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Pharmacy Services in Telepharmacy: how is it working, where is it working, and what is required to practice in this new setting

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Abstract

Telepharmacy is a rapidly growing area of communication within pharmaceutical care delivery, especially in rural areas. The purpose of this literature review was to determine where telepharmacy is currently being practiced within community and ambulatory pharmacy settings and the effectiveness of it. Additionally, state rules and regulations for the upper Midwest region were compared and contrasted to analyze how specific states are addressing the use of telepharmacy practice within the specified settings. A systematic literature review was performed using PubMed, Ovid Medline, and the Google Scholar search engine. State specific rules were researched using board of pharmacy and legislative online resources. Overall, telepharmacy was found to be an effective and safe delivery method to communicate with patients regarding their medications. It has been successfully implemented within community pharmacy settings through the creation of remote dispensing sites, which is evident through literature analysis. The focus of state regulations on telepharmacy services and practices shows the growth and acceptance of this modality of pharmacy practice. There is wide variation among Midwest state regulations pertaining to the setup and operation of telepharmacies. Trends in telemedicine show that telepharmaceutical care is likely to continue to expand as it allows for a better allocation of resources and access to more patients. Further primary research needs to be completed to specifically analyze telepharmacy cost-effectiveness

1 Introduction

Telemedicine and telepharmacy are growing in popularity as healthcare becomes more patient centered and driven by outcome and quality measures. With the technological advances of the past ten years and broadening of pharmacy services to include direct patient care, telepharmacy is being used to serve patients who are unable to physically access pharmacists trained to perform clinical evaluations.(1) Telepharmacy helps health systems expand services at a lesser additional cost by employing one full time pharmacist, who interacts with patients and professionals through telecommunication across great distances, rather than several part-time pharmacists.(1,2) Literature shows that telepharmacy services are being provided via text messaging, email, video conferencing and telephone in a variety of settings.(3) Pharmacists are using telepharmacy to perform warfarin consults,(1) evaluate psychiatric medications for pediatric patients in rural settings,(2) perform discharge medication reconciliation,(4) and improve adherence to medications.(5) As telepharmacy services continue to expand, it is critical that providers know what methods are effective in their practice setting to ensure quality care is delivered to each patient. A literature review published in 2008 focused on telepharmacy practice within the hospital setting.(6)

To learn more about the prevalence of telepharmacy, research began by determining where telepharmacy was being utilized within ambulatory and community pharmacy settings. Information regarding which types of pharmacy services were being provided and the advantages and disadvantages of telepharmacy were sought out. Next, the effectiveness of providing pharmacy services through telepharmacy pathways in ambulatory

and community settings was determined. Possible changes or improvements in services were identified based on current telepharmacy offerings. Lastly, current rules and regulations provided by boards of pharmacy in the upper Midwest region were analyzed in ambulatory/community settings. This region included North Dakota (ND), South Dakota (SD), Nebraska (NE), Minnesota (MN), Iowa (IA), Wisconsin (WI), and Illinois (IL).

2 Methods

2.1 Literature Search Strategy

In order to complete the literature review, several online databases were used including Medline (through PubMed), Embase (using the OVID interface), Cochrane Central Library, and Google Scholar. Additionally, select citations in each selected article were reviewed to expand upon the references. Key terms and MESH terms used included telepharmacy, telemedicine, pharmacy services, community pharmacy, clinical setting, ambulatory pharmacy, outpatient pharmacy, medication therapy management, and pharmacy. Several limitations were placed within the search. Only English language articles that were published after 2000 were reviewed. Settings that were not designed for ambulatory or outpatient/community pharmacy services were excluded. All efforts were made to obtain articles. Only full length articles were considered. Both researchers screened the abstracts for relevance. Differences in opinions were resolved through discussion between researchers.

Additionally, current rules and regulations listed on board of pharmacy websites were reviewed, including Boards of Pharmacy (BoP) for states listed in the introduction section as well as the National Association of Boards of Pharmacy (NABP). If necessary, email or telephone contact was made with each board of pharmacy to clarify or further address current rules and regulations regarding telepharmacy in the Upper Midwest Region.

2.2 Study Eligibility Criteria

Case studies, randomized control trials, and pilot projects on the use and effectiveness of telepharmacy were included in the review. No limitations were placed on sample size for randomized control trials (RCT) involving telepharmacy implementation or modification. The following PICOD (Population, Intervention, Comparator, Outcome, and Designs) details were considered as articles were selected:

- Population: ambulatory and community pharmacies using/experimenting with telepharmacy
- Intervention: pharmacy services provided over a distance, which are not face-to-face or in-person, and include but are not limited to video, phone, email, and text/instant messaging
- Comparator: study-dependent community health outcomes where pharmacy services are traditional in-person services or are not present, which is dependent on pharmacy setting or study design
- Outcome: qualitative analysis of the success/failure of telepharmacy services
- Designs considered: Case studies, randomized controlled trials, review articles

3 Data Extraction

Two reviewers independently abstracted the data. The Literature Review Abstraction Guide was used as a template for documenting and organizing data extraction of articles.⁽⁷⁾ Several modifications were made to the Abstraction Guide to better fit the needs of this specific project. The modifications that were made included adding study objectives, study hypothesis, study limits, and telepharmacy settings. Additionally, the definition of telepharmacy within each study was noted.

4 Quality Assessment

Each article was assessed for quality based on the Oxford Centre for Evidence-Based Medicine 2011 Levels of Evidence table. (7) Data for quality assessment was extracted as articles were read, including questions answered by the study and level of evidence.

5 Results

Eleven articles were identified that met our inclusion criteria, which is depicted in Figure 1. Twenty-one full-text articles were identified to be assessed; seven of these were excluded because they focused on acute care settings or areas of practice outside of pharmacy, including nursing and physician practice. Another article was excluded due to questionable validity. Two articles were excluded because the full-text was unobtainable. A summary of these articles is in Table 1. The practice sites of these articles contained community pharmacies with remote dispensing sites, telephonic medication therapy management (MTM), and clinical video telehealth used with anticoagulation clinics.

North Dakota State University College of Pharmacy has developed a webpage that shows the abundant research and development work that has been completed in the field of telepharmacy within the state of ND.(30) This research was sampled through the Freisner, et al, article included in this systematic review. Results from this article show that the number of errors completed in a telepharmacy setting is comparable to that of a conventional dispensing pharmacy, showing that remote supervision of pharmacy dispensing services is feasible in a community setting.(9) Additional evidence for telepharmacy success comes out of Washington State where Lam and Rose showed that automated dispensing systems, with remote order processing and patient counseling, can be successfully utilized in the dispensing of medications, particularly antibiotics, in clinics that lack pharmacies.(10) Margolis and colleagues showed that patients reported an appreciation for use of telephone interviews, rather than traveling to a clinic setting, when being counseled on asthma disease control.(17) In contrast, Clifton and colleagues reported that 55.6% of patients using remote dispensing sites were satisfied compared to 66% satisfaction at the central site, suggesting less satisfaction with telepharmacy.(11)

The presence of telepharmacy has also been expanding within ambulatory care settings, especially with the delivery of MTM. Clinical video telehealth delivery provided high quality services with patient satisfaction maintained in a study completed by the Maryland Veterans Administration.(12) Singh, et al, stated that the telehealth model can be implemented into a variety of healthcare settings to deliver pharmaceutical care services, including therapeutic drug monitoring, chronic disease management, and patient education.(12) Research shows that many of these tasks are being taken on by managed health care groups who have departments dedicated to telephone delivered pharmaceutical care services. (19) Goals of these services include: assessing medications, easing transitions of care, supporting patients in medication adherence, answering medication related questions and ordering laboratory tests.

The use of telepharmacy is not only being studied in the United States. Several international studies were also reviewed regarding their experiences with telepharmacy. A study performed in the Netherlands had great success with their telepharmacy services which lead to increased adherence to new medications (statins, RAS-inhibitors, bisphosphonates) with telephonic counseling calls performed 7-21 days after therapy initiation.(15) An Australian telepharmacy project showed the effectiveness of telepharmacy is dependent upon appropriate technology. Remote sites need adequate access to high quality technology, telephone connections, and internet speeds.(16)

State specific telepharmacy requirements are in Tables 2 and 3. Common requirements for operation of remote dispensing sites include two-way audiovisual link and computer link, technology that allows for real time prescription, and medication verification by the pharmacist and video link for patient counsel. Most states require remote dispensing sites are staffed by registered technicians with required minimum work hours; SD and WI allow pharmacy interns to staff remote dispensing sites. Routine inspections of the remote site by the pharmacist in charge are required in most states, however, inspection frequency varies from weekly to monthly. It is unclear from the state statutes if MTM services can be performed remotely, however, there

is a trend toward provisions for hospital use of telepharmacy. Some Midwest states are supporting smaller hospitals with pharmacy services at larger locations via audiovisual and computer connections.

The National Association of Boards of Pharmacy established an initial task force in 1996. This task force encouraged state pharmacy boards to reexamine definitions regarding pharmacy practice present in their state practice acts to ensure pharmacy practice is not limited to within a pharmacy. It also lists information required to be part of a multistate telepharmacy practice registration.(27) A new task force was established on June 6, 2016 to develop a guidance statement for licensing processes that will protect the public, retain board of pharmacy jurisdiction for telepharmacy practices, and allow for further development of telepharmacy models.(28)

6 Discussion

The practice of telepharmacy is rapidly evolving and becoming more widely used. The literature review showed telepharmacy use in dispensing, MTM, and anticoagulation clinic settings, as well as use in enhancement of medication adherence with specific conditions (table 2). The U.S. Department of Health and Human Services has created an Office for the Advancement of Telehealth (OAT) to further promote the practice of telecommunications within medicine. Many of the studies examined in this literature review were funded by OAT. Throughout our literature review several recurring themes were noticed. North Dakota is at the forefront for studying, utilizing, and implementing telepharmacy practices which is evident through the collaboration between the ND Board of Pharmacy and North Dakota State University. Significant amounts of research have been completed involving these two entities.(9) North Dakota contains many rural communities without access to pharmacy services. In ND, telepharmacy is most widely implemented within the community and dispensing setting where it has been well accepted by patients and health care professionals.(9,11) The abundance of work in ND shows that telepharmacies are well received by patients in medically underserved rural communities.(11,14) The underserved communities most impacted are those with limited access to pharmacy services due to the limited presence of pharmacies in rural areas. Expanding the application of telepharmacy technology can improve patient access to pharmaceutical care. Current research regarding telepharmacy services does not yet analyze cost barriers and cost effectiveness related to telepharmacy. Access and affordability of telepharmacy equipment may be another barrier in these medically underserved communities that still needs to be addressed.

Friesner, et al, completed a study comparing the safety of remote telepharmacies to traditional pharmacies, which suggested that telepharmacies have comparable safety rates to conventional dispensing pharmacies. Additionally, this study found that remote pharmacies do not adversely affect public health, patient safety, nor the quality of care provided. The majority of mistakes made at a remote dispensing telepharmacy are within the prescription entry process.(9) Several limitations to telepharmacy noted throughout the literature review included delayed order processing during technology down-time compared to when technology is fully functioning, as well as adequate time, staffing, and workspace for the pharmacists at the central site. Additionally, reliable technology and adequate backup are very important features for a telepharmacy practice to have.(16) The failure of the Australian Telepharmacy project demonstrates a disadvantage of telepharmacy: a substantial initial investment in technology is crucial to the success of telepharmacy endeavors.(16) This is a limiting factor in that telepharmacy services can only be provided to those who have the necessary infrastructure and can afford the technology required.

In the upper Midwest region, Minnesota is the only state that does not have state-based regulations for the operation of remote dispensing sites or telepharmacies in a community setting. Minnesota allows for licensed pharmacies to obtain a variance to operate telepharmacies in underserved locations.(22) North Dakota is a leader in the telepharmacy world with a program designed and operated in conjunction with the College of Pharmacy at North Dakota State University.(25) Alternatively, Nebraska was found to have the fewest regulations regarding telepharmacy, which indicates potential for growth and innovation in telepharmacy in this state. Details regarding what is required for each state are described in tables 2 and 3. Additionally, when practicing telepharmacy, it is important to follow specific state requirements regarding staffing, inspection, counseling requirements, technology, and licensure.

State BoPs show their support for telepharmacy by stating provisions under which telepharmacy can be practiced. The state BoPs have laid out clear requirements for counseling and prescription verification to make the practice safe and beneficial for patients. Five of the seven states reviewed required counseling with every prescription filled in the telepharmacy. This requirement enhances the relationship between patient and pharmacist by providing contact time and an opportunity for additional pharmaceutical care services. Telepharmacy services in community settings are a means to expand pharmacy services into communities unable to support a full service pharmacy. These community based sites have the potential to develop services to include MTM and point of care testing allowing for additional ways to serve patients. A new task force was set forth by the NABP in June 2016 which may influence future directions of telepharmacy.(28) Because of this, now is the optimal time for planting seeds for the expansion of telepharmacy.

7 Conclusion

Telepharmacy is safe, effective, and provides positive outcomes to patients. Many states within the Upper Midwest Region have addressed telepharmacy and included rules and regulations regarding the practice. Our review of the literature found eleven studies that helped with the understanding of where and how telepharmacy is being practiced. We found that telepharmacy offers medically underserved communities a way to maintain pharmacy access without pharmacist retention difficulties. Other advantages of telepharmacy include less travel for members of rural communities for access to prescription drugs and point of care tests, such as INR dosing, and maintenance of a relationship with the pharmacist the most accessible medical professional. It is the opinion of these authors that counseling with every prescription fill is highly beneficial in a telepharmacy system and will help patients develop a relationship with their pharmacist, thus maintaining pharmacist accessibility in underserved communities.

In addition, a good relationship between patient and pharmacist may open the door for additional services provided at remote dispensing sites. Technology is the both the driver of telepharmacy services and the limiting factor. Without quality technology, kept in good working order, remote dispensing sites cannot operate. This may be expensive and require additional infrastructural support. The quality of the studies reviewed here varied, with many having small sample sizes. Future work in telepharmacy is needed with larger sample sizes studied over long periods of time. This may shed more light on telepharmacy advantages, challenges, and how to overcome difficulties. Further research focusing on economic and cost-benefit of telepharmacy is also needed to determine if the benefits of telepharmacy merits the expense.

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9 References

1. Implementation and outcomes of a pharmacist-managed clinical video telehealth anticoagulation clinic. Singh L, Accursi M, Black K, et al. *Am J Health-Syst Pharm.* 2015; vol: 72, pp: 70-73. Accessed online June 12, 2016.
2. Statewide Child Telepsychiatry Consult System Yields Desired Health System Changes and Savings. Hilt, R, Barclay, R, Bush, J, et al. *Telemedicine and e-Health.* 2015; vol 21, pp: 533 - 537. Accessed online June 12, 2016.
3. Telemedicine and telepharmacy: Current status and future implications. Angaran, David M. in *Am J Health-Syst Pharm.* 1999; vol: 56, pp: 1405-1426. Accessed online June 13, 2016.

4. Pharmacist-managed inpatient discharge medication reconciliation: A combined onsite and telepharmacy model. Keeys, C, Kalejaiye, B, Skinner M, et al. *Am J Health-Syst Pharm.* 2015; vol 71, pp 2159-2166. Accessed online June 12, 2016.
5. Effects of a TELEphone counseling intervention on medication adherence, patient beliefs and satisfaction with information for patients starting treatment: study protocol for a cluster randomized controlled trial. Kooy M, van Geffen E, Heerdink E, et al. *BMC Health Services Research.* 2014; vol 14, pp. 219. Accessed online May 24, 2016.
6. Implementation of telepharmacy in rural hospitals: potential for improving medication safety. Casey M, Elias W, Knudson A, Gregg W. Upper Midwest Rural Health Research Center. 2008. <https://www.nodakpharmacy.com/pdfs/UMRHfirstDose.pdf>
7. Literature Review Abstraction Guide. Moodle. Phar 6742, Spring 2016. Practice Based Problem Solving with Evidence-Based Methods. Accessed online August 1, 2016.
8. OCEBM Levels of Evidence Working Group (Jeremy Howick, Iain Chalmers (James Lind Library), Paul Glasziou, Trish Greenhalgh, Carl Heneghan, Alessandro Liberati, Ivan Moschetti, Bob Philips, Hazel Thornto, Olive Goddard and Mary Hodgkinson). The Oxford 2011 Levels of Evidence. Oxford Centre for Evidence-Based Medicine. <http://www.cebm.net/wp-content/uploads/2014/06/CEBM-Levels-of-Evidence-2.1.pdf>
9. Do remote community telepharmacies have higher medication error rates than traditional pharmacies? Evidence from the North Dakota Telepharmacy Project. Friesner DL, Scott DM, Rathke AM, Peterson, CD, Anderson HC. *J Am Pharm Assoc.* 2011; vol 51, pp: 580-590. Accessed online February 2, 2017.
10. Telepharmacy services in an urban community health clinic system. Lam AY, Rose D. *J Am Pharm Assoc.* 2009; vol 49, pp: 652659. Accessed online February 2, 2017.
11. Provision of pharmacy services to underserved population via remote dispensing and two-way video-conferencing. Clifton GD, Byer H, Heaton K, Haberman DJ, Gill H. *Am J Health-Syst Pharm.* 2003; Vol 60, pp: 2577-2582. Accessed online February 2, 2017.
12. Implementation and outcomes of a pharmacist-managed clinical video telehealth anticoagulation clinic. Singh LG, Accursi M, Korch Black K. *Am J Health-Syst Pharm.* 2015; Vol 72, pp: 70-73. Accessed Online February 4, 2017.
13. Assessment of the Impact of Medication Therapy Management Delivered to Home-Based Medicare Beneficiaries. Welch EK, Delate T, Chester EA, Stubbings T. *Annals of Pharmacotherapy.* 2009; Vol 43, pp: 603-610. Accessed online February 6, 2017.
14. Patient And phaRmacist Telephonic Encounters (PARTE) in an Underserved Rural Patient Population with Asthma: Results of a Pilot Study. Young HN, Havican N, Griesbach S, et. al. *Telemedicine and e-Health.* 2012; vol 18, pp: 427-433. Accessed online June 11, 2016.
15. Effects of Telephone Counseling Intervention by Pharmacists (TelCIP) on Medication Adherence; Results of a Cluster Randomized Trial. Kooji MJ, Heerdink ER, van Dijk L, et al. *Front PHarmacol.* 2016; vol 7: article 269. Accesssed online February 14, 2017.
16. Can telepharmacy provide pharmacy services in the bush? Nissen L, Tett S. *J Telemed and Telecare.* 2003; vol 9, pp: 39-41. Accessed online February 14, 2017.
17. A telepharmacy intervention to improve inhaler adherence in veterans with chronic obstructive pulmonary disease. Margolis A, Young H, Lis J, Schuna A, Sorkness C. *Am J Health-Syst Pharm.* 2013; vol 70, pp: 1875-1976. Accessed online February 14, 2017.

18. Telepharmacy in health maintenance organization. Stubbings T, Miller C, Humphries T L, Nelson K M, Helling D. *Am J Health-Syst Pharm*. 2005; vol 62; pp 406-410. Accessed online February 14, 2017.
19. The Rural PILL Program: A Post discharge Telepharmacy Intervention for Rural Veterans. Rebello K E, Gosian J, Salow M, Sweeney P, Rudolph J, Driver J. *J Rural Health*. 2016; vol 00, pp: 1-8. Accessed online February 14, 2017.
20. Illinois General Assembly. Section 1330.510 Telepharmacy. Effective April 23, 2015. Accessed February 1, 2017. <http://www.ilga.gov/commission/jcar/admincode/068/068013300E05100R.html>
21. Iowa Administrative Code. Chapter 9: Automated Medication Distribution Systems and Telepharmacy Services. Effective May 20, 2015. Accessed February 1, 2017. <https://www.legis.iowa.gov/docs/iac/chapter/01-18-2017.657.9.pdf>
22. Minnesota Board of Pharmacy. Chapter 6800, Pharmacies and Pharmacists. Accessed February 1, 2017. <http://mn.gov/boards/pharmacy/statutes/>
23. Department of Health and Human Services. Statutes Relating to Pharmacy Practice Act. Effective August 30, 2015. Accessed February 1, 2017. <http://dhhs.ne.gov/publichealth/Documents/Pharmacy.pdf>
24. Stuthman A. LB 308: Adopt the Automated Medication System Act. Effective April 22, 2008. Accessed February 2, 2017. <http://dhhs.ne.gov/Documents/08legsum.pdf>
25. North Dakota Board of Pharmacy. Chapter 61-02-08: Telepharmacy Rules. Effective on various dates. Accessed February 1, 2017. <https://www.nodakpharmacy.com/pdfs/Lawbook41316.pdf>
26. South Dakota Legislature. Chapter 20:51:30: Telepharmacy. Accessed February 1, 2017. <http://sdlegislature.gov/Rules/DisplayRule.aspx?Rule=20:51:30>
27. Wisconsin State Legislature. Phar 7.095: Operation of remote dispensing sites. Effective April 1, 2010. Accessed February 1, 2017. http://docs.legis.wisconsin.gov/code/admin_code/phar/7/095
28. Resolution 92-7-96. Task Force on Telepharmacy. November 22, 1996. Accessed February 14, 2017. https://nabp.pharmacy/wp-content/uploads/2016/07/TF-Telepharmacy_AM93_Nov1996.pdf
29. Resolution 112-5-16. Task Force on Telepharmacy. June 6, 2016. Accessed February 14, 2017. <https://nabp.pharmacy/task-force-on-telepharmacy-practice-resolution-112-5-16/>
30. NDSU. Telepharmacy. Accessed February 7, 2017. <https://www.ndsu.edu/telepharmacy/>

Figure 1. Study Selection Flow Diagram.

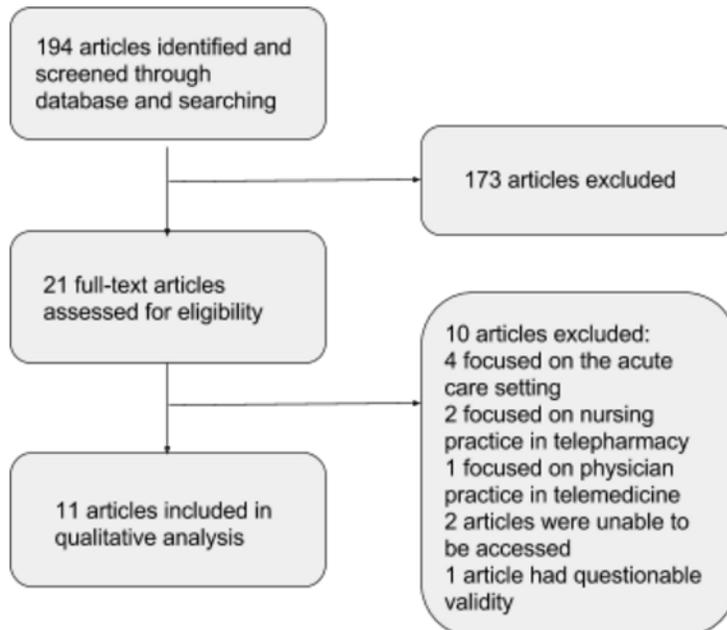


Table 1. Data Extraction Summary

Citation	Telepharmacy Definition	Pharmacy Setting/Participants	Study Design & Quality	Intervention	Results
<p>Freisner DL, Scott SM, Rathke AM, Peterson CD, Anderson HC. Do remote community telepharmacies have higher medication error rates than traditional pharmacies? Evidence from the North Dakota Telepharmacy Project.⁹</p>	<p>A pharmacist at a traditional community pharmacy (i.e. "central site") uses real-time audiovisual equipment to provide a full set of community pharmacy services at another site (i.e. "remote site") at a distance.</p>	<p>14 remote telepharmacy sites and 8 comparison community pharmacies in North Dakota from Jan 2005 to Sept 2008.</p>	<p>Pilot, cross-sectional, comparison study. EBM Level 3</p>	<p>Utilization of the Pharmacy Quality Commitment reporting system to report quality-related events, including a near miss (pharmacy discovery of a mistake caught before reaching the patient) or an error (patient discovery of a mistake).</p>	<p>The remote telepharmacy group filled 47,078 prescriptions and had 631 quality-related events. 78 of these mistakes were errors found by the patient after the medication had left the pharmacy. The community pharmacy group filled 123,346 prescriptions with 1,002 quality-related events. 125 of these mistakes were errors found by the patient. The remote telepharmacy group had an error rate of 1.3% while the community pharmacy group had an error rate of 0.8%. The nationally reported error rate is 1.7%. Both of these error rates are comparable to this national rate.</p>
<p>Lam AY, Rose D. Telepharmacy services in an urban community health clinic system.¹⁰</p>	<p>(No definition specifically stated)</p>	<p>Five network clinics without in-house pharmacies remotely connected to a central pharmacy to provide telepharmacy services in suburban western Washington state from 2007-2008</p>	<p>Practice Innovation Report EBM Level 5</p>	<p>Use of automated drug dispensing systems and webcam technology at five community clinics with no pharmacies previously, to allow for remote pharmacy order processing and medication dispensing, as well as point-of-care patient-focused consultations.</p>	<p>Within the 5 sites, 12,000 patients received 3,282 new prescriptions per month with consultations, 589 refill prescriptions, 2,800 pharmacist-provided refill authorizations (based on Washington Board of Pharmacy approved protocols), and 250 medication assistance referrals. Antibiotics were the most frequently dispensed medications. Pharmacists reported that webcam-enabled interviews resulted in longer, more private counseling sessions.</p>

<p>Clifton GD, Byer H, Heaton K, Haberman DJ, Gill H. Provision of pharmacy services to underserved population via remote dispensing and two-way videoconferencing.¹¹</p>	<p>(No definition specifically stated)</p>	<p>Central site and remote site pharmacies in Washington state during a 2-week period of March 2003 within federally funded community health centers.</p>	<p>Survey EBM Level 5</p>	<p>93 patients at remote telepharmacy sites and 106 patients at the central pharmacy site completed a questionnaire</p>	<p>66% of the patients at the central site agreed or strongly agreed that they were satisfied with the time required to complete their pharmacy visit. Only 55.6% at the remote sites agreed or strongly agreed that they were satisfied. Patient satisfaction was somewhat greater with the pharmacy services received at the central site compared with the remote sites.</p>
<p>Singh LG, Accursi M, Korch Black K. Implementation and outcomes of a pharmacist-managed clinical video telehealth anticoagulation clinic.¹²</p>	<p>Clinical video telehealth is a method of providing services to patients enrolled in community-based outpatient clinics, which can be located in geographic areas where access to healthcare services is limited.</p>	<p>Clinical pharmacy specialists at the VA Maryland Health Care System in 2012.</p>	<p>Case Study EBM Level 4</p>	<p>Clinical video telehealth technology was used to provide anticoagulation therapy management to patients at an outpatient clinic 12 miles away. Pharmacists conducted patient interviews, evaluated INR values, and gathered other clinical data for use in therapy planning. Telehealth technicians performed the physical assessment, including point-of-care INR values and vital sign measurements.</p>	<p>A patient satisfaction survey was completed, which analyzed items including: comfortableness with equipment used, ability to see and hear clinician, clinical relationship, level of care, and overall satisfaction. The mean score for each of the questions was 4.77 +/- 0.14, out of a 5-point scale. These results suggest that the use of clinical video telehealth did not compromise quality or availability of services delivered.</p>
<p>Welch EK, Delate T, Chester EA, Stubbings T. Assessment of the Impact of Medication Therapy Management Delivered to Home-Based Medicare Beneficiaries.¹³</p>	<p>(No definition specifically stated)</p>	<p>Clinical pharmacists employed by a not-for-profit health maintenance organization giving care to Medicare beneficiaries with 2 or more chronic conditions (at least one considered high risk) receiving 5 or more Part-D medications and likely to incur \$4000 in total Part-D costs in the Denver/Boulder area in 2006.</p>	<p>Non-randomized controlled study EBM Level 3</p>	<p>Eligible patients were invited to receive MTM performed by a clinical pharmacist over the telephone. The study was designed to measure all-cause mortality 180 days after the beneficiaries had the opportunity to receive MTM. Patients with end-stage renal disease were excluded from the results.</p>	<p>A total of 1231 home-based beneficiaries were targeted to receive telephonic MTM. 539 patients accepted, 365 declined, 68 were ineligible, and 259 were unable to be contacted. Of those that accepted and declined, 80 and 29 beneficiaries, respectively, were further excluded due to ESRD. Beneficiaries who opted out of MTM services were more likely to die during the 180-day follow-up (p=0.044). Beneficiaries who opted in were more likely to incur an increase in medication costs (p=0.006).</p>

<p>Young HN, Havican N, Griesbach S, et al. Patient And phaRmaciest Telephonic Encounters (PARTE) in an Underserved Rural Patient Population with Asthma: Results of a Pilot Study.¹⁴</p>	<p>Patient and Pharmacist telephonic encounters (PARTE)</p>	<p>Low income patients residing in federally designated medically underserved regions of north central WI were invited to participate if they received their medications from the Family Health Center of Marshfield, Inc. (FHC) or by 340B mail-order pharmacy.</p>	<p>Randomized control trial pilot study EBM Level 1</p>	<p>Telephone consultation was performed by pharmacists trained in asthma self-management, using a standardized guide, to help patients identify causes and solutions to asthma-related problems. Pharmacists assessed inhaler technique, contacted providers on behalf of the patient and documented the encounters.</p>	<p>Comparisons between control group and intervention group were not statistically significant, though the intervention group trended towards increased adherence to long term controller medications. The intervention group viewed the study positively with many participants unable to identify anything they disliked about the intervention. Patient's knowledge about asthma was improved with each call giving them confidence to self-manage their asthma.</p>
<p>Kooji MJ, Heerdink ER, van Dijk L, et al. Effects of Telephone Counseling Intervention by Pharmacists (TelCIP) on Medication Adherence; Results of a Cluster Randomized Trial.¹⁵</p>	<p>(No definition specifically stated)</p>	<p>Patients initiating treatment with antidepressants, bisphosphonates, RAS inhibitors, or statins were targeted. This study occurred in 53 community pharmacies in the Netherlands prior to 2016.</p>	<p>Cluster randomized controlled trial EBM Level 1</p>	<p>A telephone counseling intervention was completed by a pharmacist, pharmacy student, or pharmacy technician 7-21 days after initiation of therapy.</p>	<p>Overall, 1054 patients received the telephonic counseling intervention. Comparing the intervention to usual care, adherence was statistically significantly higher for the intervention group for patients starting RAS-Inhibitors, statins, and bisphosphonates. Patients initiating antidepressant therapy did not show benefit from the intervention.</p>
<p>Nissen L, Tett S. Can telepharmacy provide pharmacy services in the bush?¹⁶</p>	<p>Telepharmacy allows for real-time communication between a community pharmacist and dispensing doctors, videoconferencing with patients, and patient counseling at depot pharmacies.</p>	<p>Community pharmacists provided prescription services for 3 outlying towns in Australia using video-phone interactions. Community pharmacists also had video-phone in offices of two general practitioners.</p>	<p>Pilot project EBM Level 5</p>	<p>The goal of this project was to complete pharmacist-patient counseling interactions with each medication dispensed. Additionally, pharmacist-dispensing doctor interactions were also completed and documented.</p>	<p>Only 10 video-phone interactions were recorded in the six-month project timeline. Many technical problems were encountered due to telephone network problems in rural areas. Even with technical and logistical difficulties, dispensing doctors felt there was a large potential for this technology to be used in the future.</p>
<p>Margolis A, Young H, Lis J, Schauna A, Sorkness C. A telepharmacy intervention to improve inhaler adherence in veterans with chronic obstructive pulmonary disease.¹⁷</p>	<p>(No definition specifically stated)</p>	<p>Veterans aged 60 and older whose inhaler refill history revealed that fewer than 80% of expected fills were actually dispensed over the previous 6-month period.</p>	<p>Prospective, randomized, single-blind intervention study EBM Level 1</p>	<p>Pharmacists contacted patients via telephone to counsel on the COPD medications, assess knowledge of technique, and determine barriers to use. Follow up telephone calls were made 4-8 weeks after the initial counseling intervention to review items</p>	<p>Overall, patients reported satisfaction with the counseling intervention. Of the 10 that participated, 9 reported improved inhaler use as a result of the intervention. Participants were appreciative of the intervention occurring over the telephone, rather than having to travel to a clinic.</p>

				with which patients previously struggled with.	
Stubbings T, Miller C, Humphries TL, Nelson KM, Helling D. Telepharmacy in health maintenance organizations. ¹⁸	(No definition specifically stated)	Health maintenance organization serving 405,000 people in three major Colorado cities: Denver, Boulder and Colorado Springs.	Description of telepharmacy services in a health maintenance organization EBM Level 5	Pharmacists were added to the call center staff to answer patient questions related to drug therapy needs. Pharmacists were able to directly access medical records, contact providers, make medication changes and leave notes for future care providers based on their encounters.	Call center pharmacists at a clinical pharmacy call center (CPCC) acted as pharmacy care coordinators at transitions of care ensuring profiles were updated and medications were restarted appropriately. MTM services were provided to all new members to the organization, helping to optimize care coordination prior to the 1 st appointment with a new provider. CPCC has been an integral cost saving program for Kaiser Permanente in the Colorado region. The service was well received by patients and helped to ease transitions of care for members.
Rebello KE, Gosian J, Salow M, Sweeny P, Rudolph J, Driver J. The Rural PILL Program: A Post discharge Telepharmacy Intervention for Rural Veterans. ¹⁹	Phone interview between patient and pharmacist to review medications following discharge from a VA medical center for an acute care admission.	Rural Pharmacological Intervention in Late Life (PILL) program uses telephone based MTM to serve rurally based veterans age 65 and older recently discharged from VA medical centers to home. Patients with the following characteristics were prioritized: polypharmacy (12 or more medications), cognitive impairment, congestive heart failure and age greater than or equal to 75.	The study is an extension of the Pharmacological Intervention in Late Life (PILL) program in a matched controlled trial with rurally located patients. EBM Level 3	Pharmacists performed a thorough review of each medication present on the patient profile. Pharmacists called each patient included in the study and interviewed them about medication problems and clarified any misunderstandings. The encounter was documented, including discrepancies, medication changes, pharmaceutical care issues, potentially inappropriate or unnecessary medications and recommendations. Notes were advanced to the patient's primary care team along with necessary recommendations for follow-up care.	The pharmacy team found that patients discharged to rural locations generally took more medications. Additionally, they discovered many medication discrepancies following hospital discharge, with pharmacists addressing concerns for more than 75% of patients to primary care. The intervention resulted in a statistically significant effect on reducing the number of emergency room and urgent care visits at 30-days post discharge. Hospital readmission rates were the same between the two groups.

Table 2. Description of statutes and rules present within each state’s Board of Pharmacy regarding telepharmacy practice.

State	Details on Statutes/Rules
Illinois ¹⁹	Title 68, Chapter VII, subchapter b section 1330.510 of the Joint Committee on Administrative rules deals with telepharmacy. Multiple modes of telepharmacy are described in Illinois statutes. Remote dispensing sites collect, fill and dispense new prescriptions, whereas consultation sites have no inventory for on-site filling. They only collect prescriptions for filling at central sites then dispense those orders at a later date. Both are supervised by pharmacists at central sites, who provide counseling at medication pick up. The law also describes services provided through "vending machine" like dispensing systems. All telepharmacy sites require computer, video, and audio connection with a pharmacist at the central location for consultation and verification of prescriptions.
Iowa ²⁰	Iowa codes 155A.13, 155A.33 and 147.107 describe the practice of telepharmacy within the state of Iowa. Iowa BoP licenses remote dispensing sites, which are staffed by certified pharmacy technicians and supervised by the pharmacist-in-charge at the managing pharmacy. Patients picking up prescriptions at the remote site are required to consult with the remote pharmacist via a video/audio link. Remote and supervising sites must comply with all IA dispensing laws. IA codes also have provisions for telepharmacy used within inpatient settings.
Minnesota ²¹	The practice of telepharmacy in Minnesota is illegal without specific variances in place. MN rule 6800.2150 requires a board certified pharmacist be physically present in a licensed MN pharmacy during all open business hours. Rule 6800.3850 requires technicians be under direct supervision of a pharmacist. The pharmacist must perform the final check of the prescription and provide patient counseling. Variances have been accepted allowing for telepharmacy operation in community pharmacy settings. Minnesota has a published guidance document to help interested parties seeking variances related to telepharmacy gain approval.
Nebraska ^{22,23}	In 2008 legislative bill 308 was adopted giving licensed Nebraska pharmacists legal approval to participate in the practice of telepharmacy. A definition of telepharmacy has been incorporated into the Nebraska Pharmacy Practice Act along with a statement that licensed pharmacists have the power to practice telepharmacy. The practice act does not describe telepharmacy site relationships in great detail. It does state that pharmacists may perform order verification for hospital settings, required prospective DUR prior to new prescription dispensing, and patient counseling via a telepharmacy link.
North Dakota ²⁴	North Dakota Board of Pharmacy Administrative Code (Rules/Regulations) chapter 61-02-08 covers telepharmacy with sections pertaining to purpose, operations, exceptions, suspensions and terminations, remote dispensing sites, consultation sites (no inventory), hospital telepharmacy, and remote dispensing machines. ND requires computer link, video-link and audio-link active at all times for all remote locations and emphasizes that remote sites are to be established based on community needs.
South Dakota ²⁵	Chapter 20:51:30 in the South Dakota Administrative Rules outlines requirements for operation of telepharmacies. Both the remote site and the central site must be licensed. The owner of the central pharmacy site is required to prove the need for a remote pharmacy and to supervise its operations once approved.
Wisconsin ²⁶	WI Phar7.095 allows for the operation of remote dispensing sites, which are not licensed pharmacies, staffed by qualified technicians, where prescriptions are filled under the supervision of a licensed pharmacy's pharmacist. All patients are required to talk with a pharmacist each time they pick up a prescription. The remote site is required to comply with all WI dispensing laws.

Table 3. Summary of components of telepharmacy required for states in the upper Midwest region as specified in their Board of Pharmacy rules and statues.

Components of Telepharmacy	IL	IA	MN ^b	NE	ND	SD	WI
Requirement for computer link, audio-link and video-link at all times in remote site	x	x	x		x	x	
Technician staffing at remote site	x	x	x		x	x	x
Pharmacy intern staffing at remote site						x	x
Counseling required with every Rx pick up	x	x	x		x	New Rx only	x
Provisions for Automated dispensing machines in statutes/laws/rules	x			x	x	x ^c	
Must prove need for telepharmacy/remote dispensing site		x	x		x	x	
Remote site requires licensure	x	x	x		x	x	d
Remote site allowed to operate only when supervising site is open	x ^a		x			x ^a	x
Dispensing considered to be done at supervising site			x				x
Provisions for hospital settings included in statutes/laws/rules		x		x	x		
Regular inspections of remote site by supervising pharmacist required	x		x		x	x	x

a Remote dispensing sites may be open when the central pharmacy is closed if a pharmacist from the central site is physically present and working in the remote location.

b Minnesota information is based on the guidance document published by the MN BoP for obtaining a variance to MN law allowing for the operation of telepharmacies in the community setting.

c SD rules state remotes sites may utilize automated filling machines.

d WI does not allow remote dispensing sites to be licensed as a pharmacy.