culture	Conflicts, psychosocial support, shame/stigma, feeling unappreciated, feeling unrecognized (n = 264)	"I think that while organizations themselves offer mental health options to potentially address, there is still stigma associated with the concept of burnout." "All of my burnout stems from lack of support from my leadership."
Workload quantity	Time demands, need for overtime, understaffing, work–life balance, feeling rushed, having no time for educational opportunities (n = 170)	"Our current staffing complement is not adequate to maintain level of services we provide (both technician and pharmacist staffing). Management keeps taking on more new assignments and tasks, without increasing staffing."
Workload quality	Scope of practice, duties (e.g., dispensary versus clinical care) training/education/clinical, lack of administrative support (n = 103)	"Part of the pressures of work are the expectations to complete 'measurable' processes and allow non-measurables to be left. Many of the pharmacists' interventions in clinical care are what I describe as 'silent.'" "I absolutely feel frustrated that technicians do not work towards their full scope and hence limit pharmacist roles."
Other	Comments regarding the survey, self-descriptive information (n = 56)	"I am a pharmacy director." "Thank you for conducting this survey."

of pharmacists categorized as having high scores on this subscale of the MBI-HSSMP was 61.4%, a rate slightly higher than the 53% observed previously in the United States[3] and in Ontario.[12] As noted by others,[22] consensus is needed regarding whether a dichotomous criterion (burnout/no burnout) should be used (and if so, which subscales of the MBI-HSSMP should be used), or if using continuous subscale scores would be a superior approach, particularly for researchers.

In the present project, when all 3 subscales of the MBI-HSSMP were used to identify individuals experiencing burnout, univariate analyses suggested that the ability to work to full scope of practice may be a mitigating factor for burnout in pharmacists. One possible interpretation is that a definition of burnout involving high levels of both emotional exhaustion and depersonalization, as well as a low sense of personal accomplishment, may be more likely when pharmacists cannot fully focus on their clinical duties. As shown in Table 3, expectations to carry out nonclinical duties, such as preceptorship, committee work, and teaching, without dedicated time was frequently experienced negatively. Results from the content analysis further suggest that being able to work to full scope of practice is often hampered by insufficient pharmacy and administrative support. A sense of personal accomplishment may be difficult to achieve when doing tasks that could be completed by others on the pharmacy team. It is important to acknowledge that full scope of practice may be defined differently in different jurisdictions and by pharmacists with different roles in the hospital, such that the importance of clinical duties could be reduced for a minority of pharmacists.

The results obtained with a linear regression using the entire range of scores from the emotional exhaustion subscale support and extend the results of the univariate analyses. In the linear regression analysis, multiple variables were significant predictors of emotional exhaustion scores, including gender identity, perceived excessive on-call duties, and positivity of work culture. Although little research has been carried out on the role of gender identity in burnout among hospital employees, it has been found that workplace culture mediates the relationship between gender identity and job satisfaction.[24] Thus, individuals not choosing male or female as their gender and those who feel that they are assigned excessive amounts of on-call duties may be experiencing higher levels of emotional exhaustion because they do not perceive their workplace as positive.

Finally, we also found that pharmacists working in certain practices such as critical care had lower levels of emotional exhaustion. While it is possible that individuals who choose this demanding work setting are better able to deal with high work demands, it is also possible that these practices are more likely to be adequately resourced, leading to a workplace that is perceived as more supportive. The question of whether different types of practices within the hospital are perceived by pharmacists to provide differentially supportive workplaces and to lead to different rates of burnout is a question that clearly deserves research attention. It remains however, that several factors that may contribute to a less supportive workplace culture have been associated with higher rates of burnout in previous research, including feelings that contributions were not appreciated,[3,12] working with difficult colleagues,[3,13] having too many nonclinical duties,[3,8] and dissatisfaction with work–life balance.[12]

In the current study, more than half of respondents added open-ended responses to the survey's final question. Although pharmacists were invited to comment on "feelings of exhaustion, negativism and reduced professional efficacy", the most frequently used themes were workplace

culture (e.g., conflict and feeling unappreciated) and workload quantity (e.g., understaffing and excessive workloads). As has been noted elsewhere,[12] many interventions addressing burnout focus on the individual, but individuals are often powerless to make changes to reduce burnout without organizational support. In the present study, psychological dimensions did not emerge as key themes in the qualitative responses, which suggests that for these respondents, effective interventions will need to address organizational issues such as understaffing and excessive workloads, rather than individual coping skills. Possible interventions to mitigate distress could include full implementation of registered pharmacy technicians, assignment of balanced job responsibilities among staff, appropriate staffing levels, and recognition of the time demands of nonclinical tasks. It remains, however, that there is limited research, and limited support, to show that organizational-level interventions are successful in reducing burnout in health care professionals.[25] Research to identify effective interventions to reduce burnout in pharmacy and other health care professions is needed.

Our study was limited by the small sample size and the low number of respondents meeting the threshold for burnout (defined on a dichotomous basis), which led to insufficient power to robustly test the association between a dichotomized definition of burnout and its hypothesized predictors using multivariate logistic regression. With the present data set, use of a linear regression approach with the scores on the emotional exhaustion scale was more feasible and informative. Hopefully, future studies will obtain larger samples with more variability on all 3 subscales, such that in-depth analyses can be carried out to determine, for example, whether different variables predict higher scores on different subscales of the burnout measure. Other possible limitations are that our survey was distributed primarily to hospital pharmacists who are members of the CSHP and was offered in English only. Moreover, the relatively low response rate suggests the possibility of selection bias if those who had experienced or were experiencing burnout were more (or less) likely to participate in the study.

The survey was distributed during the first few months of the COVID-19 pandemic, which might have affected both the content of the responses obtained and the response rate. Early research indicates that the pandemic has had deleterious effects on the well-being of pharmacists,[16,17,26] even when they were not caring directly for patients with COVID-19[16] and before they became involved in vaccination efforts.[17] Given the continuing effects of the pandemic on the health care system, it is likely that data obtained during the first few months of the pandemic underestimate the amount of burnout experienced by hospital pharmacists. Further research should explore the effect of pandemic-related task changes on burnout, including the ability to work to full scope of practice, the potential increase in nonclinical duties, and increases in understaffing. A better understanding of the role of such task changes not only as predictors of burnout, but also as predictors of quality of care, job satisfaction, and turnover is vital to designing effective mitigation strategies to deal with the effects of the pandemic on pharmacists.

CONCLUSION

In this study of Canadian hospital pharmacists, relatively low rates of burnout were observed when burnout was defined on the basis of all 3 subscales of the MBI-HSSMP. However, when subscale scores and open-ended responses were analyzed, the results indicated that a substantial number of respondents were experiencing work-related distress. Further research is warranted to implement and test interventions to mitigate the negative work experiences of Canadian hospital pharmacists.

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Opioid Prescribing Habits of Orthopedic Surgeons Following Total Hip Arthroplasty and Total Knee Arthroplasty: A Pilot Study

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ABSTRACT

Background: Adequate pain management is important in patients' recovery from total hip arthroplasty (THA) and total knee arthroplasty (TKA).

Objective: To determine whether risk factors for prolonged opioid use are considered when discharge prescriptions for postoperative pain are written following THA and TKA.

Methods: Opioid prescriptions written between June 14 and July 9, 2021, for patients who underwent THA or TKA were analyzed. Data were also collected on the patients' age, sex, type of surgery, type of anesthesia (regional or general), preoperative use of opioids, and preoperative use of antidepressants.

Results: Among the 59 patients included in the study, the most common prescriptions were for hydromorphone 2 mg (n = 15, 25%) and hydromorphone 1 mg (n = 15, 25%). At discharge, patients received a median of 400 morphine milligram equivalents (MMEs). There was no significant difference in the quantity of opioids (MMEs) prescribed at discharge in relation to surgery type (p = 0.63), sex (p = 0.44), preoperative antidepressant use (p = 0.22), or preoperative opioid use (p = 0.97). There also appeared to be no correlation between a patient's age and MMEs at discharge (p = 0.21; r^2 = 0.028). None of these variables could be used to predict which patients would receive more than 400 MMEs.

Conclusions: Patient-specific factors appeared not to be taken into consideration when opioids were prescribed for postoperative pain among patients who underwent THA or TKA.

Keywords: opioids, prescribing patterns, orthopedics, analgesia

RÉSUMÉ

Contexte : Une gestion adéquate de la douleur est importante pour le rétablissement des patients après une arthroplastie totale de la hanche (ATH) et une arthroplastie totale du genou (ATG).

Objectif : Déterminer si les facteurs de risque relatifs à l'utilisation prolongée d'opioïdes sont pris en compte lors de la rédaction d'ordonnances de congé pour douleurs postopératoires après une ATH et une ATG.

Méthodes : Les prescriptions d'opioïdes rédigées entre le 14 juin et le 9 juillet 2021 pour les patients ayant subi une ATH ou une ATG ont été analysées. Des données ont également été recueillies sur l'âge, le sexe, le type de chirurgie, le type d'anesthésie (locale ou générale), l'utilisation préopératoire d'opioïdes et l'utilisation préopératoire d'antidépresseurs.

Résultats : Parmi les 59 patients compris dans l'étude, les prescriptions les plus fréquentes étaient l'hydromorphone 2 mg (n = 15; 25 %) et l'hydromorphone 1 mg (n = 15; 25 %). Les patients recevaient une médiane de 400 équivalents milligrammes de morphine (MME) au moment du congé. Aucune différence significative quant à la quantité d'opioïdes (mesurée en MME) prescrits au moment du congé en fonction du type de chirurgie (p = 0,63), du sexe (p = 0,44), de l'utilisation préopératoire d'antidépresseurs (p = 0,22) ou de l'utilisation préopératoire d'opioïdes (p = 0,97) n'a été observée. Il ne semblait pas non plus y avoir de corrélation entre l'âge d'un patient et les MME au moment du congé (p = 0,21; r^2 = 0,028). Aucune de ces variables ne pouvait être utilisée pour prédire quels patients recevraient plus de 400 MME.

Conclusions : Les facteurs spécifiques au patient ne semblaient pas être pris en compte lors de la prescription d'opioïdes pour la douleur postopératoire chez les patients ayant subi une ATH ou une ATG.

Mots-clés : opioïdes, tendances en prescription, orthopédie, analgésie

INTRODUCTION

The 2 most frequently performed orthopedic surgeries in Canada are total hip arthroplasty (THA) and total knee arthroplasty (TKA). For both procedures, adequate pain management is important for patients' recovery and management of postoperative complications.[1-3] In the United States, it is estimated that hydrocodone–acetaminophen and oxycodone–acetaminophen make up 47.1% and 17.5%, respectively, of all opioid prescriptions written by orthopedic surgeons.[4] These proportions have been steadily decreasing in recent years as physicians switch to other forms of pain control; however given the ongoing opioid epidemic, understanding prescribing patterns remains informative.[5] Currently, the maximum recommended amount of opioids prescribed at discharge after TKA or THA is 400 morphine milligram equivalents (MMEs).[6] In Canada, data on opioid prescribing are very limited, and not much is known about the amounts of opioids that patients are receiving.

In Canada, the opioid-related death rate is roughly 7.8 per 100 000; however, the rate varies greatly across jurisdictions, from 2.2 per 100 000 in the Northwest Territories to 20.0 per 100 000 in British Columbia.[7] Among people who experience an opioid overdose, aggregate data from across Canada show that approximately 25% received their opioids solely from pharmaceutical sources (e.g., prescriptions), with extremes of approximately 0% in British Columbia and 93% in Nova Scotia.[7] This situation emphasizes the need for health care professionals to examine their prescribing habits and ideally tailor them to each individual patient.

Several risk factors should be considered with regard to opioid prescribing. Previous studies have shown that upward of 10% of opioid-naive patients who receive opioids in association with surgery will develop a dependence postoperatively, regardless of the type of surgery.[8-10] There are numerous factors that may predict opioid dependence in opioid-naive patients, including anxiety or depression, preoperative or perioperative opioid use, alcohol misuse, and a larger amount of opioids prescribed at discharg.[11,12] Further information on these risk factors, including potential mechanisms of dependence, can be found in a previously published article.[13]

The purposes of this study were to explore orthopedic surgeons' opioid-prescribing habits at the time of patient discharge after elective TKA or THA and to provide the groundwork for further studies into this topic.

METHODS

This study was approved, on May 11, 2021, by the Nova Scotia Health Research Ethics Board as a quality improvement project and as such was exempt from ethics review. Because there was no direct patient involvement in the study, patient consent was not required; prescribers were aware of the study and consented to involvement.

This prospective study included patients of all ages who underwent elective primary TKA or THA, with same-day admission, at the Halifax Infirmary between June 14, 2021, and July 9, 2021. Patients who underwent revision surgeries or surgery for treatment of fracture were excluded. Chart reviews were performed during the patients' admission for the surgery, and information was stored in a password-protected Excel spreadsheet file (Microsoft Corporation). Patient identifiers were removed to provide anonymity. Medication reconciliation orders at admission and discharge were examined to determine preoperative use of opioids and antidepressants, defined as any current opioid or antidepressant use, regardless of dosage and duration. Antidepressants were grouped by indication, as opposed to class, because these drugs can have various uses, including treatment of chronic pain. Anesthesia charts were used to determine perioperative anesthesia medications (either general or local, including nerve blocks and spinal anesthesia). Discharge prescriptions were obtained from either a physical version given to the patient or the Nova Scotia drug information system (for e-prescriptions). In this study, prescriptions were written primarily by orthopedic surgeons, but also by clinical associates or their residents. Barring complications, patients were discharged home within 24 hours of their surgery. All opioid doses were converted to standardized MMEs using conversions set by the National Pain Centre.[14]

Because this was a pilot project, and one of the first of its kind in Canada, there were insufficient data available to perform a sample size calculation; therefore, a convenience sample was used. Based on the presence of outliers and non-normal distribution, Prism software (GraphPad Software) was used to perform Mann-Whitney *U* tests, Spearman correlation, and relative risk (RR) calculations. Because of the small sample size, statistical significance for RR calculations was determined using Fisher exact tests. The WRS2 package in RStudio (v1.4.1106) was used to perform 2-way analysis of variance (ANOVA) for medians.[15]

RESULTS

A total of 59 patients (36 women and 23 men), with average age of 65.1 years (range 15.0–86.0 years), were included in the study. Overall, 31 patients underwent THA, 28 underwent TKA, and the median prescribed opioid dose was 400 MMEs (interquartile range 200–400 MMEs) (Figure 1A).

Of the 59 patients included in this study, 53 received a hydromorphone prescription, 4 received a morphine prescription, and 2 did not receive any opioid prescription at discharge. Of these medications, the 2 most common prescriptions were for hydromorphone 2 mg 1–2 tablets PO q4–6h PRN and hydromorphone 1 mg 1–4 tablets PO q3–6h PRN (Figure 1B). The number of tablets prescribed for each patient was highly variable, ranging from 0 to 120 tablets total (including refills), with 24 (41%) of the patients having a prescription for 40 tablets (Figure 1C). The amount of opioid prescribed at discharge was also highly variable, ranging from 0 to 1200 MMEs, with 23 (39%) of the patients receiving 400 MMEs (Figure 1D).

Once we had analyzed the baseline prescriptions, we next sought to determine whether there were differences within the individual parameters that had been measured. Initially, we were interested in whether there were any differences in MMEs prescribed for patients who underwent TKA relative to those who underwent THA; both groups of patients received a median of 400 MMEs at discharge ($p = 0.63$; Figure 2A). Men and women received the same median amount of opioids at discharge (400 MMEs for each sex, $p = 0.44$; Figure 2B). With stratification by age, using 65 years as the cutoff, patients received the same amount of opioids regardless of age group, with a median of 400 MMEs given to both groups ($p = 0.24$; Figure 2C). Furthermore, when linear regression was performed comparing patients' age with the size of their discharge opioid prescriptions, we

found no significant correlation between these variables ($r^2 = 0.028$, $p = 0.21$; Figure 2D). Patients who were taking opioids preoperatively received a median of 350 MMEs, whereas those who were opioid-naive received a median of 400 MMEs ($p = 0.97$; Figure 2E). Finally, for patients using antidepressant medications at the time of admission, a median of 400 MMEs was prescribed; the median prescription was also 400 MMEs for those who were not taking antidepressants ($p = 0.22$; Figure 2F).

To eliminate potential confounding associated with pooling surgery types, we stratified the parameters by surgery type and performed 2-way ANOVA with multiple comparisons, to determine sources of variation. This analysis revealed no statistically significant differences for any of the parameters measured, although there was a nearly statistically significant interaction between preoperative opioid use and surgery type ($p = 0.07$; data not shown).

Finally, we investigated whether any of the measured parameters could be used to predict which patients would receive prescriptions for more than the recommended limit of 400 MMEs. To that end, we calculated RRs for the various parameters and found that none were able to predict which patients would receive larger discharge prescriptions, although preoperative use of opioids and antidepressants were associated with statistically nonsignificant RRs of 1.42 and 1.24, respectively (Figure 2G).

DISCUSSION

In this small pilot study, we found no statistically or clinically significant differences in the amount of opioids prescribed to patients after THA and TKA, regardless of patients' risk factors for prolonged opioid use or uncontrolled pain. Parameters examined included age, sex, surgery type, anesthesia

A

Parameter	THA	TKA	Total
Patients, Total No.	31	28	59
Mean age, yrs (range)	63.7 (28.0-86.0)	66.7 (15.0-83.0)	65.1 (15.0-86.0)
Female, n (%)	19 (61.3)	17 (60.7)	36 (61.0)
Preoperative opioid use, n (%)	8 (25.8)	4 (14.3)	12 (20.3)
Anti-depressant use, n (%)	9 (29.0)	9 (32.1)	18 (30.5)
MMEs at discharge, median (IQR)	400 (200, 400)	400 (225, 415)	400 (200, 400)

B

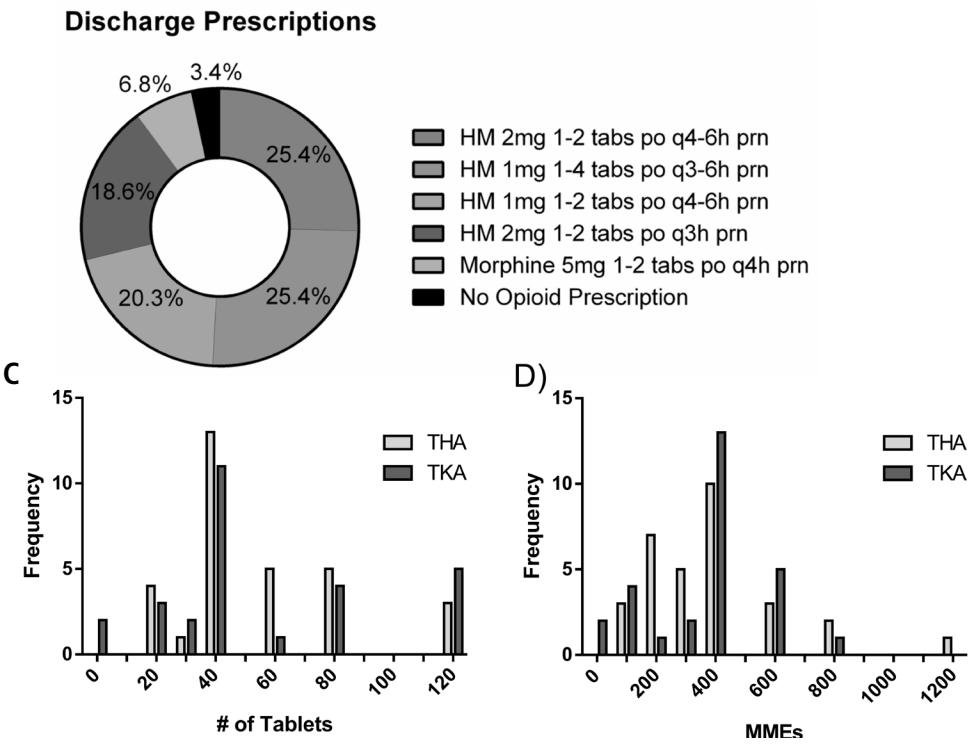
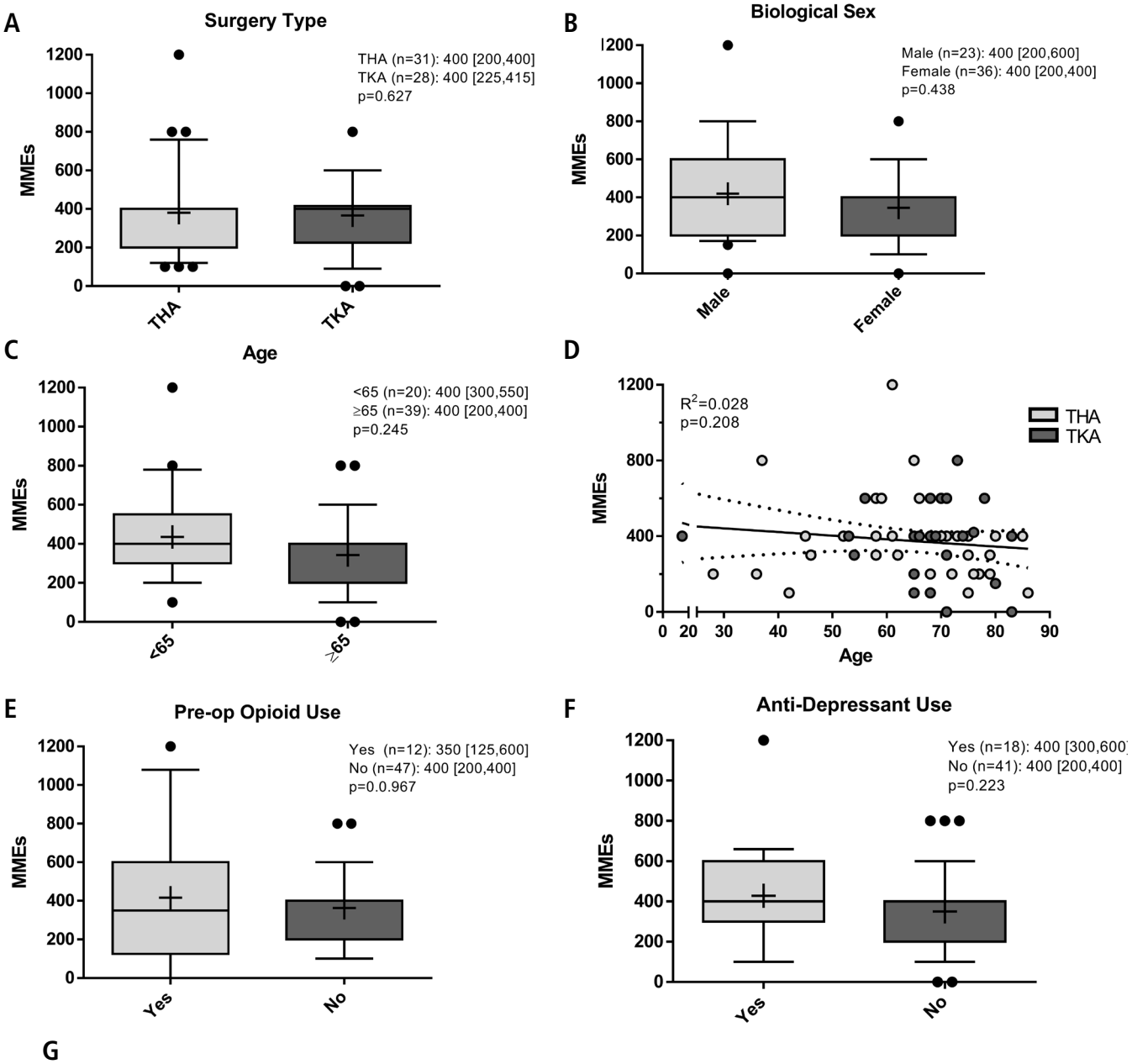


FIGURE 1. Discharge prescription characteristics. **A:** Demographic characteristics of study participants. **B:** The most common prescriptions and directions for administration (listed in descending order by percentage). **C:** Number of opioid tablets prescribed for patients at discharge. **D:** Distribution of opioid dosage (in terms of morphine milligram equivalents [MMEs]) prescribed at discharge. HM = hydromorphone, IQR = interquartile range, THA = total hip arthroplasty, TKA = total knee arthroplasty.

type, preoperative opioid use, and preoperative antidepressant use. When the data were further stratified by surgery type, we found that preoperative opioid use posed a potential source of variability within the data set, which suggests a possible correlation between this risk factor for prolonged use and uncontrolled pain, which might ultimately influence



G

Parameter	THA	TKA	Total
TKA Surgery			1.08 [0.82, 1.42]
Female Gender	1.06 [0.75, 1.49]	0.77 [0.47, 1.27]	0.92 [0.69, 1.23]
Pre-op Opioid Use	1.83 [0.90, 3.69]	1.00 [0.54, 1.84]	1.42 [0.87, 2.34]
Anti-Depressant Use	1.36 [0.84, 2.21]	1.78 [0.82, 3.82]	1.24 [0.87, 1.77]
General Anesthesia	1.12 [0.77, 1.64]	0.80 [0.56, 1.14]	0.92 [0.71, 1.21]

FIGURE 2. A–F: Univariate analyses (based on Mann-Whitney *U* tests) comparing opioid dosage (in terms of morphine milligram equivalents [MMEs]) at discharge in relation to the parameters measured in this study. In each box-and-whisker plot, the box represents the second and third quartiles, the whiskers represent the first and fourth quartiles, the plus sign represents the mean, and solid circles represent outliers. **G:** Risk ratios for receiving more than 400 MMEs of opioid therapy at discharge. Note: Throughout Figure 2, numeric values represent medians with interquartile ranges; THA = total hip arthroplasty, TKA = total knee arthroplasty.

prescribing habits. Furthermore, we found that none of these parameters could be used to determine which patients were at risk of receiving more than the recommended limit of 400 MMEs.

Numerous studies are in progress to determine the feasibility of opioid-sparing pain management systems. These interventions have been shown to reduce the MMEs per patient by about 50%–60% while maintaining patient satisfaction, and they have been associated with several other benefits, including promotion of the use of alternative methods of pain control, reduction in complication rates, and reduction in the amount of unused medication.[16-18] There may be some concerns that limiting the amount of opioids at discharge will lead patients to have their medication refilled more frequently to compensate. However, this does *not* seem to be the case, at least in the context of THA.[19] There is also evidence that preoperative opioid education can reduce, by as much as 50%, the amount of opioids used by patients who have undergone orthopedic surgery.[20]

Although this was a relatively small study, it represents one of the first Canadian reports of opioid prescribing habits following THA and TKA surgery and the first such study in Nova Scotia. Notably, of the 2 patients with no prescription of opioids at discharge, both had used opioids preoperatively and both underwent TKA surgery, leading to a larger amount of variability within the TKA group.

CONCLUSION

In this study population, patient-specific factors for prolonged opioid use or uncontrolled postoperative pain do not appear to have been taken into consideration when opioids were prescribed after THA or TKA surgery. The next step toward understanding the prescribing habits of orthopedic surgeons in Canada would be to repeat this study with a larger study sample.

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Sulfasalazine-Induced Aseptic Meningitis

Duane Bates, Sandy Zhang, Ben J Wilson, and Shyane Wiegers

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INTRODUCTION

Aseptic meningitis is a clinical syndrome of meningeal inflammation in which common bacterial causes cannot be identified. The majority of cases are caused by viral infections, with enteroviruses being the most common organisms.[1] Aseptic meningitis may also be caused by medications[1,2] and has been most frequently reported with nonsteroidal anti-inflammatory drugs (NSAIDs; most commonly in association with ibuprofen), antibiotics (most commonly in association with trimethoprim, with or without sulfamethoxazole), anticonvulsants (most commonly in association with lamotrigine), and monoclonal antibodies.[2,3] The interval between initiation of the medication and development of meningeal symptoms has ranged from minutes to 5 months.[3] Patients typically present with fever, headache, photophobia, and neck stiffness. Other symptoms may include nausea, vomiting, diarrhea, phonophobia, arthralgia, myalgia, rash, or flu-like symptoms.[1,2,4] Lumbar puncture for cerebrospinal fluid (CSF) analysis is required to confirm the diagnosis. CSF pleocytosis is nearly always present, and an increase in protein and a decrease in glucose, if present, are typically mild.[1,2] Treatment of medication-associated aseptic meningitis involves stopping the offending agent and supportive care. Symptoms typically resolve within 5 days of drug discontinuation.[2,3] We present a case of sulfasalazine-induced aseptic meningitis.

CASE REPORT

A 39-year-old woman presented to the emergency department with a 10-day history of malaise, nausea, and headache, which were associated with ocular pain, photophobia, tinnitus, and fever.* Past medical history included juvenile idiopathic arthritis, asthma, and previous upper gastrointestinal bleeding. The patient did not have a history of headaches or migraines. The patient's home medications included budesonide 200 µg/formoterol 6 µg 2 puffs inhaled 1 or 2 times daily, salbutamol 100 µg 2 puffs inhaled as needed, melatonin 5 mg PO at bedtime as needed, ibuprofen 200 mg PO as needed, and cetirizine 10 mg PO daily as needed. Two weeks before the admission, the patient had been given a prescription for sulfasalazine for her arthritis. The sulfasalazine was started at a dosage of 500 mg PO daily for 7 days and was to be increased by 500 mg daily every 7 days to a dosage of 1000 mg PO twice daily. Before admission, the sulfasalazine dosage was 500 mg PO twice daily. The patient had not taken any NSAIDs after starting the sulfasalazine. The patient reported no use of other over-the-counter medications, herbal medications, natural health products, food supplements, or traditional medicines. The patient had smoked 1 pack of cigarettes per day for 20 years, drank about 10 alcoholic beverages per week, and occasionally used cannabis.

The patient was 159.8 cm tall and weighed 57.6 kg. Vital signs on admission were as follows: temperature 39°C, blood pressure 119/73 mm Hg, heart rate 108/min, and oxygen saturation 97% on room air. Physical examination showed no neck stiffness or deficit in range of motion. The Brudzinski sign, Kernig sign, and Jolt test were all negative. On neurological examination, motor and sensory functions were normal. Serum electrolytes, hemoglobin, platelets, and liver enzymes were normal. The CSF contained normal glucose, normal protein, and elevated white blood cells (20×10^6/L; normal range $0–5 \times 10^6$/L), including 72% neutrophils (Table 1). The results of urinalysis and chest radiography were unremarkable. The patient received 1 dose of ketorolac 10 mg IV and 1 dose of metoclopramide 10 mg IV for her headache, with no effect. Acetaminophen 1000 mg PO 4 times daily was started for her headache. In addition, the following medications were started: ceftriaxone 2 g IV every 12 hours, dexamethasone 10 mg IV every 6 hours, and acyclovir 650 mg IV every 8 hours. The patient received 2 doses of oral morphine for her headache. The sulfasalazine was discontinued on admission.

On day 2 of admission, the patient received 2 doses of oral hydromorphone for her headache. Negative results were obtained for the following investigations: urine, blood, and CSF culture; respiratory pathogen panel; nasopharyngeal swab for COVID-19, influenza A/B, and respiratory syncytial virus; alpha herpes virus panel; and enterovirus and parechovirus panel. The ceftriaxone, dexamethasone, and acyclovir were discontinued because the patient's symptoms were thought to be due to aseptic meningitis

*The patient gave verbal consent for publication of this case report.

TABLE 1. Summary of Laboratory Test Results

Laboratory Test	Measured Value	Reference Range
Creatinine	64 µmol/L	40–100 µmol/L
White blood cells	3.4 × 10^9/L	4–11 × 10^9/L
Neutrophils	2.2 × 10^9/L	2–9 × 10^9/L
Serum glucose	5.4 mmol/L	3.3–11 mmol/L
International normalized ratio	1.2	0.9–1.1
Partial thromboplastin time	29.8 s	28–38 s
Cerebrospinal fluid		
Glucose	2.9 mmol/L	2.2–3.9 mmol/L
Lactate	2.4 mmol/ L	1.1–2.4 mmol/L
Protein	0.41 g/L	0.15–0.45 g/L
White blood cells	20 × 10^6/L	0–5 × 10^6/L
Neutrophils	72%	NA
Lymphocytes	23%	NA
Monocytes	3%	NA
Eosinophils	1%	NA
Basophils	1%	NA
C-reactive protein	16.9 mg/L	0–8 mg/L
Anti–doubled-stranded DNA	1 kIU/L	0–9 kIU/L
Cardiolipin antibodies	Negative	NA
Lupus anticoagulant	Negative	NA
Anti-beta 2 glycoprotein 1	Negative	NA

secondary to sulfasalazine. The patient was discharged on day 2, as the headache had improved and all other symptoms had resolved. The patient was advised to avoid the use of NSAIDs and to use only acetaminophen for headache and minor aches and pains. The headache had completely resolved 2 days after discharge. At 29 days after discharge, the patient had no recurrence of symptoms.

DISCUSSION

A literature search of PubMed, Google Scholar, and Embase databases from inception to March 30, 2021, with the search terms "aseptic meningitis" and "sulfasalazine" yielded 6 citations involving 7 patients[5-10] (summarized in Table 2). The patients were predominantly female, with ages ranging from 34 to 74 years. All of the patients had an autoimmune disease. Fever, headache, vomiting, and neck stiffness were the most commonly reported symptoms. The onset of symptoms ranged from 12 days to a few months after exposure to the medication. Resolution of symptoms occurred 2 to 8 days after sulfasalazine discontinuation. Other infectious causes were ruled out in 6 of the 7 cases. Four patients were rechallenged and experienced recurrence of symptoms within 1 to 12 hours after a single dose of sulfasalazine (Table 3). Our patient had a similar presentation and temporal association, with clinical onset and resolution within the described time frames after sulfasalazine initiation and discontinuation, respectively.

Two weeks after starting sulfasalazine, the patient described here presented with meningeal symptoms, and the results of work-up for infectious causes of meningitis were negative. The patient was not tested for other causes of viral induced aseptic meningitis, but these could be excluded on a clinical basis.[1] She did not have risk factors for HIV, and testing for this virus was therefore not conducted. The patient had not been exposed to rodent excrement, and lymphocytic choriomeningitis virus was therefore ruled out. There had been no recent travel, so arthropod-borne flaviviruses, bunyaviruses, and orthobunyaviruses were excluded. She had been vaccinated against mumps and measles, which made these viruses unlikely as the cause of aseptic meningitis. The patient had not been bitten by an animal infected with rabies.

Neutrophilic pleocytosis of the CSF is a characteristic of drug-induced aseptic meningitis.[2,3] Autoimmune diseases such as rheumatoid arthritis, systemic lupus erythematosus, Sjogren syndrome, and Behcet syndrome may predispose patients to development of aseptic meningitis.[1,2] The patient in this case had juvenile idiopathic arthritis but did not report arthralgia, and her C-reactive protein was marginally elevated, which made active rheumatoid arthritis unlikely. Antiphospholipid antibody syndrome has been associated with migraines, but the results of work-up were negative.[1] The rapid onset and resolution of signs and symptoms suggest that this was a case of aseptic meningitis secondary to sulfasalazine.[2-4] The Naranjo Adverse Drug Reaction Probability Scale score was 6, suggesting a probable adverse reaction to sulfasalazine.[11]

Before admission, the patient had been taking ibuprofen as needed, but upon discharge she was advised to avoid NSAIDs. NSAIDs are the most frequent cause of drug-induced aseptic meningitis.[2] Ibuprofen is the medication most commonly implicated, followed by diclofenac, naproxen, and sulindac.[2,3] In a review of 72 cases of NSAID-induced aseptic meningitis, 62% of the cases involved females with a mean age of 39 years (standard deviation 15).[3] Symptoms occurred within 30 minutes to 4 months (median 8 hours) of exposure.[3] Risk factors for NSAID-induced aseptic meningitis in the case presented here include the patient's sex, age, and history of juvenile idiopathic arthritis; upon discharge, she was therefore advised to use acetaminophen rather than NSAIDs.

Two mechanisms are thought to be involved in drug-induced aseptic meningitis. The first, related to direct toxicity of the drug, may involve circulating immune complex depositions in, or direct chemical irritation of, the meninges.[2,4] The intrathecal route of administration increases the risk of meningitis, depending on the concentration of the drug, the molecular size, and the drug's

TABLE 2 (Part 1 of 2). Summary of Case Reports of Sulfasalazine-Induced Aseptic Meningitis

Ref	Age (yr)/ Sex	Autoimmune Disease	Sulfasalazine		Concomitant Medications	Symptoms	Diagnostic Imaging	CSF Analysis	Investigations	Outcome	Rechallenge
			Dosage	Duration							
5	34/F	Ankylosing spondylitis	2000 mg PO daily	14 days	NR	Fever, headache, vomiting, neck stiffness	CT head (normal)	WBC 102 × 10^6/L[a] Glucose 3.1 mmol/L[b] Protein 0.77 g/L	CSF bacterial cultures (–) CSF fungal cultures (–) Enterovirus (–) Herpes simplex virus (–) Cytomegalovirus (–) Epstein-Barr virus (–) HIV (–) *Treponema pallidum* (–) *Brucella* (–) *Coxiella burnetii* (–) Antinuclear antibodies (–)	Symptoms resolved within 2 days after discontinuation of sulfasalazine	Yes
6	37/F	Sjogren syndrome	1000 mg PO daily	21 days	Thyroxine	Fever, headache, nausea, vomiting, pain in knees and legs, photophobia, neck stiffness, rash	Chest radiography (–)	WBC 640 × 10^6/L[c] Glucose 3 mmol/L[d] Protein not done	CSF bacterial culture (–) Bone scan (–) Viral titers (–) Blood culture (–) Urine culture (–) Antistreptolysin titer (–) Latex fixation (–) ESR 36 mm/h	2 weeks chloramphenicol, benzyl penicillin, flucloxacillin for provisional diagnosis of bacterial meningitis[e]; symptoms resolved	Yes
7	49/F	Undifferentiated spondyloarthritis	1000 mg PO bid	60 days	NR	Fever, nausea, vomiting	NR	NR	NR	Provisional diagnosis viral gastroenteritis; symptoms resolved[f]; discharged from hospital	Yes
8	56/F	Unclassified oligoarthritis	NR	14 days	NR	Fever, headache, mild meningeal syndrome	CT head (normal)	WBC 160 × 10^6/L[c] Glucose NR Protein NR	CSF bacterial culture (–) Blood culture (–) *Mycobacterium* (–) Leptospirosis (–) *Trophyrema whipplei* (–) Lyme disease (–) Enterovirus (–) Herpes virus (–) Rheumatoid factor (–) Anti-cyclic citrullinated protein antibodies (–) Antinuclear antibodies (–) Anti–double-stranded DNA (–) Antineutrophil cytoplasmic antibodies (–)	Initially treated with ceftriaxone and amoxicillin[e]; symptoms resolved 8 days after sulfasalazine discontinuation	No

TABLE 2 (Part 2 of 2). Summary of Case Reports of Sulfasalazine-Induced Aseptic Meningitis

Ref	Age (yr)/ Sex	Autoimmune Disease	Sulfasalazine		Concomitant Medications	Symptoms	Diagnostic Imaging	CSF Analysis	Investigations	Outcome	Rechallenge
			Dosage	Duration							
8	60/NR	Rheumatoid arthritis	NR	A few months	NR	Fever, headache, nausea, photophobia	CT head (normal)	WBC 2 × 10^6/L Glucose NR Protein NR	NR	Symptoms resolved 2 days after sulfasalazine discontinuation	No
9	74/F	Rheumatoid arthritis	1500 mg PO daily	23 days	Verapamil, prednisone, unspecified anticoagulant	Fever, headache, vomiting, stiff neck	NR	WBC 1 × 10^6/L Glucose NR Protein 0.45 g/L	CSF culture (–) C-reactive protein 64 mg/L	Symptoms resolved 2 days after sulfasalazine discontinuation	No
10	41/M	Rheumatoid arthritis	500 mg PO bid	12 days	Prednisone, unspecified anticoagulant	Fever, headache, photophobia	CT head (normal)	WBC 12 × 10^6/L[a] Glucose 3.3 mmol/L[g] Protein 0.50 g/L	CSF bacterial culture (–) Cryptococcal antigen (–) India ink stain (–)	Total resolution of symptoms by middle of following day	Yes

CSF = cerebrospinal fluid, CT = computed tomography, ESR = erythrocyte sedimentation rate, NR = not reported, PO = by mouth, WBC = white blood cells, (–) = negative result.
[a]Predominantly lymphocytes.
[b]Serum glucose 10.4 mmol/L.
[c]Predominantly neutrophils.
[d]Serum glucose 8.3 mmol/L.
[e]Dose, route, frequency, and duration not reported.
[f]Exact number of days to resolution of symptoms not reported.
[g]Serum glucose 6.2 mmol/L.

TABLE 3. Summary of Sulfasalazine Rechallenge

Ref	Age (yr)/ Sex	Autoimmune Disease	Sulfasalazine Dose[a]	Symptoms	Imaging	CSF Analysis	Investigations	Outcome
5	34/F	Ankylosing spondylitis	2000 mg (single dose)	Fever, headache	NR	NR	NR	Symptoms resolved within 24 hours
6	37/F	Sjogren syndrome	500 mg PO (single dose)	Fever, headache, photophobia, rash (including macular rash on trunk), severe joint pain, neck rigidity	CT head (normal)	WBC 250 × 10^6/L[b] Glucose 3.6 mmol/L[c] Protein 3.9 g/L	CSF culture (–) Antistaphylolysin (–) Nuclease titers (–) Chest radiography (–) CT head (–) DNA binding antibodies (–) Antinuclear antibodies (–) Anticardiolipin IgG, IgM (–)	Antibiotics for 48 h[d]; reaction due to sulfasalazine; hydrocortisone 200 mg IV q6h for 24 h, with marked clinical improvement within 24 h; stepped down to prednisolone 15 mg PO daily
7	49/F	Undifferentiated spondyloarthritis	500 mg PO (single dose)	Fever, headache, neck stiffness, photophobia, phonophobia, generalized myalgia	CT head (normal)	WBC 18 × 10^6/L[e] Glucose normal Protein normal	ESR 70 mm/h C-reactive protein 52 mg/L Septic workup (–) Herpes simplex (–)	Received ceftriaxone and acyclovir[f]; rash, mild transaminitis, facial and nuchal edema developed after 48 h; hydrocortisone 100 mg IV q8h given, with rapid resolution of headache, facial edema, and mild transaminitis; stepped down to prednisolone 30 mg PO daily after 3 days, then tapered off
10	41/M	Rheumatoid arthritis	NR (single dose)	Fever, headache	NR	NR	NR	Time to resolution of symptoms NR

CSF = cerebrospinal fluid, CT = computed tomography, ESR = erythrocyte sedimentation rate, IgG = immunoglobulin G, IgM = immunoglobulin M, NR = not reported, PO = by mouth, WBC = white blood cells.
[a]Concomitant medications not reported for rechallenge.
[b]Predominantly neutrophils.
[c]Serum glucose 9.1 mmol/L.
[d]Name, route, frequency not reported.
[e]Predominantly lymphocytes.
[f]Dose and frequency not reported.

ability to cross lipid brain barriers.[2] The second mechanism involves an immunological hypersensitivity that may be further subdivided into type I to IV hypersensitivity reactions.[2,4] Type III and IV hypersensitivity reactions are the more likely mechanisms involved in drug-induced meningitis.[2] In such reactions, antibodies combine to form complexes with the drug or its metabolite; these complexes activate complement (type III) or allow T cells reactive to the drug to be recruited to a site of inflammation (type IV).[2] The exact mechanism by which sulfasalazine causes aseptic meningitis is unknown.

CONCLUSION

In the case reported here, the clinical syndrome and its close temporal relationship with sulfasalazine initiation and discontinuation are similar to other reported cases of sulfasalazine-induced aseptic meningitis. Infectious and rheumatic causes were satisfactorily excluded. Clinicians should consider a diagnosis of sulfasalazine-induced aseptic meningitis if other potential causes have been ruled out.

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Correction to "Amisulpride Augmentation of Clozapine in Clozapine-Resistant Schizophrenia: A Case Series"

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In the byline of this article, the fourth author's name was presented incorrectly. More specifically, the surname was misspelled and the middle initial was missing. The name should read "Randall F White". The article itself has been corrected (see https://doi.org/10.4212/cjhp.3178).

Using Evidence to Inform Advocacy and Training Priorities

Sean P Spina

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After more than two years of virtual meetings of the Board, Executive Committee, and general membership of the Canadian Society of Hospital Pharmacists (CSHP), the Board got to meet in person in June 2022 in Vancouver. That gathering wasn't just my first in-person meeting as a CSHP Presidential Officer—it was my first in-person Board meeting ever! The synergy, creativity, and productivity were tangible as Board members from coast to coast weighed in on the substantial issues before us, bringing their regional perspectives to bear. During the pandemic we made incredible progress on our strategic plan using various communication technologies, but the experience of meeting in person after so many virtual meetings told me we need that in-person connection to craft new possibilities for our Society in the next strategic plan.

The COVID-19 crisis highlighted some of the things we need to consider in our strategic planning process. As wave after wave of the global pandemic rolled across Canada, pharmacists and regulated pharmacy technicians were performing essential duties: caring for critically ill patients in the face of workplace uncertainties, ensuring that medication shortages were managed appropriately, and persevering through ongoing staff shortages, all while dealing with their own personal and family responsibilities.

In healthcare delivery, we know that data support both the identification and the resolution of issues. In particular, the CSHP Board recognizes that to effect the changes in policy and funding needed to enable pharmacists to fulfil the essential duties brought to the forefront by COVID-19, we must collect meaningful data on the impact that pharmacy professionals have on patient care. In other words, to be successful, our advocacy efforts must be underpinned by evidence of pharmacy's contribution to Canadian healthcare systems. The 2020/21 *CSHP Hospital Pharmacy in Canada Report,* to be released this Fall, offers a wealth of information that can be used to make the case for pharmacy priorities in hospitals across the country.

One area flagged by the report is the ongoing shortage of highly skilled hospital pharmacists and regulated pharmacy technicians in Canada. We know this issue will form part of our next strategic plan. As such, we've taken early steps to develop the Hospital Pharmacy 101 program. It's designed to allow pharmacists to undertake enhanced, focused training earlier in their hospital-based clinical pharmacy journey as one way to alleviate the staffing crisis as the pandemic rages on. Launched in early Fall 2022, this program is designed for pharmacists seeking knowledge of fundamental hospital pharmacy topics and will be suitable for those just entering hospital practice as well as those with more experience who are looking for a refresher. It's also intended for pharmacy departments seeking training for their staff.

I am very proud of the work that hospital pharmacy teams have played in caring for patients in Canadian healthcare delivery systems. As we navigate year three of the pandemic, CSHP will continue to use data to advocate for our members and to support additional training to alleviate the staffing crisis facing our professions. I am excited about the future of our professions and feel privileged to represent CSHP members.

Sean P Spina, BSc(Pharm), ACPR, PharmD, FCSHP, is President Elect of the Canadian Society of Hospital Pharmacists.

Les données probantes au service de la défense des intérêts et des priorités en matière de formation

Sean P. Spina

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Après plus de deux ans de réunions virtuelles du conseil d'administration, du comité exécutif et de l'ensemble des membres de la Société canadienne des pharmaciens d'hôpitaux (SCPH), le conseil s'est réuni en personne en juin 2022 à Vancouver. Cet événement était non seulement ma première réunion en personne en tant que président désigné de la SCPH, mais également ma toute première réunion du conseil d'administration en personne! La synergie, la créativité et la productivité étaient palpables tandis que les membres du Conseil d'un océan à l'autre, forts de leurs points de vue régionaux, se penchaient sur les enjeux importants qui se profilent à l'horizon. Pendant la pandémie, notre plan stratégique a fait d'incroyables progrès, et cela grâce aux diverses technologies de communication. Se retrouver en personne après tant de réunions virtuelles m'a pourtant fait comprendre que nous avions besoin de cette relation en personne pour créer de nouvelles occasions pour notre Société pour le prochain plan stratégique.

La crise de la COVID-19 a mis en évidence certaines des choses dont nous devons tenir compte dans notre processus de planification stratégique. Alors que les différentes vagues de la pandémie mondiale déferlaient sur le Canada, les pharmaciens et les techniciens en pharmacie autorisés accomplissaient des tâches essentielles : prendre soin des patients gravement malades dans un contexte d'incertitudes pesant sur le milieu de travail, s'assurer que les pénuries de médicaments soient gérées de manière appropriée et persévérer malgré les pénuries constantes de personnel, tout en s'acquittant de leurs responsabilités personnelles et familiales.

Dans la prestation des soins de santé, nous savons que les données soutiennent à la fois l'identification des problèmes et leur résolution. En particulier, le conseil de la SCPH reconnaît que pour mener à bien les changements nécessaires en matière de politique et de financement pour que les pharmaciens puissent remplir leurs fonctions essentielles, que la COVID-19 a ramenées au premier plan, nous devons recueillir des données pertinentes portant sur l'incidence des professionnels de la pharmacie sur les soins aux patients. En d'autres termes, pour réussir, nos efforts de défense des intérêts doivent être étayés par des données probantes relatives à la contribution de la pharmacie aux systèmes de santé canadiens. Le *Rapport sur les pharmacies hospitalières canadiennes 2020-2021,* qui sera publié cet automne, nous offre une mine d'informations qui peuvent être utilisées pour justifier les priorités des pharmacies dans les hôpitaux de tout le pays.

Le rapport souligne la pénurie continue de pharmaciens hospitaliers hautement qualifiés et de techniciens en pharmacie autorisés au Canada. Nous savons que cette question fera partie de notre prochain plan stratégique. À ce titre, nous avons pris les premières mesures pour développer le programme Hospital Pharmacy 101. Conçu pour que les pharmaciens puissent entreprendre une formation améliorée ciblée plus tôt dans leur parcours de pharmacie clinique en milieu hospitalier, il constitue une manière d'atténuer la crise du personnel alors que la pandémie fait rage. Ce programme, lancé à l'automne 2022, est conçu pour les pharmaciens qui cherchent à acquérir des connaissances sur les sujets fondamentaux de la pharmacie hospitalière et conviendra autant à ceux qui entament leur pratique hospitalière qu'à ceux qui ont plus d'expérience et qui cherchent à se remettre à niveau. Il s'adresse enfin aux services de pharmacie qui souhaitent former leur personnel.

Je suis très fier du travail que les équipes de pharmacie hospitalière ont accompli pour prendre soin des patients dans les systèmes de prestation de soins de santé canadiens. Alors que nous sommes dans la troisième année de la pandémie, la SCPH continuera de mettre les données au service de la défense de ses membres et soutenir les formations additionnelles afin d'atténuer la crise de dotation en personnel à laquelle sont confrontées nos professions. L'avenir de nos professions est une source d'enthousiasme et je me sens privilégié de représenter les membres de la SCPH.

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