Evaluation of a microlearning module on hypertension for Canadian healthcare professionals.

Khrystine Waked, BSc, PharmD[a,b]

Jeff Nagge, BScPharm, PharmD[a,b]

Kelly Grindrod, BScPharm, PharmD, MSc[a]

   a. School of Pharmacy, University of Waterloo, Kitchener, Ontario, Canada
   b. The Centre for Family Medicine Family Health Team, Kitchener, Ontario, Canada

Corresponding Author:

Khrystine Waked
School of Pharmacy, University of Waterloo,
200 University Avenue West, Waterloo ON N2L 3G4
E-mail: kwaked@edu.uwaterloo.ca.

Introduction

With the increasing needs of the patient population, the role of the pharmacist in Canada is evolving.[1] With focus on expanded scope of practice and patient care, lifelong learning is a necessity for pharmacy professionals.[1] New professional development opportunities and creative learning approaches are therefore needed to meet the demands of the new roles being created for pharmacy professionals.[1] Further, university-based continuing education programs may be highly sought after as they provide a unique outlook to learners; one that combines evidence, research, and clinical knowledge.[1]

Pharmacy5in5 is an online microlearning platform for healthcare professionals across Canada, created by pharmacists at the University of Waterloo School of Pharmacy.[2] It was created to promote the continual development of healthcare professionals by assessing their knowledge and providing them with resources for further learning.[3] With various clinical topics, users have free access to both self-assessment quizzes as well as clinical support tools to help address the evolving learning needs of healthcare providers.[3]

Recently, Canadian studies have demonstrated the impact of pharmacists working to their full potential.[4,5] Specifically, clinical trials have reported reductions in blood pressure when pharmacists were involved in the management of hypertension.[4] The Pharmacy 5in5 hypertension module was thus developed to help engage pharmacists in managing hypertension in a primary care setting. The goal of the project is to use a microlearning platform to evaluate pharmacists' knowledge and behaviour related to hypertension.

Methods

The hypertension module consists of the following components: five fast facts, six case-based quizzes, five flash cards, two infographics, and a short video.

Creating the module

We reviewed a combination of Canadian and American hypertension guidelines, landmark trials, tertiary drug resources, and clinical expertise to ensure the module content was evidence-based, accurate and up to date. With the information collected, the hypertension module was created with a goal of assessing knowledge and educating the users of the platform through the fast facts and case-based quizzes. To guide these assessments, and to also provide users with a focused learning experience, learning objectives were developed for the module (Figure 1).

Learning Objectives

By the end of this module, you should be able to:

1. Individualize blood pressure goals according to patient specific factors
2. Choose a first line antihypertensive drug
3. Educate a patient about home blood pressure monitoring (HBPM)
4. Develop a monitoring plan for a patient taking an antihypertensive drug
5. Identify appropriate antihypertensive therapy for a patient not meeting their blood pressure goals

Figure 1. Pharmacy5in5 hypertension module learning objectives.

Fast Facts quiz

The Fast Facts quiz was designed to quickly assess the user's baseline knowledge of hypertension. The quiz consists of 5 true or false questions that assess general hypertension knowledge, with the topic of each question relating back to one of the five learning objectives of the module. Feedback was also created for this quiz to provide the user with clinical information (i.e. link to guidelines, resources) or evidence supporting the correct answer. Whether correct or not, the user is provided with immediate feedback once the answer is submitted.

Case-based quizzes

The case-based quizzes provided users with questions mimicking practice, allowing them to make clinical decisions. The hypertension module contains six case-based quizzes, each quiz

set composed of 5 questions. Additionally, each quiz set can be related back to one of the five hypertension module learning objectives. The sixth case-based quiz set differs slightly as it encompasses all the learning objectives for the module. Thus, the questions were developed to be more clinically complex. At the end of each case-based quiz, the users are asked to complete one or two reflection questions on how they manage hypertension in practice. These questions were specific to the topic being assessed in that quiz and were designed to identify current behaviours seen in primary care.

Feedback created for the case-based quiz sets was similar to that of the Fast Facts quiz, however the timing was delayed. This meant that the feedback was only provided to the user once the entire quiz set was completed, including the reflection question.

Developing educational materials

To accompany the module quizzes, educational materials were also developed. These included flash cards (one for each learning objective), a short video highlighting five things healthcare practitioners should know about hypertension, a patient-friendly infographic on home blood pressure monitoring, and a healthcare practitioner infographic on managing hypertension.

The Managing Hypertension infographic was designed as a clinical support tool to assist healthcare practitioners in managing hypertension in a primary care setting. The five topics chosen to be represented in the infographic were: (1) When to start a drug and what to aim for?; (2) What drug to start first?; (3) When to add another drug?; (4) Measuring blood pressure in clinic; (5) Special situations.

The Pharmacy5in5 modules generally have one accompanying infographic for healthcare providers. For the hypertension module, we identified a need for a simple tool to assist patients

in accurately measuring blood pressure at home. Because of this, the authors developed a second infographic outlining the process of measuring blood pressure at home.

Collecting and analyzing the data

Registered users to the Pharmacy5in5 platform were able to access the hypertension module as of April 27th, 2019. De-identified data was collected on the users' inputted professional demographic information (e.g., job title, province of practice), quiz performance, and reflection questions.

The data was processed in several stages by consulting statisticians from the University of Waterloo. Of note, duplicate entries (i.e. quiz results from the same user) and beta-tester data were identified and removed. Further, entries related to reflection questions were stored separately when analyzing users' performance.

User performance was analyzed with a binomial regression model. The binomial regression model was used in order to determine if there was a relationship between users' demographic information and performance. In order to do this, a reverse stepwise analysis was completed to identify demographic information that had a significant relation with users' performance.

Results

Overall, 600 users accessed the Pharmacy5in5 platform between April 27 and June 20, 2019, of which 485 (81%) were from Ontario (table 1). Of the 600 users who accessed the module, 322 (54%) completed the entire module and 588 (98%) completed at least one quiz in the module. The overall hypertension module user performance average was 77.4% (SD 22%).

Table 1. Pharmacy5in5 hypertension module user demographic information.

Demographic Information	n (range or %)
Year started practicing	2003 (1969-2019)
Gender	
Female	419 (70%)
Location of training	
Canada	412 (69%)
Outside of Canada	155 (26%)
Both	32 (5%)
Job title	
Licensed pharmacist	435 (72%)
Unlicensed pharmacist	47 (8%)
Pharmacy student	78 (13%)
Pharmacy technician	16 (3%)
Pharmacy technician student	17 (3%)
Other	6 (1%)
Type of pharmacy practice	
Independent pharmacy	151 (25%)
Small chain or banner pharmacy	86 (14%)
Large chain pharmacy	191 (32%)
Hospital	73 (12%)
University	12 (2%)
Primary care	15 (2%)
Long term care	15 (2%)
Other	56 (9%)
Province of practice	
Alberta	55 (9%)
British Columbia	13 (2%)
Saskatchewan	10 (2%)
Manitoba	5 (1%)
Ontario	485 (81%)
Quebec	5 (1%)
Newfoundland	3
Nova Scotia	9 (2%)
New Brunswick	3
Prince Edward Island	2
Yukon	2

Case-based quiz performances

When evaluating first-attempt performance, the quiz resulting in the highest average

focused on proper techniques for home blood pressure monitoring (mean score of 87%; SD

17%), while the quiz resulting in the lowest average focused on choosing first-line medication therapy (mean score of 59%; SD 22%) (Table 2).

Table 2. Average score achieved per case-based quiz on first attempt.

Quiz	Median (Range)	Mean (SD)
Fast Facts	80% (20%–100%)	85% (16%)
Josh Chooses Meds	60% (0%–100%)	59% (22%)
Nadia Puts it Together	60% (20%–100%)	67% (21%)
Nancy & Home Monitoring	100% (0%–100%)	87% (17%)
Pradeep Follows-up	80% (20%–100%)	77% (19%)
Quan Optimizes Therapy	80% (0%–100%)	82% (21%)
Sasha & BP goals	80% (0%–100%)	72% (21%)

User demographics and module performance

Overall, licensed pharmacists performed significantly better than other registered users, such as pharmacy students ($\beta = -0.56$, t (3362) $= -2.15$, p $= 0.03$), pharmacy technicians ($\beta = -1.27$, t(3362) $= -4.7$, p < 0.001) , pharmacy technician students ($\beta = -1.44$, t(3362) $= -5.11$, p < 0.001), unlicensed pharmacists ($\beta = 0.03$, t(3362) $= 0.3$, p $= 0.76$) and those with other titles ($\beta = 1.2$, t(3362) $= 3.36$, p < 0.001). Also, users who received their healthcare training in Canada performed better than those who received their training outside of Canada ($\beta = -0.29$, t(3362) $= -5.56$, p < 0.001). Further, while users who work in hospital performed slightly better than those working at independent pharmacies ($\beta = 0.01$, t(3362) $= 3.21$, p $= 0.001$), and long term care ($\beta = 0.45$, t(3362) $= 2.97$, p $= 0.003$), the difference in performance is small.

Self-reported current behaviours

When asked to reflect on the last three months, 69% of users reported counseling a patient on home blood pressure monitoring and 62% had educated patients on their blood pressure targets, but only 18% had contacted a prescriber (or used their full scope of practice) to optimize pharmacotherapy (Table 3).

Table 3. Percent of pharmacist users responding "yes" to reflections questions at the end of each case-based quiz.

Reflection Questions	Yes (%)	
In the last 3 months, have you educated a patient about their specific BP goals according to their risk factor(s) (e.g., 130/80 for those with diabetes)?	62%	
In the last 3 months, have you educated a patient about the proper technique for measuring BP at home?	69%	
In the last 3 months, have you been able to access lab values related to BP drugs (e.g., serum creatinine, potassium, sodium)?	32%	
In the last 3 months, have you scheduled a follow-up with a patient within 4 weeks of a new or different BP therapy?	30%	
In the last 3 months, have you modified a patient's BP therapy using the full pharmacist's scope of practice in your province?	18%	
How do you feel about your ability to adjust BP therapy using your full scope of practice?*	HC 12% MC 42%	SC 30% NC 17%

*HC = highly confident; MC = moderately confident; SC = slightly confident; NC = not confident.

Discussion

Overall, the performance of the hypertension module was good, with the average being similar to that of other Pharmacy5in5 modules. Demographic factors associated with a higher overall module performance included being a licensed pharmacist, having been trained in Canada, and working in a hospital setting. While the majority of users were licensed pharmacists, the quiz resulting in the lowest average focused on choosing medications suggesting a possible area for further learning.

Based on the quiz results and reflection questions, pharmacy professionals appear to be more comfortable counselling a patient on home blood pressure monitoring and educating patients on their blood pressure targets as compared to optimizing pharmacotherapy and following up with patients. Lack of confidence may be a reason pharmacists are not proactively managing hypertension as most users described themselves as only slightly to moderately confident with regards to adjusting blood pressure medications.

Pharmacists are in a prime position to manage hypertension through intervention.[4] It has been shown that when pharmacists proactively manage hypertension (i.e. counseling, optimizing therapy), there is a resulting reduction in blood pressure.[6] Additionally, recent evidence has

demonstrated the cost-effectiveness of pharmacists who prescribe, educate and counsel hypertension patients. The reason behind its cost-effectiveness is the low cost of implementation versus the cost of treating cardiovascular disease.[4] Thus, pharmacists managing hypertension would not only help reduce uncontrolled hypertension, but it would also be cost-effective to the already burdened Canadian healthcare system.

Although evidence supports pharmacist interventions in managing hypertension, lack of confidence may be a barrier to implementation, as reflected in the responses from the hypertension module reflection questions. Qualitative research and anecdotal evidence has shown that pharmacists lack confidence and tend to avoid new responsibilities, both significant barriers to the expanding role of the pharmacist.[7] The management of hypertension by pharmacists would require making decisions and accepting clinical responsibility for those decisions. Confidence can be increased as pharmacists become more comfortable making clinical decision, through continuing education and development.[7,8]

Continuing education is a staple in health professions and is mandated by many regulatory bodies, including the Ontario College of Pharmacists.[9] It is expected that healthcare professionals maintain the skills and knowledge necessary to practice through professional development activities.[9] Further, curriculum-based continuing education activities increased pharmacists' knowledge and skills.[10]

Recently, a scoping review demonstrated that microlearning, a form of interactive continuing education, has been demonstrated to increase both knowledge and confidence of health professionals.[8] Further, well-designed microlearning modules with clear learning objectives have been shown to improve clinical performance.[8]

Microlearning has been an emerging trend in health professionals' education due to the characteristic breakdown of the material into smaller, more easily processed portions.[8] The method of delivery (e.g., online, apps) puts the participant in control of the timing and place of learning, and promotes self-determined learning.[8] To maximize the potential of microlearning, it is important that the material be focused and interconnected.[8] Making connections is what contributes to participants building their clinical reasoning and critical thinking skills; both very important for healthcare professionals.[8]

The Pharmacy 5in5 hypertension module was developed to help engage pharmacists in managing hypertension in a primary care setting. Being a microlearning platform, uptake of the module was large over a short period of time. With the data collected from the module, we have determined that despite a good overall performance, there may still be barriers preventing pharmacists' intervention in managing hypertension despite increasing evidence for benefit. Continuing education and development may play a role in overcoming these barriers. Therefore, the completion of the hypertension module may assist in identifying areas for further development in order for pharmacy professionals to become more confident and practice to their full potential.

Limitations

While our study does have many strengths, there are some limitations. The hypertension module assesses the user's knowledge and not their behaviour in a practice setting. To compensate for this, reflection questions were developed to collect information on current behaviour. The limitation being that this is self-reported behaviour and not necessarily what is happening in primary care settings. Despite the benefits of continuing education, it is unclear whether the attaining of further knowledge translates to a change in clinical behaviours.[10] Our

module does not currently have a method to evaluate the change in behaviour as a result of completing this module, representing an area for future module development.

Conclusion

The Pharmacy5in5 hypertension module is an engaging method of continuing education which can be used to rapidly reach many healthcare professionals in a short time. However, more education is needed to support pharmacists in working with prescribers to proactively optimize hypertension therapy.

References

1. T, Schindel, et al. University-Based Continuing Education for Pharmacists. *Am. J. Pharm. Educ.* 2012;76(2):20. doi: 10.5688/ajpe76220.
2. Pharmacy5in5 Resources. University of Waterloo. https://uwaterloo.ca/pharmacy/pharmacy5in5-resources. Accessed July 2019.
3. Pharmacy5in5: Developing New Topics to Self-Assess and Improve Your Knowledge. Pharmacy Connection. https://pharmacyconnection.ca/pharmacy5in5-spring-2019/. Published June 18, 2019. Accessed July 2019.
4. Marra C, Johnston K, Santschi V, Tsuyuki RT. Cost-effectiveness of pharmacist care for managing hypertension in Canada. *Can. Pharm. J (Ott).* 2017;150(3):184-197. doi: 10.1177/1715163517701109.
5. Tsuyuki RT, Houle SK, Charrois TL, Kolber MR, Rosenthal M, Lewanczuk R, Campbell N, Cooney D, McAlister FA. Randomized Trial of the Effect of Pharmacist Prescribing on Improving Blood Pressure in the Community: The Alberta Clinical Trial in Optimizing Hypertension (RxACTION). *Circulation.* 2015;132(2):93-100. doi: 10.1161/CIRCULATIONAHA.115.015464.
6. Santschi V, Tsuyuki RT, Paradis G. Evidence for pharmacist care in the management of hypertension. *Can Pharm J (Ott).* 2015;148(1):13-16. doi: 10.1177/1715163514560564.
7. Frankel GEC, Austin Z. Responsibility and confidence: Identifying barriers to advanced pharmacy practice. *Can Pharm J (Ott).* 2013;146(3):155-161. doi: 10.1177/1715163513487309.
8. De Gagne JC, Park HK, Hall K, Woodward A, Yamane S, Kim SS. Microlearning in Health Professions Education: Scoping Review. *JMIR Med Educ.* 2019;5(2):e13997. doi: 10.2196/13997.
9. Continuing Education. Ontario College of Pharmacists. https://www.ocpinfo.com/practice-education/continuing-education/. Accessed August 2019.
10. Fjortoft NF, Schwartz AH. Evaluation of a Pharmacy Continuing Education Program: Long-Term Learning Outcomes and Changes in Practice Behaviors. *Am. J. Pharm. Educ.* 2003;67(2). https://doi.org/10.5688/aj670235.