RESEARCH

Design and Assessment of Telepharmacy and Telehealth Training in Two Pharmacy Programs

Jeanne E. Frenzel, PharmD, PhD,^{a,c} Andrea L. Porter, PharmD^{b,c}

^a North Dakota State University, School of Pharmacy, Fargo, North Dakota

^b University of Wisconsin-Madison, School of Pharmacy, Madison, Wisconsin

^c Editorial Board Member, *American Journal of Pharmaceutical Education*, Arlington, Virginia

Corresponding Author: Jeanne E. Frenzel, North Dakota State University, School of Pharmacy, Fargo, ND 58102. Tel: 701-231-8546. Email: Jeanne.Frenzel@ndsu.edu

Submitted July 6, 2021; accepted February 28, 2022; ePublished March 2022

Objective. To develop and assess the impact of a learning module through the evaluation of students' knowledge of, perceptions of, and intent to provide telepharmacy and telehealth services.

Methods. Second and third-year students from two schools of pharmacy completed a telepharmacy and telehealth learning module and discussion questions. A post-survey measured their knowledge, perceptions of, and intent to provide remote services.

Results. Students scored an average of 94.8% on a post-knowledge assessment. The Theory of Planned Behavior was used to develop a survey measuring intent to provide remote services. Mean scores (1 = *strongly disagree* to 4 = *strongly agree*) were attitude (M=3.18; SD=0.36), subjective norm (M=3.02; SD=0.43), behavioral control (M=2.67; SD=0.41), and intent (M=2.63; SD=0.59). Thematic analysis of discussion question responses found that students' felt the delivery and quality of care was similar between in-person and remote care. Students felt technology use and troubleshooting, perceived difficulty in building relationships, and the inability to provide device training, medication show-and-tell, and physical exams were differences from face-to-face care. They felt telehealth services would expand in the next five years due to increased access, convenience, and cost savings.

Conclusion. Upon completion of a learning module, students were knowledgeable about telepharmacy and telehealth. Students agreed that remote services positively impact patient care and would be well-received by patients and providers. Students had lower intent to offer remote services upon graduation; thus, simulations and service management information should be added to curricula to prepare students for and develop student interest in telepharmacy and telehealth.

Keywords: digital education, telepharmacy, telehealth, rural pharmacy, theory of planned behavior

INTRODUCTION

Telepharmacy is defined as pharmacist care through telecommunication technologies to patients or caregivers at a distance.¹ Telepharmacy services can positively impact patient care in medically underserved areas and may include medication dispensing and patient consultation, medication therapy management, or disease-state clinical consultation.¹ Telehealth is broader than telepharmacy and often multidisciplinary.² There are many positives associated with using telehealth such as convenience, reduced costs, and less exposure to disease.³ It is important for pharmacy graduates to recognize that telepharmacy and telehealth should be a standard of care.³ Additionally, pharmacists need also to consider the logistics, etiquette, technologies, legal aspects, and reimbursement processes associated with telepharmacy and telehealth practices.⁴

Calls have been made to increase education related to telehealth for pharmacy students.⁴⁻⁶ It is recommended that programs take a multimodal approach to the development of students' knowledge and skills and include classroom, simulation, and experiential learning. A review of the literature suggested there are few health profession programs that provide education regarding telepharmacy and telehealth.^{7,8} Due to the limited data on the instruction of telehealth and telepharmacy in pharmacy programs, a three-phase research study was developed and used to gather information about these topics.

In 2019, North Dakota State University (NDSU) School of Pharmacy received funding from the National Association of Boards of Pharmacy/American Association of Colleges of Pharmacy (AACP) District 5 to pilot a telepharmacy and telehealth simulation for first-year students. Pilot data suggested that students would benefit from additional experience using telepharmacy software and equipment. To accomplish this, a collaboration was formed

between faculty from University of Wisconsin – Madison School of Pharmacy (UW) and NDSU. Faculty were recipients of an AACP grant used to fund the second phase of the study, a telepharmacy simulation for third-year students.⁹ This study outlines the third and final phase of the project. The objectives of this study were to develop a learning module used to increase student knowledge of telepharmacy and telehealth; to assess students' knowledge and perceptions of telepharmacy and telehealth; and to measure students' intent to provide these services in the future.

METHODS

Second (N = 69) and third-year (N = 73) students from NDSU enrolled in Pharmacy Practice Laboratories II and III and second (N = 125) and third-year (N = 136) students from UW enrolled in Integrated Pharmacotherapy Skills I and III completed a telepharmacy and telehealth module. The module was created by UW faculty and used by NDSU faculty, except for customization to include state-specific laws. The module consisted of four readings and five videos (10 minutes) accessed through a learning management system.^{1,10-14} The module was asynchronous, self-paced, and a course requirement. Upon completion of the module, students completed two discussion questions. The questions asked students to discuss the similarities and differences in providing telehealth versus face-to-face care and comment on the pharmacists' role in providing care through telepharmacy and telehealth services in the next five years. A conventional qualitative content analysis process using an inductive approach was used to evaluate responses.¹⁵ Responses were coded and reviewed to remove redundancies, categorized into themes and sub-themes, by two researchers at UW and one researcher at NDSU. Researchers used two-researcher peer-review as a credibility strategy to ensure trustworthiness in analysis of the data. Coding and theming analysis was conducted independently, then discussed to consensus. Researchers maintained a log of tasks as part of a dependability strategy associated with the trustworthiness analysis. Students were asked to respond to the questions as part of the module; thus, consent was not obtained from students for the qualitative analysis.

Students could consent to participate in a post-survey. The post-survey was piloted in phase two of this study and had 35 items and three parts.⁹ No changes were made to the survey following the pilot study. Part one measured students' knowledge of telepharmacy and telehealth (9 items) using true/false statements that focused on state laws governing telepharmacy and telehealth. Part two measured students' intent to provide telepharmacy and telehealth services (22 items). Intent to provide services items used a 4-point Likert scale (1 = *strongly disagree* to 4 = *strongly agree*) and were developed using the Theory of Planned Behavior.¹⁶ Four constructs of the Theory of Planned Behavior were used to create subscales measuring attitude (10 items), subjective norm (3 items), perceived behavioral control (5 items), and intent (4 items). The attitude construct measured the degree a student regarded a behavior positively or negatively; the subjective norm construct measured perceived social pressure associated with attempting or not attempting a behavior; the perceived behavioral control construct measured the degree a student believed a behavior would be easy or difficult; and the intent construct measured intent to complete a behavior.¹⁶ Face validity through faculty review was used to ensure readability.¹⁷ Content validity was established through literature review to confirm items measured intended constructs.¹⁷ The survey is available upon request.

Part three consisted of five items asking students about experiences with telepharmacy or telehealth, anticipated future practice setting, importance of offering tele-services (1=*very low* to 4=*very high* or 1=*very unimportant* to 4=*very important*), interest in providing tele-services in the future (1=*very low* to 4=*very high* or 1=*very unimportant* to 4=*very important*), and likeliness of using tele-services in the future (1=*very low* to 4 = *very high* or 1=*very unimportant* to 4=*very important*). Different scales of measurement were used by NDSU and UW. Since the intent of the questions was the same, the results are included, but reported separately. The post-survey was administered through Qualtrics (Qualtrics, Provo, UT). SPSS (IBM Corp. Released 2014. IBM SPSS Statistics for Windows, Version 24.0) was used to analyze data. This study was approved by the UW Education and Social/Behavioral Science Institutional Review Board and the NDSU Institutional Review Board.

RESULTS

A total of 390 (N=132 NDSU; response rate=93.0%) (N=258 UW; response rate=98.9%) students answered the questions. Students indicated similarities of telehealth to in-person patient care to be synchronous in delivery, similar in content and quality of care provided, and dispensing workflow. Students cited the use of technology, body language, physical assessment, device training, and medication show-and-tell as differences of telehealth to in-person patient care. Lastly, students predicted telehealth services would expand in the next five years due to increased access, convenience, and cost savings. Table 1 includes representative quotes for each theme.

A total of 289 (N =98 NDSU; response rate=69%) (N=191 UW; response rate=73.1%) students completed the post-survey. Students scored an average of 94.8% (SD=9.05) on the nine-question post-knowledge assessment. The overall Cronbach's alpha for items measuring students' intent to provide telepharmacy and telehealth services was 0.85.

The Cronbach's alpha for the four subscales were: attitude (10 items, $\alpha=0.8$), subjective norm (3 items, $\alpha=0.6$), perceived behavioral control (5 items, $\alpha=0.6$), and intent (4 items, $\alpha=0.9$). For this exploratory study, reliability was established as acceptable at or above 0.6.¹⁸ Students' mean scores on the intent to provide telepharmacy and telehealth services survey for each subscale were attitude ($M=3.18$; $SD=0.36$), subjective norm ($M=3.02$; $SD=0.43$), behavioral control ($M=2.67$; $SD=0.41$), and intent ($M=2.63$; $SD=0.59$). The overall intent to provide telepharmacy and telehealth services mean score was ($M = 2.89$; $SD = 0.35$).

Students' responses to the experience and future practice questions are reported in Table 2. Of 87 NDSU students (response rate=88.8%), 60 (69%) indicated they felt the importance of offering telehealth services was of high to very high importance ($M=3.86$; $SD 0.75$); 14 (16.1%) indicated a high to very high interest in using telehealth in their future profession ($M=3.03$; $SD=0.72$); and 22 (25.3%) felt there was an average to very high likelihood of using telehealth in their future profession ($M=3.17$; $SD=0.7$). Of 190 UW students (response rate=99.5%), 183 (96.3%) indicated that offering telehealth services is important to very important ($M=3.37$; $SD=0.57$); 136 (71.6%) rated their interest in using telehealth in their future profession as important to very important ($M=2.79$; $SD=0.73$); and 140 (73.7%) rated the likelihood of using telehealth in their future profession as important to very important ($M=2.88$; $SD=0.72$).

DISCUSSION

An asynchronous learner-centered module engaged students through multi-media exposure to telepharmacy and telehealth topics. Students learned about remote pharmacy services specific to their rural state of residence from both pharmacist and patient perspectives. The impact of the module was measured through students' knowledge of, perceptions about, and intention to provide telepharmacy and telehealth services.

Student performance on the knowledge assessment indicated that their familiarity of state laws was adequate. Students' mean score on the attitude subscale was high indicating they believed remote pharmacy services positively impact patient care. Their mean score on the subjective norm subscale was also high indicating they believed stakeholders would approve of using remote pharmacy services. Their mean scores on the perceived behavioral control and intent subscales were low. Additional research is needed to achieve a better understanding of student responses to the questions of these two survey subscales. Perhaps, students had lower intent to offer remote services upon graduation, due to believing they will be managed by another without the ability to determine offered pharmacy services. In contrast, thematic analysis found that students believed the benefits of offering telepharmacy and telehealth services are beginning to be recognized and these services will grow over the next five years.

In 2016, the American Medical Association called for a list of telemedicine focused competencies to guide the education of telehealth and tele-precepting of medical students.¹⁹ The curriculum of a such a program typically includes didactic, simulation, and experiential training.¹⁹ Topics may include an overview of telepharmacy and telehealth, associated technologies, etiquette, related practice laws, reimbursement, and guidelines for privacy and confidentiality.¹⁹ There is little pharmacy education literature focused on comprehensive instruction on remote pharmacy services topics. Several articles describe transitioning students from in-person to virtual patient interactions; however, reports focused on the patient cases and interactions and not telepharmacy and telehealth topics.²⁰⁻²² This review of literature indicated that, like in medical education, there is a need for telepharmacy and telehealth education in pharmacy programs as the delivery of tele-services goes beyond student interactions via video link and requires knowledge of technologies, decorum, and guidelines.¹⁹

Students' lower intent to provide telepharmacy and telehealth services in the future and the pharmacy education literature illustrate the importance of pharmacy service management topics, including entrepreneurship and intrapreneurship, in the curriculum.^{23,24} Additionally, the Center for the Advancement of Pharmacy Education Educational Outcomes 2013 highlight the importance of using innovative thinking to expand pharmacy services.²⁵ When these concepts are applied to the results of this study, it may be useful for programs to evaluate their curriculums to maximize opportunities in the profession related to innovative pharmacy services provided through telepharmacy and telehealth.

One limitation of this study is the small number of participants associated with two Midwest schools of pharmacy, which may limit generalizability of results. Additionally, findings may have been strengthened through the use of a pre/post survey methodology to better quantify the full effects of the educational intervention. Prior experiences, knowledge, and opinions may have influenced responses to the questions. Finally, students had not participated in Advanced Pharmacy Practice Experiences and it may be these experiences that impact their intent to participate in telepharmacy and telehealth encounters in the future.

Both schools plan to continue to use the module in their courses and to more purposefully include application of the learned information through the use and assessment of simulated telepharmacy and telehealth encounters to provide students opportunities to practice these skills.

CONCLUSION

The learning module was developed to introduce telepharmacy and telehealth to students. Upon completion of the module, students were knowledgeable about telehealth and telepharmacy. Students agreed that remote services positively impact patient care and would be well-received by patients and providers. Students were less likely to believe that they had control over their ability to offer remote services and had lower intent to offer remote services upon graduation. Pharmacy programs should consider incorporating or enhancing a telepharmacy or telehealth curriculum, including simulations and service management information, to prepare students for and further develop student interest in telepharmacy and telehealth.

ACKNOWLEDGEMENTS

The authors thank Isabella Kotarski, Katherine Davenport, and Kadee Gullickson for performing the thematic analysis.

REFERENCES

1. Alexander E, Butler C, Darr A, et al. ASHP Statement on Telepharmacy. *Am J Health Syst Pharm*. 2017;74(9):e236-e241. doi:10.2146/ajhp170039
2. Telemedicine and Telehealth | HealthIT.gov. Accessed December 15, 2021. <https://www.healthit.gov/topic/health-it-health-care-settings/telemedicine-and-telehealth>
3. Smith A, Thomas E, Snoswell C, et al. Telehealth for global emergencies: Implications for coronavirus disease 2019 (COVID-19). *J Telemed Telecare*. 2020;26(5):309-313. doi:10.1177/1357633X20916567
4. Frenzel J, Porter A. Preparing Graduates for telepharmacy and telehealth: The need for tele-education. *Am J Pharm Educ*. Published online February 24, 2021:8566. doi:10.5688/ajpe8566
5. Alsharif N. The need for disruptive innovation in pharmacy. *Am J Pharm Educ*. 2019;83(10):837719. doi:10.5688/ajpe837719
6. Azzopardi L. Digital health in pharmacy education: Faculty perspective. Accessed December 15, 2021. <https://www.um.edu.mt/library/oar/bitstream/123456789/73826/1/4958-pages-44-48.pdf>
7. Rutledge C, Kott K, Schweickert P, Poston R, Fowler C, Haney T. Telehealth and eHealth in nurse practitioner training: Current perspectives. *Adv Med Educ Pract*. 2017;8:399-409. doi:10.2147/AMEP.S116071
8. Jonas C, Durning S, Zebrowski C, Cimino F. An interdisciplinary, multi-institution telehealth course for third-year medical students. *Acad Med*. 2019;94(6):833-837. doi:10.1097/ACM.0000000000002701
9. Porter A, Frenzel J, Siodlak M. Assessment of a two-school collaborative telepharmacy simulation. *Curr Pharm Teach Learn*. 2022;14(2).
10. American Pharmacists Association. Telehealth. Accessed December 15, 2021. <https://www.pharmacist.com/Practice/Practice-Resources/Telehealth>
11. National Consortium of Telehealth Resource Centers. Framing telehealth. Accessed December 15, 2021. <https://3f9znz109u3oybcpa3vow591-wpengine.netdna-ssl.com/wp-content/uploads/2019/01/Framing-Telehealth-Updated-FINAL.pdf>
12. Centers for Disease Control and Prevention. Using telehealth to expand access to essential health services during the COVID-19 pandemic. Updated June 10, 2020. Accessed December 15, 2021. <https://www.cdc.gov/coronavirus/2019-ncov/hcp/telehealth.html>
13. Larson M. Telepharmacy: A patient's perspective. Accessed December 15, 2021. <https://blog.telepharm.com/telepharmacy-a-patients-perspective>
14. Cardinal Health. TelePharm. Accessed December 15, 2021. <https://www.cardinalhealth.com/en/services/retail-pharmacy/pharmacy-ownership/telepharm.html>
15. Hsieh H, Shannon S. Three approaches to qualitative content analysis. *Qual Health Res*. 2005;15(9):1277-1288. doi:10.1177/1049732305276687
16. Ajzen I. The theory of planned behavior. *Organizational behavior and human decision processes*. 1991;50(2):179-211.
17. Taherdoost H. Validity and reliability of the research instrument: How to Test the validation of a questionnaire/survey in a research. *IJARM*. 2016;5. Accessed December 15, 2021. <https://hal.archives-ouvertes.fr/hal-02546799>
18. Taber K. The use of Cronbach's alpha when developing and reporting research instruments in science education. *Res Sci Educ*. 2018;48(6):1273-1296. doi:10.1007/s11165-016-9602-2

19. Proceedings of the 2016 annual meeting of the American Medical Association house of delegates. Accessed December 15, 2021. <https://www.ama-assn.org/sites/ama-assn.org/files/corp/media-browser/public/about-ama/councils/Council%20Reports/council-on-medical-education/a16-cme-reports-v2.pdf>
20. VanLangen K, Sahr M, Salvati L, Meny L, Bright D, Sohn M. Viability of Virtual skills-based assessments focused on communication. *Am J Pharm Educ.* 2021; 85(7): 8378. doi:10.5688/ajpe8378
21. Lempicki KA, Holland CS. Web-based versus face-to-face interprofessional team encounters with standardized patients. *Curr Pharm Teach Learn.* 2018;10(3):344-351. doi:10.1016/j.cptl.2017.11.014
22. Candelario D, Cunningham K, Solano LA, Pabst A, Srivastava S. Description of a transitions of care and telemedicine simulation lab activity. *Curr Pharm Teach Learn.* 2019;11(11):1184-1189. doi:10.1016/j.cptl.2019.07.017
23. Mattingly T, Mullins C, Melendez D, Boyden K, Eddington N. A systematic review of entrepreneurship in pharmacy practice and education. *Am J Pharm Educ.* 2019;83(3). doi:10.5688/ajpe7233
24. Hohmeier KC, Gatwood J. Toward Intrapreneurship in Pharmacy Education. *Am J Pharm Educ.* 2016;80(3). doi:10.5688/ajpe80353
25. Medina M, Plaza C, Stow C, et al. Center for the advancement of pharmacy education 2013 educational outcomes. *Am J Pharm Educ.* 2013;77(8). Article 162.

Table 1. Representative Student Quotes from the Thematic Analysis of Discussion Questions

Theme	Student quotes
Similarities	
Synchronous conversation	<p>“One similarity between an in-person healthcare visit and a telehealth visit is exchanging information with the patient in real time and the opportunity for both parties to ask questions.”</p> <p>“There is flexibility with communication forms, but video chatting provides a very similar feel to an in-person experience.”</p>
Same consultation content	<p>“One similarity of telehealth and face-to-face care is that the patient still receives the same counseling on their medication.”</p> <p>“I will still be able to effectively counsel the patient on most medications in the same manner as in person. I will still be able to complete CMRs and MTM.” services.</p>
Quality of care	<p>“I believe telehealth can still provide excellent customer service for patients as compared face-to-face interaction.”</p> <p>“Telepharmacy also provides these services at the same quality as an in person pharmacist.”</p>
Workflow for dispensing the medication	<p>“Another similarity that I see is that the pharmacist must still have the same level of vigilance if not more when observing the prescription and prepared product.”</p> <p>“A second similarity between the two pharmacy experiences is that the prescription filling process is identical to that of a traditional pharmacy.”</p>
Differences	
Technology Issues	<p>“It might be hard for some people to use the online platform. For those patients, it might be easier for them to just come to a pharmacy and receive healthcare in person. Also, technical training and equipment are needed for telehealth/telepharmacy.”</p> <p>“A difference is that the stability of the internet connection might not be strong.”</p>
Relationships and body language	<p>“An additional difference between the two modes of health care is that telehealth creates a decreased sense of human interaction between the patient and the pharmacist. This potentially could lead to decreased trust in the provider and reduced quality of care.”</p> <p>“Some differences between face-to-face pharmacy and telepharmacy is body language. Body language is very beneficial to tell emotions and feelings that the patient is thinking of especially if it’s a new medication.”</p>
Lack of device training and show and tell	<p>“If a pharmacist needs to show a patient how to use a product, like insulin, it can be difficult to see clearly through a screen.”</p> <p>“Pharmacists will have difficulty performing device demonstrations for inhalers and insulin injection devices through telehealth as compared to face-to-face visit.”</p>
No physical exam/vitals	<p>“It may be challenging to obtain blood pressure readings or BG readings off devices that the patient brings to their telehealth appointment. Pharmacist can educate patient show to upload these records, or to document them and send them to the Pharmacist via secure messaging like OneChart.”</p> <p>“A difference between telehealth and regular visits would be the ability to perform any physical exams such as blood pressure, or demonstrating proper technique for insulin administration.”</p>
Growth in telehealth in the next five years	
Growth to be expected	<p>“In 5 years I see Telehealth dominating the way we provide care, because it does not only save costs, but also decreases barrier for patients who had always had difficulty accessing health care services.”</p>

“I believe that telehealth is expanding rapidly. Not only is it a way to have less patient interaction at the time of a pandemic, but it is also a way for hospitals to maximize their profits.”

Table 2. Student Experience with Telepharmacy Services and Anticipated Practice Setting

	North Dakota (N=86)	Wisconsin (N=191)
Experience		
Previous experience with telepharmacy	20 (23.3%)	83 (43.5%)
No previous experience with telepharmacy	66 (76.7%)	108 (56.5%)
Anticipated practice setting		
Community pharmacy	45 (52.3%)	38 (19.9%)
Hospital pharmacy	24 (27.9%)	70 (36.6%)
Clinic pharmacy	13 (15.1%)	61 (31.9%)
Industry	2 (2.3%)	12 (6.3%)
Academia	1 (1.2%)	3 (1.6%)
Government pharmacy	1 (1.2%)	7 (3.7%)