Impact of a Pharmacist-Led Chronic Disease State Management Clinic on Patient Assessment of Chronic Illness Care

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Abstract
Background: The Patient Assessment of Chronic Illness Care (PACIC) tool measures patient satisfaction with chronic disease care. Objective: A modified PACIC tool (PACIC-RxFM) was used to assess patient satisfaction in a pharmacist-led chronic disease state management clinic. The secondary outcome compared satisfaction with pharmacist-led and physician-led visits. Methods: This cross-sectional study surveyed individuals with ≥1 chronic disease who saw a pharmacist (pharmacotherapy) or primary care provider (usual care) in the Texas Tech Physicians Family Medicine Clinic. The PACIC-RxFM survey included 15 items rated on a five-point Likert scale (5 = “always satisfied”). Results: A total of 107 patients with no significant differences in demographics or complexity between groups were surveyed. All mean domain scores indicated a high level of satisfaction in the pharmacotherapy group with statements regarding perceptions of care organization and encouragement to go to group classes yielding statistically significantly higher scores than the usual care group. Conclusion: Patients are satisfied with both providers’ and pharmacists’ involvement in chronic illness care. This involvement leads to significant improvement in patient perception of care organization.

Keywords
Clinician–patient relationship, interprofessional communication, outpatient satisfaction data, patient satisfaction

Introduction
For many years, healthcare in the United States has been encouraging interprofessional collaboration for optimal management of chronic diseases. Led by the Primary Care Collaborative (PCPCC), the patient-centered medical home (PCMH) has become a popular model to promote interprofessional collaboration (1). In 2010, the Patient Protection and Affordable Care Act (PPACA) prioritized interprofessional healthcare delivery, stating a need for “team management of chronic disease” and “integration of models of healthcare that incorporate transitions in health settings” (2).

In 1997, the Center for the Advancement of Health in Washington DC released a commentary describing the collaborative management of chronic illness. The authors insist that collaborative care not only involves the necessary healthcare disciplines, but also patients and their families (3). Patients and their families are the primary care-givers in chronic illness, taking responsibility for the day-to-day tasks necessary to promote health and prevent adverse sequelae (3). The article outlines several principles of effective patient-inclusive chronic illness care including identification of problems, targeted goal setting and planning, provision of adequate training and support for self-management, and active and sustained follow-up (3).

Despite the demonstration of consistent improvement in patient safety and quality of care, a 2020 review of the

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literature indicates that little is known about patient experience with interprofessional primary care (4). In response to the need for patient-centered care in chronic illness, the MacColl Center for Healthcare Innovation developed the Chronic Care Model (5). The team developed the Assessment of Chronic Illness Care (ACIC) tool which allows providers to self-assess how well they are addressing the basic elements of chronic illness care (6). In 2005, the MacColl Center released and validated the Patient Assessment of Chronic Illness Care (PACIC) tool to assess chronic illness care from the patient perspective (7). Since 2005, the tool has been translated into numerous languages and adapted to assess patient satisfaction with diabetes care and home health care (7).

Patient activation is defined as the patient’s “willingness and ability to take independent actions to manage their healthcare” (8). The Patient Activation Measure (PAM) is the validated, gold standard tool for assessing patient activation (8). Higher PAM scores were shown to correlate with higher patient satisfaction, and subsequently, higher PACIC scores.

Numerous studies suggest that pharmacist participation in primary care clinics leads to positive clinical outcomes, increases adherence to medications, and elicits positive behavior change (9,10). Previous studies have also shown that patients are satisfied with pharmacist care, but these studies have not been specific to chronic illness.

With the increasing demand for primary care services and the current primary care provider shortage, collaborative care is more important than ever. Previous studies have established that pharmacists improve patient outcomes, but there is a gap in knowledge of the patient experience in a pharmacist-led chronic disease state management clinic. This study used a modified PACIC tool to describe patient perceptions of chronic illness care in an academic, pharmacist-led chronic disease state management clinic. The study also assessed differences in patient experience between patients seen only by a primary care provider and those who were seen by both a primary care provider and a pharmacist.

**Methodology**

This study was an observational, cross-sectional study with the primary outcome to describe the patient assessment of chronic illness care in an academic, pharmacist-led chronic disease state management clinic (pharmaco-therapy group). A group of patients seen only by a primary care provider (usual care group) at the same clinic was surveyed to establish a baseline level of satisfaction in the clinic. The usual care group was used to evaluate the secondary outcome which was to determine if any differences in patient experience exist between the pharmacotherapy and usual care groups.

The study population included patients who were 18 years of age and older with at least one chronic disease state and being seen for a nonacute visit at the time of the survey. Nonacute visits included those for hypertension, dyslipidemia, anticoagulation, diabetes, COPD, asthma, chronic pain, or preventive care (Medicare Annual Wellness visits [AWV]). This list of chronic disease states reflects the disease states included in the pharmacist collaborative drug therapy management protocol. The protocol allows pharmacists to independently conduct visits, adjust medications, and order appropriate laboratory monitoring tests for these disease states. Patients presenting for a pharmacist visit were assigned to the pharmacotherapy group, and patients presenting for a primary care visit were assigned to the usual care group. Pharmacotherapy and usual care patients were matched on a 1:1 basis with a goal of 50 surveys in each group during the data collection period.

The research team identified eligible patients on the clinic schedule and prepared participant packets for each patient. The survey packet is included in Appendix A. Surveys were provided at the time of the clinic visit in a blinded manner, and patients were asked to complete the survey at the conclusion of their chronic disease state management visit.

Completion of the survey was not required. The survey was available in English only and the patient was to complete the survey him/herself or with the assistance of a caregiver. Clinic providers were not allowed to assist patients with the survey to avoid any possible influence on a patient’s responses.

Each week, a research team member collected all surveys from the designated collection box and tabulated the anonymous responses into a password-protected Microsoft Excel file. A count of eligible patients and returned completed surveys were kept for the purposes of calculating a survey response rate.

The PACIC-RxFM survey is subdivided into 4 domains, including patient activation, decision support, goal setting, and problem-solving. The original PACIC tool includes a fifth domain, “follow-up and coordination of care,” which was intentionally excluded from the PACIC-RxFM tool. The activities described in these statements pertain to referrals made to other healthcare providers and community programs, which are activities rarely completed by the pharmacist.

Data collection for this project began in March 2020 but took longer than anticipated during the COVID-19 pandemic. As the clinic transitioned to a larger portion of telehealth visits, the number of patients eligible to complete the survey at an in-person visit dropped significantly. To accommodate for the decrease in eligible participants and the lower number of chronic disease visits, this study underwent IRB amendment to allow for online administration of the survey through Qualtrics. At the time of the amendment, the intended number of usual care surveys had already been collected. A list of eligible pharmacotherapy patients with a planned telehealth visit was kept with the pharmacy providers who emailed the Qualtrics survey link to patients after
their chronic disease state management visit. The Qualtrics survey link did not ask for identifiable patient information to maintain anonymity across all survey respondents.

Raw data were stored in a password-protected Microsoft Excel file. Descriptive statistics were used for demographic data and Chi-Square tests were used to assess any significant baseline characteristic differences between the pharmacotherapy and usual care groups. Unpaired t-tests were used to compare PACIC-RxFM scores between pharmacotherapy and usual care groups.

**Results**

Participants were recruited during a 13-month period from March 2020 to April 2021. During the study period, there were 156 patients eligible in the pharmacotherapy group, and the research team received 50 responses, with a response rate of 32%. There were 4 pharmacotherapy responses received from the online Qualtrics version of the survey. Similarly, the usual care group had 171 patients eligible and received a total of 57 responses, which is a 33.3% response rate. There were no online Qualtrics surveys received from the usual care group.

Demographic responses are included in Table 1. The mean age of survey respondents is similar between the pharmacotherapy group and the usual care group. There were no statistically significant differences between the number of visits per year and the number of chronic medications taken by each patient. The main differences between the pharmacotherapy and usual care groups were in the disease states that each visit focused on. In the usual care group, there were significantly more hypertension visits (33.9%) than in the pharmacotherapy group (10.2%, \( P = .005 \)). The usual care group also conducted significantly more visits for hyperlipidemia (19.6% vs 0%, respectively, \( P = .0007 \)). The pharmacotherapy providers conducted significantly more anticoagulation visits (16.3% vs 0%, respectively, \( P = .0016 \)) and more Medicare Annual Wellness Visits (46.9% vs 14.3%, respectively, \( P = .005 \)). Of note, only 3 patients from the pharmacotherapy group noted being seen for more than one disease state at any given visit. There were 17 patients reporting multiple diagnoses in the usual care group.

Results for the primary outcome are shown in Table 2. Table 2 shows the mean score for each PACIC-RxFM domain.

### Table 1. Demographic Information.

| Demographic          | Pharmacotherapy (n = 50) | Usual care (n = 57) | \( P \)-value |
|----------------------|-------------------------|--------------------|--------------|
| Age (yrs)a           | 64.3 ± 14.9              | 61.6 ± 13.8        | .3341        |
| Gender               |                         |                    |              |
| Male (%)             | 34                      | 32.1               | .8373        |
| Reason for visit (%)b|                         |                    |              |
| HTN                  | 10.2                    | 33.9               | .0049        |
| HLD                  | 0                       | 19.6               | .0007        |
| DM                   | 20.4                    | 30.4               | .2710        |
| COPD                 | 0                       | 7.1                | .1212        |
| Anticoagulation      | 16.3                    | 0                  | .0016        |
| Pain management      | 4.1                     | 10.7               | .2789        |
| AWV                  | 46.9                    | 14.3               | .0005        |
| Other                | 8.2                     | 35.7               | .0009        |
| TTFM visits/year (%)c|                         |                    |              |
| 1-2                  | 53.3                    | 66.0               | .2203        |
| 3-4                  | 26.7                    | 20.8               | .6331        |
| 5 or more            | 20.0                    | 13.2               | .4187        |
| Chronic medications (%)|                       |                    |              |
| 0-1                  | 6.5                     | 5.6                | 1.000        |
| 2-5                  | 45.7                    | 48.1               | .8427        |
| 5-10                 | 32.6                    | 33.3               | 1.000        |
| 10 or more           | 15.2                    | 13.0               | .7794        |

\( a \)Expressed as mean ± SD.

\( b \)Total is more than 100% because of visits in which 2 or more disease states were addressed.

\( c \)Texas Tech Physicians Family Medicine Clinic.

\( d \)P-value for age determined using unpaired t-test for continuous data; \( P \)-value for all other demographic variables determined using a Chi-square test with 2 \( \times \) 2 contingency table for nominal variables.
domain and the percentage of responses that were 4 or 5 in each domain. All mean domain scores were above 3.5, indicating a high level of satisfaction with chronic illness care provided by pharmacists. The lowest scoring statement for the pharmacotherapy group was “Encouraged to go to a specific group or class to help me cope with my chronic condition,” with a mean score of 2.86. The highest scoring statement for the pharmacotherapy group was “satisfied that my care was well-organized,” with a mean score of 4.92.

Table 3 shows the results for the secondary outcome, which was to determine if there were any significant differences in PACIC-RxFM scores between groups. Of the fifteen statements in the PACIC-RxFM tool, only 2 statements had a statistically significant difference in mean score. Patients reported they were “more satisfied that my care was well organized,” in the pharmacotherapy group than in the usual care group (4.92 vs 4.39, \( P = .0458 \)). Even though low scores indicate a low occurrence rate overall, more patients in the pharmacotherapy group were “encouraged to go to a specific group or class to help me cope with my chronic condition,” than in the usual care group (2.86 vs 2.11, \( P = .0396 \)).

Discussion

The Centers for Disease Control and Prevention (CDC) estimates that 6 out of 10 (60%) adults are living with a chronic disease, defined as lasting for 3 months or longer (11). In 2014, the National Health Council estimated that 133 million Americans had a chronic disease, a number that is now estimated to be 160 million Americans in 2021 (12). Chronic disease accounts for half (5 out of 10) of the top 10 leading causes of death in the United States (13).

The PACIC tool has been previously used to describe the patient assessment of chronic illness care provided by primary care physicians, diabetes educators, and home health care services, but the literature has not yet described the patient assessment of chronic illness care in a pharmacist-led chronic disease state management clinic. The PACIC domains clearly reflect the steps involved in providing patient-centered care. Even more striking is the similarity between the PACIC domains and the elements of the Pharmacist Patient Care Process (PPCP) (14). The PPCP includes collecting information, assessing the information, creating a patient care plan, implementing the patient care plan, and follow-up. Figure 1 shows the parallel between the PACIC domains and the PACIC-RxFM tool. Our study used a modified version of the PACIC tool, renamed...
PACIC-RxFM, to assess patient experience with chronic illness care in a pharmacist-led chronic disease state management clinic.

Our study demonstrates high levels of satisfaction with chronic illness care provided by pharmacists. Perhaps more important is the consistently positive experience across all aspects of the patient care process. Patients in the pharmacist-led chronic disease state management clinic were frequently given choices to think about their care, shown how their actions influence their condition, helped to set specific goals, and experienced visits in which they felt their values, beliefs, and traditions were taken into account before deciding on a particular treatment plan.

All information collected from patients, including demographic information, was self-reported to maintain the anonymity of survey responses. There weren’t any differences in the level of complexity for patients in the pharmacotherapy group versus the usual care group. The measures of complexity in this study were the number of clinic visits in the past 6 months, the number of hospitalizations over the past year, and the number of chronic medications. The only statistically significant difference between these parameters was more patients in the pharmacotherapy group being hospitalized one time in the past year. Because this trend is not seen across all categories for hospitalization, the difference may not be seen if the study was conducted with a larger sample size. One may anticipate that the pharmacotherapy patients may be “more complex,” because the referral system to pharmacy services lends itself to patients with complex medication regimens and chronic disease states. These similarities between the patient population in each group are a strength of the study because they eliminate potential confounding variables that could impact a patient’s experience with his/her chronic illness care.

Another strength of this study is that there are few differences in patient satisfaction with chronic illness care between the pharmacotherapy patients and the usual care patients, indicating that both sets of providers at the clinic are effectively employing the elements of the Pharmacists’ Patient Care Process and delivering patient-centered care. There were only 2 statements that reached statistical significance. The first statement was, “satisfied that my care was well organized.” This statement scored very high in both groups, but the mean score was significantly higher in the pharmacotherapy group. The clinic pharmacotherapy service has third and fourth-year pharmacy students completing experiential rotations in the clinic almost year-round, and the educational process allows for extremely thorough chart reviews, careful follow-up, and “many hands making light work,” which may explain the difference. Another potential explanation for this difference is both a challenge for the primary care physician, but also one of the benefits. PCPs are tasked with managing multiple disease states, often in a much shorter visit than a pharmacotherapy provider. This one-stop shopping allows patients to have many different concerns addressed in a single visit, but also makes it difficult to do so as thoroughly within the allowable time constraints. In this clinic, PCPs typically conduct 15 to 30 min visits while pharmacotherapy providers spend 30 to 60 min with each patient. The nature of having more time with each patient allows pharmacotherapy providers to ensure that care for 1 or 2 specific disease states is very well organized, emphasizing the importance of interprofessional care. Even with the best intentions, a PCP may not have time for extensive counseling, but collaboration with an interprofessional team that includes a pharmacist provides the patient with this opportunity. The other statement was, “encouraged to go to a specific group or class to help me cope with my chronic condition.” This statement scored relatively low in both groups, but the pharmacotherapy patients did respond more confidently that their provider had referred them to additional services. The explanation for this difference is partially the type of services that fall under a pharmacist’s scope of practice, but it also highlights that our pharmacotherapy providers are active in getting patients connected to other services in the community.

Our study is not without limitations. Only one-third of eligible patients chose to participate in the PACIC-RxFM survey and all responses were self-reported. The study faced significant challenges with administering surveys during the COVID-19 pandemic as there were changes in clinic workflow, limited in-person visits, and other unforeseen challenges that occurred after the study was outlined. The significant differences demonstrated in the disease states managed by the pharmacotherapy group versus the usual care group may be somewhat representative of the patient population in the pharmacotherapy clinic; however, it does not tell the full story of pharmacist-led chronic disease state management. As mentioned previously, many more patients in the usual care group reported discussing more than one disease state at a chronic disease state management visit. Pharmacist are equipped to assess and address all chronic disease states in the collaborative drug therapy management protocol and do so at most visits. All patients with diabetes are evaluated for the need for lipid-lowering therapy and full medication reconciliation is completed with each visit. There are known differences in the patient population in that anticoagulation is a full medication management state, and Medicare Annual Wellness Visits are often delegated to pharmacists and non-physician providers whose scope of practice allows them to contribute to preventative care.

Because of the shift to teledhealth visits due to the COVID-19 pandemic, there may have been a greater opportunity to address patient assessment of chronic illness care conducted via telehealth. However, given the timeline of our study and the small number of patients responding through the Qualtrics online survey (n = 4), all responses were evaluated together, and future studies may consider comparing patient assessment of chronic illness care provided via telehealth to that provided at an in-person clinic visit. Finally, in hindsight, the objective information presented in this article may have been strengthened by collecting qualitative responses to answer questions as to what elements of chronic illness care
The study describes the patient assessment of chronic illness care in a pharmacist-led chronic disease state management clinic. Of the elements surveyed in the PACIC-RxFM tool, pharmacists employed the elements of the patient care process and the chronic care model at a high level. The fact that there are few differences between the pharmacotherapy and usual care groups indicates that patients are satisfied with their care at the clinic and that the patient experience in this interprofessional setting is well-received on both sides. This study is another indication that interprofessional care not only improves outcomes, but also improves the patient experience. As more health-systems work toward a shared medical appointment model, future studies could explore whether patient satisfaction is maintained or perhaps even improved when multiple providers are seen during the same visit.

Declaration of Conflicting Interests
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Ethical Approval
Ethical approval to report this study was obtained from the Texas Tech University Health Sciences Center Institutional Review Board (IRB Approval Number A20-4134).

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Statement of Human and Animal Rights
All procedures in this study were conducted in accordance with the Texas Tech University Health Sciences Center Institutional Review Board’s (IRB Approval Number A20-4134) approved protocols.

Statement of Informed Consent
Verbal informed consent was obtained from the patients for their anonymized information to be published in this article.

Supplemental Material
Supplemental material for this article is available online.

References
1. Patient Centered Primary Care Collaborative. Defining the Medical Home. 2007. Accessed November 9, 2019. https://www.pcpcc.org/about/medical-home.
2. 111th United States Congress. The Patient Protection and Affordable Care Act. 2010. Accessed October 17, 2019. http://housedocs.house.gov/energycommerce/ppacaon.pdf.
3. Von Korff M, Gruman J, Schaefer J, Curry SJ, Wagner EH. Collaborative management of chronic illness. Ann Intern Med. 1997;127(12):1097-102. DOI: 10.7326/0003-4819-127-12-199712150-00008.
4. Morgan KH, Barroso CS, Bateman S, Dixon M, Brown KC. Patients’ experiences of interprofessional collaborative practice in primary care: a scoping review of the literature. J Patient Exp. 2020;7(6):1466-75. DOI: 10.1177/2374373520925725.
5. Improving Chronic Illness Care. History. 2011. Accessed October 17, 2019. http://www.improvingchroniccare.org/index.php?p=About_US&s=6.
6. Improving Chronic Illness Care. ACIC Survey. 2011. Accessed November 9, 2019. http://www.improvingchroniccare.org/index.php?p=ACIC_Survey&s=35.
7. Improving Chronic Illness Care. PACIC Survey. 2011. Accessed November 9, 2019. http://www.improvingchroniccare.org/index.php?p=PACIC_Survey&s=36.
8. Hibbard JH, Greene J. What the evidence shows about patient activation: better health outcomes and care experiences; fewer data on costs. Health Aff (Millwood). 2013;32:207-14. DOI: 10.1377/hlthaff.2012.1061.
9. Martin MT, Faber DM. Patient satisfaction with the clinical pharmacist and prescribers during hepatitis C virus management. J Clin Pharm Ther. 2016;41:645-9. DOI: 10.1111/jcpt.12436.
10. Bishop L, Young S, Twells L, Dillon C, Hawboldt J. Patients’ and physicians’ satisfaction with a pharmacist managed anticoagulation program in a family medicine clinic. BMC Res Notes. 2015;8:233. DOI: 10.1186/s13104-015-1187-8.
11. Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion. Chronic Diseases in America. 2019. Accessed October 17, 2019. https://www.cdc.gov/chronicdisease/tools/infographics.htm.
12. National Health Council, About Chronic Diseases. 2014. Accessed October 17, 2019. https://nationalhealthcouncil.org/wp-content/uploads/2019/12/AboutChronicDisease.pdf.
13. Centers for Disease Control and Prevention, Leading Causes of Death. 2019. Accessed October 17, 2019. https://www.cdc.gov/nchs/fastats/leading-causes-of-death.htm.
14. Joint Commission of Pharmacy Practitioners. Pharmacists’ Patient Care Process. 2014. Accessed August 26, 2019. https://jcpp.net/wp-content/uploads/2016/03/PatientCareProcess-with-supporting-organizations.pdf.