Journal of Pharmacy Technology
2014, Vol. 30(3) 76–80

DOI: 10.1177/8755122513505744
pharmatech.sagepub.com
SAGE

Initial Experience of Clinical Pharmacy Services Delivered by Computer Communication via Cisco Jabber Video in a US Veterans Administration Medical Center

Julie A. Stading, PharmD, CDE[1,2], Linda Phan, PharmD[3,4], Andrea Walter, PharmD[5], Lisa Bilslend, PharmD[2], Rebecca White, PharmD[2], and Yongyue Qi, MS[1]

Abstract

Background/Objective: Clinical video telepharmacy is a new initiative of the Department of Veterans Affairs (VA) to provide rural patients access to clinical pharmacy services. This article describes some of the obstacles that pharmacists faced as they initiated this service and early outcomes in diabetes and hyperlipidemia patients. **Methods:** This study was approved by the institutional review board. This was a single-center, retrospective review of patients seen by 3 clinical pharmacists who developed and administered the telepharmacy clinics. Patients were referred by their primary care providers. Patients traveled to their local community-based outpatient clinic where a nurse set up video conferencing and then paged the pharmacist at the Lincoln VA. Patients were referred for management of anticoagulation, diabetes, hyperlipidemia, or hypertension, with 112 patients screened and 12 patients meeting criteria for hemoglobin A1c (HbA1c) evaluation and 25 patients meeting criteria for low-density lipoprotein (LDL)-cholesterol evaluation. Pharmacists also saw new patients for medication reviews, patients just out of the hospital, and patients with questions about their medication regimens. This study looked specifically at the effect that the pharmacist had on HbA1c and LDL-cholesterol reduction and meeting goals for these 2 parameters. **Results:** Patients in the diabetes group had a mean ± standard deviation reduction in HbA1c of 1.08 ± 0.85 (95% confidence interval = 0.53-1.62; $P = .001$). The mean HbA1c decreased from 9.1% to 8% after pharmacist intervention. Patients in the hyperlipidemia group had a mean ± standard deviation reduction in LDL-cholesterol of 23.74 ± 7.76 mg/dL (95% confidence interval = 7.76-39.75; $P = .005$). The mean LDL-cholesterol decreased from 145 to 121 mg/dL after intervention. There were no significant changes in the number of patients attaining their HbA1c or LDL-cholesterol goals after intervention. **Conclusions:** This study shows that telepharmacy allows patients to have access to pharmacy services in a rural environment with minimal inconvenience to the patient. This study also suggests that outcomes of disease management are similar to face-to-face visits.

Keywords

telemedicine, telepharmacy, rural health, diabetes, dyslipidemias

Introduction/Background

Rural areas of the United States face shortages of health care professionals. Many remote areas do not offer amenities that can attract and retain quality personnel. Various ideas have been proposed to help alleviate the shortage. One of these ideas involves delivery of health care services via long distance. At the Nebraska-Western Iowa Healthcare System, Department of Veteran Affairs (VA), approximately 52% of patients live in rural areas. As part of an initial program, pharmacists at the Lincoln VA deliver clinical video

[1]Creighton University School of Pharmacy and Health Professions, Omaha, NE, USA
[2]VA Nebraska-Western Iowa Health Care System, Lincoln, NE, USA
[3]Kingman Regional Medical Center, Kingman, AZ, USA
[4]University of Arizona College of Pharmacy, Phoenix, AZ, USA
[5]Rozene, Omaha, NE, USA

Corresponding Author:
Julie A. Stading, PharmD, CDE, Creighton University School of Pharmacy and Health Professions, 2500 California Plaza, Omaha, NE 68178, USA.
Email: juliestading@creighton.edu

telepharmacy services via Jabber. This overview of the first few years reviews both accomplishments and learning experiences.

One of the initial problems with distance interaction with patients was technology. Many older patients can be uncomfortable with computers or other electronic equipment. To overcome this barrier, patients go to a local community-based outpatient clinic (CBOC) near their home. There, a nurse prepares the computer for communication. This requires a quiet room and a computer with a secure Internet connection. Once the patient is in the room and the program is running, then the nurse calls or pages the pharmacist at the Lincoln VA. The pharmacist then connects to the patient and the conversation can begin.

There was a learning curve for the pharmacists at the Lincoln VA as they instituted this program. One problem that needed to be resolved was space. Initially, all 3 pharmacists shared 1 office space divided into cubicles. It was often too noisy if more than 1 pharmacist was online at the same time. Another room was acquired that allowed 2 pharmacists to be online at the same time. Later, headphones with a microphone allowed the other 2 pharmacists who shared an office space to minimize excess noise and conduct simultaneous appointments.

Another issue that arose was the difficulty in viewing both the electronic medical record and the patient on the same video screen. Adding a second screen allowed the pharmacist to view labs and medications without leaving the video conference. It also took practice for the pharmacists to look at the video camera rather than the patient's face on the screen. They discovered that when they actually looked at the patient's image on the screen, the patients thought they were looking down instead of looking at them.

As with any video communication, it is important to look at the background behind and on the desk in front of the clinician, to ensure there is nothing that will distract the patient's attention as well as anything that might show another patient's confidential information, which could violate HIPPA. It also helped to wear clothing of a different color than the background. Investing in a good microphone was important to provide communication that was not hindered due to poor sound quality.

Clinical pharmacists at the Lincoln VA have conducted clinical video telepharmacy visits for management of anticoagulation, lipids, diabetes, and hypertension. New patients to the VA system have had medication review appointments where medications have been changed to formulary alternatives. Medication reviews have also been done after hospital discharge, or to clarify a complicated medication regimen for the patient.

There have been drawbacks to long-distance communication, such as visits that require physical assessment that must be done by personnel at the site where the patient is visiting. For examples, telehealth pharmacists are able to alert the nurse on site via instant messaging if a blood pressure needs to be taken, bruises need to be evaluated, edema needs to be checked, or further action needs to be taken for a patient experiencing chest pain. It is helpful to have the appropriate personnel at the distant site.

One of the advantages that the VA system has for this type of interaction is that labs, medication lists, as well as clinic notes are available via computer to all personnel within the same region. Patients seen in any Nebraska VA, whether for an outpatient or inpatient visit, will have notes available to read and labs available to review. So information for a patient who has labs done in a town 100 miles away are available as soon as they are entered into the system and progress notes regarding therapy can be read prior to visiting with the patient.

Whenever you have a new program, it is important to assess progress made and whether there is some benefit gained by the patient. Management of diseases via the Internet should have similar impact as face-to-face contact if done appropriately. Multiple studies assessing the impact that pharmacists have on diabetes and lipids have been done.[1-6] Face-to-face patient visits with clinical pharmacists in a study of 101 patients in the management of diabetes and dyslipidemia demonstrated significant improvement in hemoglobin A1c (HbA1c) from 7.7% to 7.0% and low-density lipoprotein (LDL)-cholesterol reduction from 108 to 91 mg/dL for private health care plan members.[1] Mazzolini et al conducted a retrospective chart review in hyperlipidemia patients revealing more patients reached their LDL-cholesterol goals in the pharmacist-managed lipid clinic compared to usual care.[2] Only 36% of patients were at LDL-cholesterol goals before and 64% were at goal after intervention ($P < .001$), with an average reduction of 24 mg/dL ($P < .001$). Fabbio et al were also able to show similar results in a pharmacist-managed telephone lipid clinic.[3] The LDL-cholesterol was 168 mg/dL before and 123 mg/dL after intervention, and none of 36 were at goal before and 10 of 36 were at goal following intervention. Stading et al reviewed 36 type 2 insulin dependent diabetes patients who had intervention by a pharmacist compared to 45 controls and showed a drop of 0.672 in the HbA1c compared to an increase of 0.308 in the control group ($P < .02$).[4] The number of those reaching goal HbA1c was 50% versus 37% in the control group; however, it was not a statistically significant reduction. In a study by Rothman et al, 138 patients started with a baseline HbA1c average of 10.8%, and after 6 months of intervention, the mean reduction in HbA1c was 1.9 percentage points (95% confidence interval = 1.5-2.3).[5] McCord performed a retrospective chart review of 316 patients who had pharmacist intervention, which showed a mean HbA1c reduction of 1.4% ($P < .001$), and the number of patients reaching a goal HbA1c <7% increased from 14.8% to 43.2% ($P < .001$).[6]

But there are less data available for distance education and management of patients by pharmacists. McFarland and colleagues studied management of diabetes patients via a home

Table 1. Inclusion and Exclusion Criteria of the Study.

Inclusion	Exclusion
• Received care at any of the 3 CBOCs at least 6 months prior to first telepharmacy visit	• Inactive patient status
• Diagnosis of type 2 diabetes and/or hyperlipidemia	• Not seen by primary care provider in the 6 months prior to enrollment
• At least 2 visits with pharmacist after enrollment	• Concurrently followed by Chronic Disease Management nurses
• At least 1 HbA1c or LDL-C lab result within 6 months prior to enrollment	• Only seen for triglyceride management
• Seen by telepharmacy for diabetes or hyperlipidemia for at least 6 months	• No lab results consisting of HbA1c or lipid panel
	• Only one visit with telepharmacist

Abbreviations: CBOC, community-based outpatient clinic; LDL-C, low-density lipoprotein cholesterol.

monitoring system.[7] Thirty-six patients were part of a home telepharmacy program compared with 67 patients in a control group. The patient first met the pharmacist face-to-face, but then used a home messaging device to communicate with the pharmacist. They did have 2 follow-up visits face-to-face as well. A statistically significant difference in mean HbA1C was noted in the home telepharmacy group versus the control group at 3 months (7.2% vs 8.0%, $P < .001$) and 6 months (6.9% vs 7.5%, $P < .01$). Sixty-nine percent of the telepharmacy group versus 36% in the control group achieved the American Diabetes Association HbA1C goal of less than 7% ($P < .001$). Even though this used distance technology, it still involved face-to-face visits.

The following study shows the initial outcome of clinical video telepharmacy services provided by pharmacists at the Lincoln VA in Lincoln, Nebraska, where patients never meet face-to-face. Instead, the patient meets the pharmacist via video teleconferencing.

Goals and Objectives of Data Collection

In 2010, the Lincoln division of the Veteran Affairs Nebraska-Western Iowa Health Care System (VA NWIHCS) initiated a clinical telepharmacy clinic with video conferencing ability, to assist practitioners at 3 rural CBOCs in the management of chronic disease states. The intent of this study was to assess efficacy of intervention by a pharmacist-managed telehealth clinic in addition to standard care to improve outcomes in veterans with diabetes, hyperlipidemia, or both.

Methods

Study Design

This study was a single-center, retrospective analysis of data collected for dates of service 6 months prior to and after the initial clinical video telepharmacy visit on all active veterans diagnosed with diabetes and/or hyperlipidemia at CBOCs of VA NWIHCS. The clinics in Norfolk and Holdrege, Nebraska, and Shenandoah, Iowa, were included. Primary outcome data of HbA1c and LDL-cholesterol was gathered. The HbA1c goal was defined as <7% and LDL-cholesterol goal is defined by the primary care provider or cardiologist. The secondary outcome was the number of patients attaining HbA1c and LDL-cholesterol goal before and after pharmacist intervention.

The VA computerized patient record system was used to identify patients with diabetes and/or hyperlipidemia and to gather intervention dates, lab values, and demographic information. All patients who were scheduled into the telepharmacy medication therapy management clinic between the dates of August 30, 2010, and February 17, 2011, were screened based on inclusion and exclusion criteria. See Table 1.

Patients were separated into 2 study groups, diabetes and hyperlipidemia. The mean HbA1c and LDL-cholesterol lab values within 6 months prior to initial telepharmacist intervention were compared to the mean values within 6 months after intervention. One hundred and twelve patients were screened and 34 patients with diabetes and/or hyperlipidemia were included in the data analysis. The patients in both groups were not mutually exclusive. See Table 2.

Study Participants

At baseline, both the diabetes and hyperlipidemia groups included veterans mostly in their upper 60s, all white, and obese (body mass index > 30 kg/m^2). Both groups had the mean values of liver enzymes and serum creatinine within normal limits. The diabetes group had a mean HbA1c of 9.1% prior to pharmacist intervention. The hyperlipidemia group had a mean LDL-C of about 140 mg/dL prior to intervention. See Table 3.

Statistical Analysis

To determine the primary outcome, a paired *t* test was used to analyze the HbA1c and LDL-cholesterol within 6 months prior to and after initial telepharmacist intervention. The paired *t* test was chosen since there were 2 time points to compare and the

Table 2. Screening Patients.

N = 112; Consults for Clinical Video Telepharmacy Services Between August 30, 2010, and February 17, 2011	
Patients Excluded, n	Explanation of Exclusion
28	Not seen for diabetes or lipids
8	Treatment was for triglycerides
26	Not seen for at least 6 months in clinic
10	Only had one telepharmacy visit
6	Patients were also seen by chronic disease manager nurse
Thirty-Four Patients Included in the Study[a]	
12 Diabetes management patients	25 LDL-cholesterol management patients

Abbreviation: LDL, low-density lipoprotein.
[a]Three patients were being managed for both diabetes and LDL-cholesterol.

Table 3. Baseline Characteristics of the Study Population.

	Diabetes (n = 12)	Hyperlipidemia (n = 25)
	Mean ± SD	Mean ± SD
Male sex, n (%)	12 (100%)	23 (95.8%)
White race, n (%)	12 (100%)	25 (100%)
Age (years)	67.7 ± 8.2	69.6 ± 10.7
Weight (kg)	102.9 ± 19.4	98.5 ± 20.1
BMI (kg/m^2)	31.5 ± 5.8	31.3 ± 5.4
HbA1c (%)	9.1 ± 1.0	—
Total cholesterol (mg/dL)	—	212.8 ± 38.8
Triglycerides (mg/dL)	—	175.5 ± 70.6
HDL cholesterol (mg/dL)	—	38.5 ± 9.6
LDL cholesterol (mg/dL)	—	139.8 ± 41.4
AST	28.2 ± 10.8	37.9 ± 16.8
ALT	30.8 ± 19.9	29.3 ± 15.6
Serum creatinine	1.2 ± 0.4	1.2 ± 0.5

Abbreviations: SD, standard deviation; BMI, body mass index; HDL, high-density lipoprotein; LDL, low-density lipoprotein; AST, aspartate aminotransferase; ALT, alanine aminotransferase.

differences between the 2 measures were approximately normally distributed. For the secondary outcome, the McNemar test was chosen to determine proportion changes. The test analyzed the number of patients who attained their HbA1c and LDL-cholesterol goals prior to and after intervention.

Results

Primary and Secondary Outcomes

Intervention by clinical video pharmacy (telepharmacy) services demonstrated statistically significant reductions in HbA1c and LDL-cholesterol. These results are comparable to patient results from face-to-face visits with clinical pharmacists. Patients in the diabetes group had an average HbA1c reduction of 1.08 (SD = 0.85), indicating the intervention resulted in a significant decrease in HbA1c (P = .001). The mean HbA1c decreased from 9.1% to 8.0% after pharmacist intervention. Patients in the hyperlipidemia group had an average LDL-cholesterol reduction of 23.74 mg/dL (SD = 38.78). The mean LDL-cholesterol significantly decreased from 145 to 121 mg/dL after intervention (P = .005). See Table 4.

Regarding the secondary outcome, there were no significant changes in the number of patients attaining their HbA1c or LDL-cholesterol goals after intervention. In the diabetes group, 2 patients met their HbA1c goal prior to telepharmacist intervention compared to 3 patients afterwards. In the hyperlipidemia group, 3 patients met their LDL-cholesterol goal prior to intervention compared to 9 patients afterwards. See Table 5.

Discussion

Limitations

There were a few limitations in this study. The small sample of size of 34 patients was due to multiple reasons. First, the

Table 4. Changes in Hemoglobin A1c and LDL-Cholesterol.

	Mean ± SD	95% CI	*P*
Reduction in HbA1c (%)	1.08 ± 0.85	0.53-1.62	.001
Reduction in LDL-C (mg/dL)	23.74 ± 7.76	7.76-39.75	.005

Abbreviations: SD, standard deviation; CI, confidence interval; LDL-C, low-density lipoprotein cholesterol.

Table 5. Number of Patients at Goal.

	Number at Goal Prior to Intervention	Number at Goal After Intervention	*P*
Hemoglobin A1c at goal	2	3	.200
LDL-cholesterol at goal	3	9	.070

Abbreviations: LDL, low-density lipoprotein.

telepharmacy clinic is relatively new, meeting with its first patient in late 2010. Along with a new service, providers were not in the habit of referring patients to the telepharmacy clinic. Therefore, the number of patient referrals was low and patients were not able to meet the required telepharmacy enrollment duration of at least 6 months. Second, CDM nurse involvement excluded one third of the potential diabetes patients from this study. The third reason for a small sample size involved patients who met their HbA1c or LDL-cholesterol goals after pharmacist intervention and were discharged from the telepharmacy clinic before the 6-month mark, which excluded them from the study. Another limitation deals with the small number of lab values gathered due to the short time frame of 6 months prior to and after intervention. Many providers may only order HbA1c or LDL-cholesterol labs once every year or every 6 months, with the shortest frequency of every 2 to 3 months. Thereby, this provided a maximum of 3 lab values to compare prior to intervention to 3 lab values after intervention. It is also important to note that patients who are referred to the pharmacy clinic are usually more complicated or have more issues with compliance.

Conclusions

With the lack of providers in rural areas in our country, it is encouraging that care may be provided from a distance that can make a difference in their lives. Prior to this program being implemented, the patients in the rural areas of Nebraska did not have access to a clinical pharmacist. This program allows them additional care that would otherwise be unobtainable. As the US population ages, the need for health care services will continue to rise and will provide more opportunities for pharmacists to become involved. The results of this study suggest that this may be accomplished from a distant setting.

Authors' Note

The work described in this article was presented at the Midwest Pharmacy Residents Conference in May 2012.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

References

1. Johnson CL, Nicholas A, Divine H, Perrier DG, Blumenschein K, Steinke DT. Outcomes from DiabetesCARE: a pharmacist-provided diabetes management service. *J Am Pharm Assoc*. 2008;48:722-730.
2. Mazzolini, TA, Irons BK, Schell EC, Seifert CF. Lipid levels and use of lipid-lowering drugs for patients in pharmacist-managed lipid clinics versus usual care in 2 VA Medical Centers. *J Manag Care Pharm*. 2005;11:763-771.
3. Fabbio KL, Bradley M, Chrymko M. Evaluation of a pharmacist-managed telephone lipid clinic at a Veterans Affairs Medical Center. *Ann Pharmacother*. 2010;44:50-56.
4. Stading JA, Herrmann J, Walters R, Destache C, Chock A. Impact of pharmacist intervention on diabetes patients in an ambulatory setting. *Diabetes Spectr*. 2009;22:241-246.
5. Rothman R, Malone R, Bryant B, Horlen C, Pignone M. Pharmacist-led, primary care-based disease management improves hemoglobin Hg A1c in high-risk patients with diabetes. *Am J Med Qual*. 2003;18:51-58.
6. McCord AD. Clinical impact of pharmacist-managed diabetes mellitus drug therapy management service. *Pharmacotherapy*. 2006;26:248-253.
7. McFarland M, Davis K, Wallace J, et al. Use of home telehealth monitoring with active medication therapy management by clinical pharmacists in veterans with poorly controlled type 2 diabetes mellitus. *Pharmacotherapy*. 2012;32:420-426.