

Original Research

Exploring Canadian pharmacy students' e-health literacy: a mixed method study

Jamie Y. PARK , Jason MIN 

Received (first version): 21-Nov-2019

Accepted: 8-Mar-2020

Published online: 16-Mar-2020

Abstract

Background: While much has been described about technology use by digital natives in general, understanding of pharmacy student's knowledge and understanding of technology is lacking.

Objective: This study explores the current state of pharmacy students' self-rated digital health literacy in British Columbia, Canada, and seeks to identify future opportunities for technology training in pharmacy education and in practice.

Methods: A mixed methods design using surveys and semi-structured interviews was conducted. An online, validated survey (eHEALS) was conducted among currently enrolled 2nd to 4th year pharmacy students at the University of British Columbia. An additional interview was offered to consenting participants to further explore the use of technology in daily lives, pharmacy practicums, and implications on future pharmacy curricula. Both quantitative and qualitative thematic analysis was done of all data.

Results: A total of 30 pharmacy students completed the eHEALS survey and 5 completed interviews. Most participants were 2nd year students (50%), were 25 years and younger (80%), and female (87%). Ranking of digital health literacy was lower than expected with participants stating they know what (87%), where (87%) and how to find (77%) health resources on the Internet. Even less students (77%) rated that they have the skills to evaluate the health resources that they find on the Internet and only 53% felt confident in using information from the Internet to make health decisions. Most students mentioned that they had limited technology related training at school and would like more training opportunities throughout their program and connect what they have learned at school to their practice.

Conclusions: These results expose significant and surprising gaps in student understanding of technology despite modifications seen in the entry-to-practice PharmD curriculum. Regional differences and digital health literacy of practicing pharmacists are areas that require better understanding and hold significant impact as practice evolves.

Keywords

Students, Pharmacy; Education, Pharmacy; Therapy, Computer-Assisted; Internet; Health Literacy; Telemedicine; Curriculum; Pharmacists; Surveys and Questionnaires; Qualitative Research; Canada

INTRODUCTION

Technology and health informatics are key enablers of pharmacy education and practice. For example, in Canada, the majority of pharmacists have incorporated digital health into their practice, noting increasing productivity, quality-of-care benefits and ensuring patient and medication safety with the assistance of technology.¹⁻⁴ In community pharmacy settings, the majority of pharmacists use pharmacy management programs to aid with dispensing medications and for administrative tasks.⁵ As pharmacy practices continue to evolve, there are increasing demands and expectations to use technologies such as Electronic Health Records, telehealth services, and web-based monitoring systems to support the provision of effective medication management.⁶ In response, pharmacy education programs are continuously evolving to develop and incorporate health informatics content to meet these demands, including in Canada and the United States.⁷⁻⁹ For schools that currently do not offer health informatics content, the students recognize the importance of eHealth in their pharmaceutical studies and are actively advocating for its implementation in their curriculum.¹⁰

Despite these expectations for using technology in practice and the curricular growth in pharmacy education, there is a lack of understanding of the students' knowledge and understanding of technology as it relates to their practice readiness. For the purpose of this study, we defined eHealth literacy as "the degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions".¹¹ Studies have previously examined health care staff/students' eHealth literacy related training experiences and their preparedness to adopt new technology.¹²⁻¹⁴ Specific to pharmacy, Maclure *et al.* (2018) conducted a mixed methods study to examine pharmacy staff members (e.g. pharmacists, pharmacy graduates, pharmacy assistants)' self-reported levels of eHealth literacy in Scotland.¹² Staff members reported that although the use of technology is essential in their everyday practice, they do not recall receiving information technology training as part of their pharmacy education. They expressed low confidence in their use of technology and low self-reported eHealth literacy.

To our knowledge, there have been no studies exploring the eHealth literacy of pharmacy students in Canada.

The objectives of this study are to explore the current state of pharmacy students' self-rated eHealth literacy in British Columbia, Canada.

Jamie Y. E. PARK. Faculty of Pharmaceutical Sciences, University of British Columbia. Vancouver, BC, (Canada).
jamie.park@alumni.ubc.ca

Jason MIN. BSc(Pharm), RPh. Faculty of Pharmaceutical Sciences, University of British Columbia. Vancouver, BC, (Canada).
jason.min@ubc.ca

METHODS

Study design

A mixed methods design using surveys and semi-structured interviews was conducted in January 2019 at the University of British Columbia (UBC). Currently enrolled 2nd, 3rd and 4th year UBC Entry-to-Practice Doctor of pharmacy students who have previously taken at least one practicum course were eligible to participate in the study.

An email was sent by Student Services to eligible participants and students had more than 24 hours to review the invitation and participate in an online, anonymous survey containing the eHealth Literacy Scale (eHEALS).¹⁵ We selected eHEALS because it is a widely used, validated survey that consists of 8 questions on a 5-point Likert scale (1=strongly disagree, 5=strongly agree) and has been administered in different languages and different programs.¹⁵⁻¹⁸ The survey aims to measure the participants' skills at finding, using, evaluating and applying health information found online.

Upon completion of the survey, students were invited to further participate in a semi-structured interview exploring more detailed questions regarding their use of technology in their daily lives, course practicums, and possible improvements that could be made in future curricula. The interview was created based on a previous mixed methods study exploring eHealth literacy experiences of pharmacy staff in Scotland and through consulting an expert in the field.¹² Students were given the opportunity to win a raffle draw for a coffee gift card. Every participant, even those that withdrew from the project, were permitted to enter the draw. We completed 5 interviews based on the students' availability and willingness to participate. The interviews were conducted either by phone or in-person, and was audio recorded for accuracy. Consent was obtained verbally at the start of each interview and was recorded as part of the audio recording. The interviews were conducted in a secure, confidential area in the Faculty of Pharmaceutical Sciences building at UBC. After the interview, the participants were given an opportunity to review their transcript and provide feedback if necessary.

Data analysis

Afterwards, we engaged in both quantitative analyses of data and qualitative thematic analysis which was created with the consensus of the two authors. For the quantitative analysis, descriptive statistics were used to analyze the eHEALS scores using Microsoft Excel. Throughout the thematic analysis process, a constant comparative method

was utilized, which was deemed appropriate based on the nature of the study and the number of interviews we anticipated.

Ethical review

Ethics approval was obtained by the UBC Behavioural Research Ethics Board.

RESULTS

eHEALS survey

A total of 30 pharmacy students completed the eHEALS survey and took on average 3 minutes to complete it. 50% (15/30) of the participants were 2nd year students, 80% (24/30) of the students were 25 years and younger, 87% (26/30) were female. Overall, pharmacy students' self-rated eHealth literacy was high (Table 1), the average total score being 31.07 out of 40. The average score per question ranged from 3.50 to 4.10. When grouping the "Agree" and "Strongly Agree" portion of the eHEALS questionnaire together, most of the students know what (87%, 26/30), where (87%, 26/30) and how to find (77%, 23/30) health resources available on the Internet. Less students (77%, 23/30) rated that they have the skills to evaluate the health resources that they find on the Internet. 53% (16/30) of the students rated that they feel confident in using information from the Internet to make health decisions.

Interview

After the survey, 5 pharmacy students indicated their interest to participate in the interview. Therefore, all 5 interviews were conducted. The average time to complete the interviews was 20 minutes. Three participants were from Year 2 and the remaining two participants were from Year 3 and Year 4. The mean age of the participants was 25. In total, 3 themes were identified: 1) Learning to use technology at the pharmacy; 2) Technology training in pharmacy related course; Future technology training that would be beneficial for students.

When asked how the participants' personal experience was learning these technologies, there were varying responses. 60% (3/5) participants mentioned that their manager or staff member showed them how to use the technologies and they "observe[d], practice[d] and ask[ed] questions" (Participant 5). However, for some participants, they experienced difficulty learning the technologies due to limitation in their role at the pharmacy or due to inadequate training. One participant expressed that "it took me a long time. [...] I wasn't allowed to do the front typing

Table 1. Average eHEALS scores for pharmacy students

	Score Mean (SD)	"Agree" + "Strongly Agree" Responses (%)**
1. I know what health resources are available on the Internet	3.97 (0.61)	26 (87%)
2. I know where to find helpful health resources on the Internet	3.93 (0.78)	26 (87%)
3. I know how to find helpful health resources on the Internet	3.77 (0.85)	23 (77%)
4. I know how to use the Internet to answer my questions about health	4.00 (0.59)	25 (83%)
5. I know how to use the health information I find on the Internet to help me	3.90 (0.61)	25 (83%)
6. I have the skills I need to evaluate the health resources I find on the Internet	3.90 (0.80)	23 (77%)
7. I can tell high quality health resources from low quality health resources on the Internet	4.10 (0.66)	25 (83%)
8. I feel confident in using information from the Internet to make health decisions	3.50 (0.86)	16 (53%)
Total Score	31.07 (4.39)	N/A

* Maximum score: 5; ** Total 30 responses

[...] and so I had to do behind the scenes ordering. For the actual typing part, I learned it recently. I would ask my pharmacists or assistants to help me with it" (Participant 1). Another mentioned that "To be honest, I don't think I learned them very well. For Kroll, I mainly consulted the Kroll manual. The staff showed me little bits of stuff but I wouldn't say I had comprehensive training. I would not feel comfortable using it for work yet" (Participant 4). Another potential reason for lack of training was because students were tasked to complete practicum activities that did not require them to extensively use the technology. One student mentioned that during their practicums "all I was really doing at that the [practicum site] was counseling. So I was only really pulling out information sheets for different drugs. I wasn't really entering too much into the database" (Participant 4).

Unanimously, all participants expressed that there was a brief introduction to technology related training during their first-year laboratory session. Students recalled "We were given a manual and was taught basic functions, things to do on Kroll and gave us a manual that we can refer to in the future if we wanted to learn more about the program. But yeah, that's mostly it" (Participant 3). One other student mentioned that their laboratory sessions "focus on using both online resources, RxTx and using the UBC library system to access various databases to access literature" (Participant 2).

Forty percent (2/5) of the participants mentioned that the students would benefit from learning how to use various pharmacy management systems. It may be a "huge learning curve when [students are] on the spot on practicum and it can be stressful to expect people to have to teach [students] and having to remember it right away" (Participant 1). Another student shared that they "only know a small percentage of [a pharmacy management system] and there's a lot more that I don't know" (Participant 3). One participant shared that the Technology in Healthcare course (PHRM 161) that they took in the first year Entry-to-Practice PharmD program, was "academically interesting" (Participant 3). However, the participant expressed difficulty in "how [students] can implement [what they learned] into [their] practice going forward" and would appreciate "finding some way to connect that to our work as pharmacist" (Participant 3). 40% (2/5) students requested for "more training with various Electronic Medical Record (EMR) systems" (Participant 2). To learn more about EMR systems, one student mentioned that they attended an external educational event.

DISCUSSION

Overall, pharmacy students are aware of the health information available online and have the knowledge of where and how to find them. However, they feel less confident evaluating the health resources that they find on the Internet and using the information found on the Internet to make health decisions. Students received varying methods of technology training based on their practicum/work site and their assigned task at the pharmacy. They expressed that further training on various pharmacy management programs at school and better

connection to what they learn at school to their practice would be desirable.

UBC pharmacy students average eHEALS score, 31.07 out of 40, was higher compared to previous studies conducted on healthcare students.^{19,20} Brown *et al.* (2010) administered the eHEALS survey to 75 Canadian first-year master-level occupational therapy students and the median score was 28.45.²⁰ Similar to UBC pharmacy students, only 44.1% participants did not feel confident in using information from the Internet to make health decisions when grouping the "strongly agree" and the "agree" portion of the questionnaire. Dashiti *et al.* (2017) also administered a Persian translation of the eHEALS survey to 192 Medical and Health Sciences students in Iran with the mean score of 28.21.¹⁹ It is also important to reconsider the eHealth literacy tool that is used for pharmacy students. The eHEALS survey may not comprehensively capture the eHealth literacy specific to pharmacy students due to the survey's focus on the Internet.¹⁶ The complexity of technology that pharmacy students and pharmacists would be considerably more diverse than the use of the Internet when providing care to patients.

Our study findings were consistent with previous findings in that pharmacy students have a desire to familiarize and receive further education on health care informatics.¹² There are currently a limited offering of health care informatics courses available for pharmacy students across Canada.²¹⁻²³ For pharmacy programs that do not offer a course in health informatics, other National resources are available such as the online educational, peer reviewed, open-access resource called Informatics for Pharmacy Students developed by AFPC and Canada Health Infoway.⁷ From our results, students experience difficulty evaluating and applying the information that they found to make health decisions and is an area for improvement.

Limitations

This study was conducted amongst a relatively small sample of UBC pharmacy students, which could be attributed to the timing of study recruitment at the end of the school year. Additionally, at the time of recruitment, students were receiving a large number of program-related emails on exams, upcoming practicums, and projects. One of the possible reasons why our study showed a relatively high eHealth literacy score among students could be because of the existence of PHRM 161 Technology in Healthcare as a core course for first year students focusing on the informatics-related knowledge and skills related to the pharmacy profession.²¹ Students from other institutions without core informatics coursework may score differently on the eHEALS survey.

CONCLUSIONS

Our study suggests areas that may be targeted for future informatics curricula toward pharmacy students to better equip the pharmacy students as a practicing pharmacist. Future research should include exploring and understanding eHealth literacy of pharmacy students across different contexts and eHealth literacy of practicing pharmacists. Additionally, further research to create a more tailored, extensive survey for pharmacy students to capture their eHealth literacy may be necessary.

CONFLICT OF INTEREST

The authors declare no potential conflicts of interest.

FUNDING

None.

References

1. Leung V, Tharmalingam S, Cooper J, Charlebois M. Canadian community pharmacists' use of digital health technologies in practice. *Can Pharm J (Ott)*. 2016;149(1):38-45. <https://doi.org/10.1177/1715163515618679>
2. Bates DW, Gawande AA. Improving safety with information technology. *N Engl J Med*. 2003;348(25):2526-2534. <https://doi.org/10.1056/NEJMsa020847>
3. Kaushal R, Barker KN, Bates DW. How can information technology improve patient safety and reduce medication errors in children's health care? *Arch Pediatr Adolesc Med*. 2001;155(9):1002-1007. <https://doi.org/10.1001/archpedi.155.9.1002>
4. Schneider PJ. The impact of technology on safe medicines use and pharmacy practice in the US. *Front Pharmacol*. 2018;9:1361. <https://doi.org/10.3389/fphar.2018.01361>
5. Gregorio J, Ferreira TL, Cavaco A, da Silva MM, Lovis C, Lapão LV. Community pharmacies and ehealth services: barriers and opportunities for real primary healthcare integration. In: *Proceedings of the 26th IEEE International Symposium on Computer-Based Medical Systems*, 2013.
6. Car J, Tan WS, Huang Z, Sloot P, Franklin BD. eHealth in the future of medications management: personalisation, monitoring and adherence. *BMC Med*. 2017;15(1):73. <https://doi.org/10.1186/s12916-017-0838-0>
7. Association of Faculties of Pharmacy of Canada. Informatics for Pharmacy Students E-resource. Available at: <https://cpsi.ca/informatics-for-pharmacy-students/> (accessed Jul 22, 2019).
8. Hincapie AL, Cutler TW, Fingado AR. Incorporating health information technology and pharmacy informatics in a pharmacy professional didactic curriculum -with a team-based learning approach. *Am J Pharm Educ*. 2016;80(6):107. <https://doi.org/10.5688/ajpe806107>
9. Vanderbush RE, Anderson HG, Fant WK, Fujisaki BS, Malone PM, Price PL, Pruchnicki MC, Sterling TL, Weatherman KD, Williams KG. Implementing Pharmacy Informatics in College Curricula: The AACP Technology in Pharmacy Education and Learning Special Interest Group. *Am J Pharm Educ*. 2007;71(6):117. <https://doi.org/10.5688/aj7106117>
10. European Pharmaceutical Students' Association. EPSA position paper on eHealth and digital skills. 2019; https://drive.google.com/file/d/0BwLQgaHkB_6INzZJYnROT1qtcmpWTU11U0ZIS3d2NDBCS1pJ/preview (accessed Jul 22, 2019).
11. Institute of Medicine Committee on Health Literacy. In: Nielsen-Bohlman L, Panzer AM, Kindig DA, eds. *Health literacy: a prescription to end confusion*. Washington, DC: National Academies Press; 2004.
12. MacLure K, Stewart D. A qualitative case study of ehealth and digital literacy experiences of pharmacy staff. *Res Social Adm Pharm*. 2018;14(6):555-563. <https://doi.org/10.1016/j.sapharm.2017.07.001>
13. Kuek A, Hakkennes S. Healthcare staff digital literacy levels and their attitudes towards information systems. *Health Informatics J*. 2019 [Ahead of Print]. <https://doi.org/10.1177/1460458219839613>
14. Saleh S, Khodor R, Alameddine M, Baroud M. Readiness of healthcare providers for eHealth: the case from primary healthcare centers in Lebanon. *BMC Health Serv Res*. 2016;16(1):644. <https://doi.org/10.1186/s12913-016-1896-2>
15. Norman CD, Skinner HA. eHEALS: The eHealth Literacy Scale. *J Med Internet Res*. 2006;8(4):e27. <https://doi.org/10.2196/jmir.8.4.e27>
16. van der Vaart R, van Deursen AJ, Drossaert CH, Taal E, van Dijk JA, van de Laar MA. Does the eHealth Literacy Scale (eHEALS) measure what it intends to measure? Validation of a Dutch version of the eHEALS in two adult populations. *J Med Internet Res*. 2011;13(4):e86. <https://doi.org/10.2196/jmir.1840>
17. Britt RK, Collins WB, Wilson K, Linnemeier G, Englebert AM. eHealth literacy and health behaviors affecting modern college students: A pilot study of issues identified by the American College Health Association. *J Med Internet Res*. 2017;19(12):e392. <https://doi.org/10.2196/jmir.3100>
18. Islam MM, Touray M, Yang HC, Poly TN, Nguyen PA, Li YJ, Syed Abdul S. E-Health literacy and health information seeking behavior among university students in Bangladesh. *Stud Health Technol Inform*. 2017;245:122-125.
19. Dashti S, Peyman N, Tajfard M, Esmaeeli H. E-Health literacy of medical and health sciences university students in Mashhad, Iran in 2016: a pilot study. *Electron Physician*. 2017;9(3):3966-3973. <https://doi.org/10.19082/3966>
20. Brown CA, Dickson R. Healthcare students' e-literacy skills. *J Allied Health*. 2010;39(3):179-184.
21. University of British Columbia. PHRM161 Technology in healthcare. <https://courses.students.ubc.ca/cs/courseschedule?pname=subjarea&tname=subj-course&dept=PHRM&course=161> (accessed Jul 22, 2019).
22. University of Toronto. Pharmacy informatics. 2016; <https://pharmacy.utoronto.ca/wp-content/uploads/sites/default/files/upload/pharmd/PHM113H1%20Course%20Outline%202016-17.pdf> (accessed Jul 22, 2019).
23. University of Waterloo. Foundation and application of health informatics. https://uwaterloo.ca/pharmacy/sites/ca.pharmacy/files/uploads/files/spring_2019_class_schedule_-_final_may8.pdf (accessed Jul 22, 2019).