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ACCP WHITE PAPER

Current and future state of quality metrics and performance indicators in comprehensive medication management for ambulatory care pharmacy practice

Jennifer N. Clements Pharm.D., FCCP | Roshni P. Emmons Pharm.D. | Sarah L. Anderson Pharm.D., FCCP | Marissa Chow Pharm.D. Candidate | Scott Coon Pharm.D. | Adriane N. Irwin Pharm.D. | S. Mimi Mukherjee Pharm.D. | Julie M. Sease Pharm.D., FCCP | Kim Thrasher Pharm.D., FCCP | Stephanie R. Witek Pharm.D.

American College of Clinical Pharmacy, Lenexa, Kansas

Correspondence
American College of Clinical Pharmacy, 13000 W. 87th St. Parkway, Suite 100, Lenexa, KS 66215-4530.
Email: accp@accp.com

Abstract

The American College of Clinical Pharmacy (ACCP) 2011 publication "Tenets for Developing Quality Measures for Ambulatory Clinical Pharmacy Services" describes comprehensive, accountable, feasible, scientifically sound, and usable quality metrics for ambulatory care (AC) practice. ACCP endorsed the definition of comprehensive medication management (CMM) in 2014 and has since advocated consistent implementation of CMM in patient-centered, team-based care. Given the decade of changes and advances in AC practice since the 2011 publication, the 2020 ACCP Publications Committee has developed the present white paper to update quality metrics and provide performance indicators with proposed guidance for CMM in AC practice.

KEYWORDS
clinical pharmacist, performance indicators, quality measures, quality metrics

1 | INTRODUCTION

Health care quality, as defined in 2001 by the Institute of Medicine (now the National Academy of Medicine), is "the degree to which health care services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge."[1] A *quality measure*, as defined by the Agency for Healthcare Quality and Research (AHRQ), is a "mechanism to assign a quantity to quality of care by comparison to a criterion."[2] *Performance indicators* in health care seek to monitor, evaluate, and communicate the performance of specific aspects of the health system and can be viewed or prioritized differently, depending on the lens of the patient, the clinician, the health care system, the payers, and the government.

In 2011, the American College of Clinical Pharmacy (ACCP) published a white paper on developing quality metrics for ambulatory care (AC) pharmacy services.[3] In this paper, the authors suggested the following five core tenets for quality metrics: (a) should include measures of structure, process, and outcomes; (b) hold individual practitioners accountable for their components of the care process; (c) be feasible to track and document within the usual process of clinical care; (d) produce reliable and valid results; and (e) be understandable to the target audience so that the results could be used in decision-making.

This document was prepared by the 2020 Publications Committee: Jennifer N. Clements, Pharm.D., FCCP, FADCES, BCPS, CDCES, BCACP, BC-ADM (Chair); Roshni P. Emmons, Pharm.D. BCPS (Vice-Chair); Sarah L. Anderson, Pharm.D., FCCP, FASHP, BCPS, BCACP; Marissa Chow, Pharm.D. Candidate; Scott Coon, Pharm.D., BCPS, BCACP; Adriane N. Irwin, Pharm.D., BCACP; S. Mimi Mukherjee, Pharm.D., BCPS, CDCES; Julie M. Sease, Pharm.D., FCCP, BCPS, CDCES, BCACP; Kim Thrasher, Pharm.D., FCCP, BCACP; Stephanie R. Witek, Pharm.D.

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The authors examined the clinical literature available at the time to describe the usefulness of these tenets. The authors also addressed the provision of integrated health care services by AC pharmacy practice; this specialty area can involve accessible pharmacists in community pharmacies and outpatient clinics, including physician-based offices, given the similar clinical models and incorporation of quality metrics. Within the 2011 white paper, the authors proposed a framework by which individual settings could judge a potential quality measure to ensure it would reward quality, coordinated, team-based care that included clinical pharmacy services.

Since publication of the original white paper, many systematic reviews and meta-analyses have examined the impact of clinical pharmacists serving in direct patient care roles in the ambulatory setting (Table 1).[4-15] Although clinical pharmacy services are consistently linked to improved outcomes for chronic diseases, most commonly through surrogate clinical markers, the pharmacy intervention literature has identified several issues that may dilute the true effect. Themes that limit external validity include a lack of specificity and consistency in patient selection and the structure of pharmacist-provided interventions, and how outcomes are defined. Ascertaining the impact of clinical pharmacists alone is challenging because a multimodal, interprofessional approach has often been used in patient care. In addition, small sample sizes and short study durations have led to the use of surrogate end points rather than health outcomes such as morbidity and mortality.

Passage of the Affordable Care Act in 2010 increased the focus on patient-centered, team-based care and accelerated the movement toward payment models focused on achieving clinical, economic, and humanistic outcomes. This in turn provided an opportunity to expand collaborative drug therapy management (CDTM) legislation and create a framework for comprehensive medication management (CMM) as part of accountable care organizations (ACOs) and patient-centered medical homes.[16] As described by ACCP in the "Standards of Practice for Clinical Pharmacists," CMM is "a patient-centered approach to optimizing medication use and improving patient health outcomes."[17] AC clinical pharmacists are well positioned to deliver CMM in collaboration with other members of the health care team and patients. Indeed, clinical pharmacists have the expertise to coordinate and oversee complex medication regimens, thus maximizing medication efficacy, safety, adherence, and cost-effectiveness.

In 2014, the Joint Commission of Pharmacy Practitioners formally approved the Pharmacists' Patient Care Process (PPCP), defining the comprehensive approach to patient-centered care provided by pharmacists in collaboration with other members of the interprofessional team (Table 2).[18] Also in 2014, the "triple aim" of health care—improving the health of populations, enhancing the patient experience of care, and reducing the per capita cost of health care - was expanded to the "quadruple aim" by adding "improving the work life of health care providers, including clinicians and staff,"[19] offering AC clinical pharmacists additional opportunities to demonstrate value. Furthermore, ACCP in 2014 formally endorsed CMM as the standard of care provided by clinical pharmacists and subsequently funded the CMM in Primary Care Study to support the development of CMM implementation tools.[7,20]

In the 4 ensuing years, the CMM in Primary Care Study team identified and evaluated 35 CMM practices with embedded clinical pharmacists across the country, with two general focus areas: how to effectively and efficiently implement CMM with fidelity and how to measure the impact of CMM on clinical and economic outcomes.[21,22] In July 2018, the research team released "The Patient Care Process for Delivering CMM," a seminal publication that defined CMM as an intervention and articulated a common language to include a philosophy of practice, five essential functions, and operational definitions, coupled with a practitioner assessment of fidelity to the CMM model.[20] Establishment of a clear definition of CMM as an intervention has been critical to ensuring a standardized approach to medication optimization in team-based care and further assessing quality of care.

2 | PURPOSE

ACCP charged the 2020 Publications Committee to update the original 2011 ACCP white paper by discussing quality metrics and performance indicators for CMM provided by clinical pharmacists in the AC environment. The authors of this update also discuss financial implications, barriers to standardization for quality metrics, and future opportunities.

With the accepted standards for CMM provision and the continual evolution of the U.S. health care system and pharmacy's role within it, identifying comprehensive, accountable, feasible, scientifically sound, and usable quality metrics for clinical pharmacists in AC settings is paramount. Furthermore, they must be commonly accepted and translatable to the patient, the health care system, and payers.

3 | CMM QUALITY METRICS AND PERFORMANCE INDICATORS

Nationally recognized quality metrics and performance indicators created for use by health care systems can be adapted for CMM to standardize pharmacist evaluation and further substantiate the value of AC clinical pharmacists in providing CMM. Metrics should be supported by evidence in both the primary literature and systematic reviews showing benefit for the quadruple aim of health care, and performance indicators should be quantifiable to gauge the effectiveness of achieving each metric.

In 2019, the Pharmacy Quality Alliance (PQA) produced an action guide of quality metrics after focusing on social determinants of health and medication insecurity. This guide can be used by community pharmacists, health care payers, and other stakeholders to expand value-based pharmacist-provided care.[23] The guide recommends that pharmacists and payers identify areas for improvement

TABLE 1 Literature review summary[4-15]

Citation	Type of literature	Primary outcome/ objective discussed	Time interval of included studies	Geographic locations included	No. of studies included	Conclusions	Comments
Cochrane Database Syst Rev 2010;7: CD000336	SR and MA	Examine effect of outpatient pharmacists' roles on patient and health professional outcomes	January 1996 to March 2007	Not specified	43	• Inadequate evidence to make a conclusion regarding the delivery of health profession-targeted services by pharmacists to improve patient or health profession outcomes • Prescribing practice most common outcome studied; results mixed between studies • SBP: −6.32 mmHg (95% CI, −8.8 to −3.83) • DBP: −3.12 mmHg (95% CI, −4.57 to −1.67) • A1C: −0.75% (95% CI, −1.41 to −0.09)	• Lack of power in some individual studies included • Impact of pharmacists' interventions on health care practice measures mixed • Internal validity problems of individual studies (eg, lack of appropriate blinding techniques, follow-up procedures, contamination bias)
Med Care 2010;48:923-33	SR and MA	Effects of pharmacist-provided direct patient care on therapeutics, safety, and humanistic outcomes	Inception to January 2009	United States	298	• Findings suggest that pharmacists' interventions (medication education and disease management) improve surrogate therapeutic end points (BP, LDL, A1C control) • Findings suggest largely favorable effects on safety outcomes • Findings suggest somewhat favorable, more variable outcomes in humanistic outcomes (adherence, satisfaction, knowledge, QoL)	• 65.1% in outpatient setting • Does not address specifics of how pharmacy services operated (in fact, notes that this heterogeneity is a limitation of the SR/MA) • Does not address how these outcome measures were collected
Arch Intern Med 2011;171:1441-53	SR and MA	Determine the impact of pharmacist care on the management of CVD risk factors	Inception to November 2010	United States, Australia, Brazil, Canada, Chile, Portugal, Taiwan, Thailand	30	• SBP: −8.1 mmHg (95% CI, −10.2 to −5.9) • DBP: −3.8 mmHg (95% CI, −5.3 to −2.3) • TC:-17.4 mg/dL (95% CI, −25.5 to −9.2) • LDL: −13.4 mg/dL (95% CI, −23 to −3.8) • Risk of smoking: RR 0.77 (95% CI, 0.67-0.89)	• Unable to determine the most efficient intervention • Possible overestimation of effect/ heterogeneity of effect present among studies • Potential publication bias
J Am Geriatr Soc 2013;61:1119-27	SR and MA	Effect of pharmacist-provided care on older adult patient-oriented health outcomes	Inception to July 2012	United States	20	• Therapeutic category (including outcomes such as SBP, antibiotic treatment, therapeutic INR, and death): SMD −0.36 ($P < .001$) • Safety category (including falls, ADEs, and number of unnecessary drugs): SMD −0.33 ($P < .001$)	• Variability in study population, setting, sample size, study design, intervention, outcomes measured, and comparison groups used among the studies included • Small sample size of some included studies • Selection may have been biased

TABLE 1 (Continued)

Citation	Type of literature	Primary outcome/ objective discussed	Time interval of included studies	Geographic locations included	No. of studies included	Conclusions	Comments
						• Hospitalization category (included number of hospitalizations, length of stay, and readmission): SMD −0.33 (P = .01) • Adherence category (included refill history and pill counts): SMD −0.78 (P < .001)	
Res Social Adm Pharm 2014;10:608-22	SR and MA	Review the effectiveness of clinical pharmacist-provided services delivered in primary care general practice clinics	Inception to May 2013	United States, UK, Canada, South America, Asia	38	• SBP: −5.72 mmHg (95% CI, −7.05 to −4.39) • DBP: −3.47 mmHg (95% CI, −4.35 to −2.58) • TC: −32 mg/dL (95% CI, −54.86 to −9.14) P < .006 • LDL: −18.72 mg/L (95% CI, −34.1 to −3.36) P < .017 • 10-year Framingham risk reduction: −1.83% (95% CI, −3.66 to 0.00) P = .05	• Publication bias/some relevant studies may not have been included • Most studies were conducted at a single site or single health care organization • Intervention performed by single or specially trained pharmacist, limiting external validity • Contamination of participants possible • Surrogate end points • No mortality improvement proven
J Manag Care Spec Pharm 2015;21:614-38	SR	Pharmacists' interventions in continuity-of-care programs that improve clinical outcomes	Inception to November 2014	North America, Europe, Australia	30	• Well-designed/reported RCTs are needed • Isolated post-discharge interventions: evidence supports collaborating with nurses and tailoring to the patient • Multifaceted intervention programs - med rec alone is possibly insufficient in reducing post-discharge clinical outcomes • Close collaboration between pharmacists and physicians during all stages is beneficial (including outreach between inpatient and outpatient)	• Five studies investigated only post-discharge interventions (three effective, two ineffective) • All three effective studies incorporated nurse involvement (two involved in home visit evaluation, one in post-discharge planning), indicated pharmacist-specific measures may be difficult unless focused solely on pharmacist-provided skills/responsibilities (ie, ADEs/adherence) • Also noted that pharmacist involvement in the inpatient setting provided better interventions vs an external pharmacist who evaluated post-discharge
VA ESP Project #09-009; 2015	SR	Chronic disease management by pharmacists; pharmacists take responsibility for managing or preventing one or more chronic diseases	1995 to June 2015	United States	57	• Pharmacist-led care similar to usual care for disease-specific clinical events • When reported, mortality similar between pharmacist-led and usual care groups	• Outcomes used in SR were not usually the study-defined primary end points • Small sample sizes and short follow-ups • Limited reporting of HRQoL and patient satisfaction

(Continues)

TABLE 1 (Continued)

Citation	Type of literature	Primary outcome/ objective discussed	Time interval of included studies	Geographic locations included	No. of studies included	Conclusions	Comments
						• Similar office visit rate, urgent care or ED visit rate, and hospitalizations between pharmacist-led and usual care groups • Similar medication adherence between pharmacist-led and usual care groups • Higher patient satisfaction in pharmacist-led care with reaching someone in an emergency or availability of advice about health condition • No difference in patient perceptions of communication with the care team and problems receiving care • No significant difference in total costs, medication costs, cost savings, or program costs • Pharmacist-care led to higher number or dose of medications • Pharmacist-led care improved study-selected glycemic, BP, and lipid goals	• Ill-defined HRQoL and patient satisfaction • Lack of validation of scale scores • Varying interventions with respect to composition, delivery mode, and intensity • Lack of use of typical measures of access and rare evaluation of patient satisfaction or perception of access • Lack of consistent definitions for office visits • Limited reporting of drug-related problems
J Clin Pharmacol 2016;56:24-38	SR	Comparison of pharmacist-provided services and usual medical care in anticoagulation	Inception to January 2014	North America, Europe (mainly United States, Canada, UK)	24	• TTR using Rosendaal method determined to be best indicator of quality of anticoagulation control (mixed results regarding superiority of pharmacist group) • Bleeding events lower (though not always statistically significant) in pharmacist group • Thromboembolic events had mixed results comparing the groups • Hospitalization and ED visit rates not frequently reported; however, when pooled, significantly lower in pharmacist group • Cost-effectiveness (can be retrieved from hospitalization avoidance data) favors pharmacists • Patient satisfaction surveys in favor of pharmacist-provided services	• In this type of AC practice, it is likely easier to assess pharmacist-driven quality outcomes as it frequently relies on pharmacists only • However, evaluating both clinical outcomes and adverse effects and high-cost health care use (ie, admissions) could be viable for other practices

TABLE 1 (Continued)

Citation	Type of literature	Primary outcome/ objective discussed	Time interval of included studies	Geographic locations included	No. of studies included	Conclusions	Comments
BMJ Open 2016;6: e010003	SR and MA	Investigate the effect of pharmacist-led medication reconciliation programs on clinical outcomes at hospital transitions	Inception to December 2014	United States, Sweden, Ireland, Australia	17	• ADE-related hospital revisits reduced by 67% (RR 0.33; 95% CI, 0.20-0.53) • ED visits reduced by 28% (RR 0.72; 95% CI, 0.57-0.92) • Hospital readmissions reduced by 19% (RR 0.81; 95% CI, 0.7-0.95) • No difference in mortality or composite readmission and/or ED visit	• Various definitions of high-risk patients used and no confirmation completed for which patients benefited the most • Different transitions targeted • Possible reporting bias in studies included • Lack of homogeneity in data
J Clin Pharm Ther 2016;41:128-44	SR and MA	Investigate the effect of pharmacist-led medication reconciliation interventions on medication discrepancies at hospital transitions and to categorize these interventions as single transition or multiple transitions interventions	Inception to December 2014	United States, Netherlands, Ireland, Canada, Australia, Sweden, Colombia, France	19	• Single medication reconciliation interventions at either admission or discharge reduced medication discrepancies by 66% (RR 0.34; 95% CI, 0.23-0.5) • No significant difference in discrepancies with multiple transitions	• Lack of homogeneity between studies with interventions, population characteristics, and methods for measuring outcomes • Variations in definitions and terminology for medication discrepancies • Source of medication history for discrepancy identification varied • Type of medications included in discrepancy evaluation varied • Possible bias within studies included
Ann Pharmacother 2017;51:890-907	SR and MA	Effect of pharmacists in clinic on A1C	1995 to February 28, 2017	Mainly United States, some Middle East, Asia, Australia	35	• Pharmacists' interventions: collaborative practice with prescriptive authority and with recommendations only, patient education • Overall significant improvement in A1C, SBP, LDL in pharmacist care groups vs without • A1C difference 1.1%; (95% CI, 0.88-1.27)	• Study heterogeneity listed as main limitation
Ann Pharmacother 2017;51:1122-37	SR	Quality of warfarin anticoagulation control in outpatient pharmacist-managed anticoagulation services vs routine medical care	Inception to May 2017	United States, Asia, Canada, UK, Spain, Qatar, and New Zealand	25	• TTR higher in pharmacist-managed group in 92% of studies • 83% of studies reported statistically significant TTR with pharmacist-managed care vs routine medical care • Improved TTR with pharmacist-provided management was 1.7% to 28.0%	• Studies from various settings and countries • Definition of INR target and TTR calculation methods varied • Different definitions of bleeding events used • Combination of RCTs and observational studies included

(Continues)

TABLE 1 (Continued)

Citation	Type of literature	Primary outcome/ objective discussed	Time interval of included studies	Geographic locations included	No. of studies included	Conclusions	Comments
						• 83.3% of trials reported lower or equal major bleeding with pharmacist-provided management • 90% of trials reported lower or equal risk of thromboembolic events • Decreased hospitalization, shorter length of stay, and fewer ED visits reported with pharmacist management in 100% of studies reporting on this outcome • Cost savings reported with pharmacist-management in all studies reporting on this outcome	

Abbreviations: ADE, adverse drug event; CVD, cardiovascular disease; DBP, diastolic blood pressure; HRQoL, health-related quality of life; MA, meta-analysis; RCT, randomized controlled trial; SBP, systolic blood pressure; SMD, standardized mean difference; SR, systematic review; TTR, time in therapeutic range.

TABLE 2 Patient care process for CMM[18]

Essential functions (aligned with PPCP)	Guiding statement
Collect and analyze information (COLLECT)	The clinical pharmacist ensures the collection of the necessary subjective and objective information about the patient and is responsible for analyzing information in order to understand the patient's relevant medical/medication history and clinical status
Assess the information and formulate a medication therapy problem list (ASSESS)	The clinical pharmacist assesses the collected information and formulates a problem list consisting of the patient's active medical problems and medication therapy problems in order to prioritize recommendations to optimize medication use and achieve clinical goals
Develop the care plan (PLAN)	The clinical pharmacist implements the care plan in collaboration with the health care team and the patient or caregiver
Implement the care plan (IMPLEMENT)	The clinical pharmacist implements the care plan in collaboration with the health care team and the patient or caregiver
Follow up and monitor (FOLLOW-UP: MONITOR AND EVALUATE)	The clinical pharmacist provides ongoing follow-up and monitoring to optimize the care plan and identify and resolve medication therapy problems, with the goal of optimizing medication use and improving care

initiatives that can demonstrate the value of pharmacist-provided care, including managing chronic diseases, addressing immunization gaps, and promoting other wellness activities (eg, smoking cessation). The guide also calls for payers and pharmacists to establish clear program goals, responsibilities, and implementation requirements, including appropriate reporting, measurement, incentives, and reimbursement.

However, to establish a universal consensus on the specific metrics to use within the profession, it is first important to understand the processes surrounding metric development and their aggregation into larger frameworks, followed by their application within value-based payment models. To highlight the similarities and differences between these metrics, this section describes the various measures and indicators currently available that may potentially be affected by CMM and benefit the quadruple aim. Using the most common roles and responsibilities of AC clinical pharmacists, including the disease states managed, Table 3 highlights the metrics available to consider for universal application when assessing CMM quality.[24-28]

TABLE 3 Universal application of quality metrics in CMM[24-28]

Measures	Organizations[a]
Adherence to medications	
Antihyperglycemics	PQA, STAR-D
Antihypertensives	PQA, STAR-D
Statins	PQA, STAR-D
Direct acting oral anticoagulants	PQA
Long-acting bronchodilators in COPD	PQA
Antiretroviral agents	PQA
DMARDs for rheumatoid arthritis	PQA, HEDIS
DMARDs for multiple sclerosis	PQA
Appropriate medication use	
β-Blocker use after acute myocardial infarction	HEDIS
ACEI/ARB after acute myocardial infarction	ASHP
Diabetes medication dosing	PQA
Statin use in individuals with diabetes	PQA, STAR-C, STAR-D, HEDIS, ASHP
Medication therapy for individuals with asthma	PQA, HEDIS
Chronic anticoagulation for Afib/Aflutter	ASHP
Antithrombotic therapy for patients with ischemic stroke	ASHP
Statin use for patients with ischemic stroke	ASHP
Heart failure therapy (use of ACEI or ARB, BB)	ASHP
Medication safety	
Drug-drug interactions	PQA, STAR^{DP}
Antipsychotic use in individuals with dementia	PQA, STAR^{DP}
Antipsychotic use in children <5 years	PQA, HEDIS
Use of high-risk medications in older adults	PQA, HEDIS
Use of benzodiazepine sedative-hypnotic medications in older adults	PQA
Polypharmacy (use of multiple anticholinergic medications in older adults)	PQA, STAR^{DP}
Polypharmacy (use of multiple CNS-active medications in older adults)	PQA, STAR^{DP}
Concurrent use of opioids and benzodiazepines	PQA, STAR^{DP}
Use of opioids at high dosage in individuals without cancer	PQA, STAR^{DP}, HEDIS, ASHP
Use of opioids from multiple providers in individuals without cancer	PQA, STAR^{DP}, HEDIS, ASHP
Use of opioids at high dosage and from multiple providers in individuals without cancer	PQA, STAR^{DP}, ASHP
Initial opioid prescribing at high dosage	PQA, HEDIS, ASHP
Initial opioid prescribing for long duration	PQA
Initial opioid prescribing for long-acting or extended-release opioids	PQA
Patients treated with an opioid who are given a bowel regimen	ASHP
Medication therapy management	
Comprehensive medication review	STAR-C, STAR-D, PQA
Monitoring measures	
BP control <140/90 mmHg	HEDIS
Diabetes control (A1C testing)	HEDIS
Diabetes control (A1C < 8%)	STAR-C, HEDIS
Diabetes control (eye examination)	STAR-C, HEDIS
Diabetes control (BP control)	HEDIS
Diabetes poor control (A1C > 9%)	HEDIS, ASHP
Diabetes care—kidney disease monitoring	STAR-C
MTP resolution	PQA

(Continues)

TABLE 3 (Continued)

Measures	Organizations[a]
Diabetes and cardiovascular screening and monitoring for individuals with schizophrenia or bipolar disorder	HEDIS, ASHP
Transitions of care—patient engagement post-hospital discharge	HEDIS
Medication reconciliation post-discharge	STAR-C, HEDIS
INR monitoring for individuals taking warfarin	ASHP
Quality improvement indicators	
Provision of MTM services post-hospital discharge	PQA
Readmission of patients provided MTM services post-hospital discharge	PQA
Medication synchronization	PQA
Preventive care	
Influenza vaccinations	STAR-C, HEDIS, ASHP, CAHPS
Pneumococcal vaccinations	HEDIS, CAHPS
Assistance with tobacco cessation	HEDIS, CAHPS
Health care utilization	
Getting needed care	STAR-C, CAHPS
Getting appointments and care quickly	STAR-C, CAHPS
Customer service	STAR-C, CAHPS
Care coordination	STAR-C
All-cause readmission rate	STAR-C, HEDIS
Hospitalization for potentially preventable complications	HEDIS

Abbreviations: COPD, chronic obstructive pulmonary disease; DMARD, disease-modifying antirheumatic drug.
[a]STAR[DP]: Included in CMS's Patient Safety Reports (2021).

3.1 | Better health outcomes

3.1.1 | HEDIS measures

In 1991, the National Committee for Quality Assurance (NCQA) developed the Healthcare Effectiveness Data and Information Set (HEDIS), which allows consumers to objectively compare health plans in a variety of areas, termed *domains*. The current HEDIS definition was introduced in 2007. Over 90 HEDIS measures now exist across six domains of care: effectiveness of care, access/availability of care, experience of care, utilization and relative resource use, health plan descriptive information, and measures collected using electronic clinical data systems.[26] Data for HEDIS reporting are generated using administrative information from claims and encounters and information from surveys. Many of the metrics within the HEDIS domains pertain to the services offered by AC clinical pharmacists, including both outcome and process metrics. Outcome metrics often include clinical surrogate markers (eg, A1C) to help define disease control. Process metrics pertain to effectiveness of care. For example, the *β-blocker use after acute myocardial infarction* metric assesses the percentage of patients discharged after an acute myocardial infarction who received persistent β-blocker therapy for 6 months. Additional process measures pertain to care coordination, especially during transitions of care (eg, medication reconciliation), where AC clinical pharmacists are also engaged.[26]

The primary literature often attempts to describe clinical pharmacy interventions and recommendations in accordance with HEDIS metrics. In one study evaluating the effect of a community-based, pharmacist-directed diabetes management program, patients were randomized to a diabetes management intervention or a standard care arm.[29] HEDIS outcome metrics used in the evaluation were A1C less than 7.0%, blood pressure (BP) less than 130/80 mmHg, and LDL less than 100 mg/dL. The composite study outcome was the percentage of patients achieving at least two of the three HEDIS metrics after 9 months. According to the results, 56.7% of the intervention patients achieved the study outcome compared with 18.2% of the control participants ($P < .004$), demonstrating pharmacists' positive impact on HEDIS health metrics and the need for pharmacist-managed clinical programs in treating chronic disease.[29]

In another study, investigators attempted to align pharmacists' recommendations from video conferences for patients with epilepsy residing in a rural area with HEDIS performance indicators.[30] Between April 2016 and October 2017, comprehensive medication reviews (CMRs) were performed through videoconferencing, with the resulting recommendations from the CMRs categorized as 1 of 24 preselected HEDIS metrics or as a non-HEDIS metric. During the intervention period, 306 recommendations were made, 41 (13.4%) of which aligned with a HEDIS metric. Specific HEDIS metrics included were medication management for individuals with asthma, BP control, comprehensive adult diabetes care,

antidepressant medication management, diabetes screening for people with schizophrenia or bipolar disorder using antipsychotic medications, and annual monitoring for patients on persistent medications. In addition, the investigators indicated the need to develop strategies to increase recommendations aligning with HEDIS metrics and the ways in which they align with the metrics developed by other organizations, such as the Centers for Medicare & Medicaid Services (CMS).[30]

3.1.2 | PQA measures

In 2006, the PQA was established in partnership with CMS to provide a forum for pharmacy stakeholders to develop metrics addressing medication safety, adherence, and appropriate use. Over the years, more than 250 members, including organizations and other stakeholders, have participated in developing quality metrics that optimize health from the pharmacy perspective. Measures are grouped into six domains: adherence, appropriate medication use, medication safety, medication therapy management (MTM), monitoring, and quality improvement indicators.[24,25]

Most PQA metrics use prescription claims data for evaluation in various capacities, generally focusing on surrogate markers. Those pertaining to appropriate medication use are often process-related measures for evaluation of medication therapy or initiation of a therapeutic plan. For example, the *statin use in persons with diabetes* (*SUPD*) metric reports the percentage of patients with prescription claims for both antihyperglycemic and statin medications. Metrics within the medication safety domain address medication-related issues such as drug-drug interactions, inappropriate antipsychotic use, use of high-risk medications in older adults, and polypharmacy. Metrics pertaining to MTM include the CMR completion and medication therapy problem (MTP) resolution rates. MTP resolution is the primary metric for the monitoring domain. The PQA quality improvement indicators encompass those used solely for internal quality improvement and that include data on the provision of medication-related services after discharge and medication synchronization. PQA also includes two core measure sets on opioids and specialty medication use. The metrics within these sets are also included within other domains, such as adherence and safety.[25]

Within the PQA domain of medication adherence, a patient's adherence to a specific medication is measured and evaluated as proportion of days covered (PDC) greater than 80%. To determine the impact of clinical pharmacist-provided services in the Veterans Affairs health system for patients with diabetes in 2002-2014, the PQA measure of PDC for oral antidiabetic medication over a 365-day period was used as a study measure. Adherence, defined as the percentage of patients achieving a PDC of 80% or more, and mean change in A1C were greater among veterans who were seen by a pharmacist than among those who were not.[31]

PQA-developed metrics have largely been accepted as quality indicators for safe and effective medication use. As a result, some PQA measures have been endorsed by other quality groups and included in value-based reimbursement programs. Although PQA metrics may vary between institutions, systems, and programs, they are often influenced by CMM.

3.1.3 | Medicare star rating system

Implemented in 2008, the five-star CMS rating system describes the quality of Medicare Advantage and Part D plans. In this system, health care plans are assigned a rating from 1 to 5 stars, with higher star ratings receiving more monetary bonuses. Beneficiaries are enrolled almost year-round, creating a financial incentive to promote quality. For the 2020 ratings, 47 measures existed between Medicare Advantage and Part D plans, with each measure having a specific threshold associated with the number of stars.[25] Each plan is also assigned an overall star rating, which includes distinct medication-related measures. Specifically, 5 of the 14 Part D measures pertain to medication use: (a) medication adherence for diabetes medications; (b) medication adherence for hypertension (renin-angiotensin system antagonists); (c) medication adherence for cholesterol (statins); (d) MTM program completion rate for CMRs; and (e) SUPD. Measures 1 to 3 are surrogate metrics, using the percentage of patients with prescription data suggesting optimal adherence, defined as 80% PDC or more. Measures 4 and 5 are process measures that report the monthly timeliness completion rate and percentage of patients with diabetes prescribed statin therapy. All five measures directly pertain to pharmacists' contributions to providing CMM.[25] In addition to the metrics used in the star rating system, CMS provides information on other measures through patient safety reports, with several of the metrics also aligning with those endorsed by PQA.

CMS also created a Quality Payment Program to improve patient care and outcomes in the fee-for-service Medicare program while managing patient costs for services. Clinicians can participate in one of two tracks: advanced alternative payment models, discussed later in the text, or the Merit-based Incentive Payment System (MIPS).[32] The MIPS model evaluates providers across four categories: quality, promoting interoperability, improvement activities, and cost. CMS offers bonuses to MIPS-eligible physicians if they achieve higher scores through MIPS measures, thus preserving a version of the fee-for-service model while promoting quality. Eligibility is based on clinician type, volume of care provided to Medicare patients, and Medicare enrollment date. Although pharmacists are not an eligible clinician type, practices, rather than individual clinicians, can still submit the information required for MIPS measures for incentive payment.[32]

In one example, pharmacists in a North Carolina interprofessional primary care practice were evaluated for their ability to achieve quality measures through annual wellness visits (AWVs) and chronic care management. For the MIPS measures used, patients seen by pharmacists were more likely to achieve the measures than those not seen by pharmacists, demonstrating the opportunity for reimbursement in this value-based payment model.[33]

3.1.4 | ASHP pharmacy accountability measures

In 2014, the American Society of Health-System Pharmacists (ASHP) workgroup on Pharmacy Accountability Measures proposed a suite of pharmacy-related measures, updated in 2019, to identify the measures that pharmacy departments should be held accountable for achieving. In the updated report, the work group selected 28 measures for inclusion that encompassed both inpatient and outpatient pharmacy practice as well as transitions of care. The measures focused on six therapeutic areas commonly managed by pharmacists: antithrombotic safety, cardiovascular control, glycemic control, pain management, behavioral health, and antimicrobial stewardship.[27]

3.2 | Improved patient experience

3.2.1 | AHRQ CAHPS program

At the federal level, AHRQ developed the Consumer Assessment of Healthcare Providers and Systems (CAHPS) program in 1995 to better understand the patient experience within health care. In this endeavor, AHRQ created a series of voluntary surveys to assess health care quality by gleaning a patient's experience with the health care system in collaboration with other research organizations.[28] Survey sponsors in the program include state Medicaid agencies, Medicare, individual health plans, and the Children's Health Insurance Program. Composite metrics include an assessment of whether patients receive needed care, receive care quickly, and believe their physicians communicate well, as well as how they perceive health plan information and customer service. Questions within the composite measures use a 4-point response scale: *always*, *usually*, *sometimes*, or *never*. For example, one question asks respondents, "*How often was it easy to get needed care, tests, or treatment?*" In addition to the composite measures, patients are asked to provide overall ratings of their health care, physicians, specialists, and plans using a 0 to 10 Likert scale (with 0 being the worst and 10 being the best). Surveys differ depending on the setting and provider. For example, because pharmacists often lack provider status, the Clinician & Group (CG)-CAHPS survey cannot automatically be used after visits with AC clinical pharmacists.[34]

However, an abbreviated CG-CAHPS survey regarding the impact of pharmacist-led diabetes management in primary care clinics on patient satisfaction showed that patients were highly satisfied with pharmacist-provided services. Services were rated as "always" more than 90% of the time and received either a 9 or a 10 in 97.4% of cases. A gap remains in the recognition of the contribution of AC clinical pharmacists to health care providers' CG-CAHPS results and/or use of a separate survey to evaluate pharmacy services.[35]

Other examples of evaluating patient experience include the Patient Satisfaction with Pharmacist Services Questionnaire. This 22-question tool covers three domains: the patient-pharmacist relationship, quality of care, and overall patient satisfaction.[36] Another patient satisfaction survey created by AC pharmacy directors, administrators, practitioners, patients, student pharmacists, university faculty, and members of a health literacy committee from health systems and organizations in Minnesota evaluates pharmacists' contributions to providing CMM. This survey consists of 10 questions asking patients to evaluate their experiences with AC clinical pharmacists and rate the overall quality of care and services.[37] These tools successfully demonstrate reliability and validity in multiple settings; however, they still need to be formally incorporated into a national organization's metric system for quality assessment.

3.3 | Improved provider experience

Implementation of team-based models that include AC clinical pharmacists is one way to fulfill the expanded quadruple aim, which now considers the provider experience with the intent to increase satisfaction and both reduce and prevent burnout. At University of California Los Angeles (UCLA) Health, AC clinical pharmacists are embedded within primary care practices, providing services consistent with CMM.[38] Data from UCLA Health physician surveys and interviews indicate that 90% of respondents agree that having a pharmacist in the practice increases the efficiency of managing patients' medications, and 93% agree that pharmacists' recommendations are clinically helpful. In addition, 71% of respondents indicated that access to a pharmacist increased their medication-related knowledge, and 75% believed that having a pharmacist as part of the team made their job easier. At Kaiser Permanente in Colorado, pharmacists manage a refill and monitoring program for patients with hypertension requiring BP medications. Data indicate that after the intervention, pharmacists are more satisfied with their job, and patients are more satisfied when picking up their prescriptions. Moreover, primary care providers spend less time on refills and indicate 80% satisfaction with the pharmacist-led intervention.[39]

4 | CMM IN TEAM-BASED CARE AND FINANCIAL IMPLICATIONS

The U.S. health care system is rapidly evolving. With lower costs as part of the quadruple aim, it is no longer a question of if, but when, reimbursement will shift from fee for service to models that include shared responsibility for clinical outcomes and cost of care. Despite the wide variety of terms used to describe these emerging models, including *pay for performance*, *ACO*, *clinical episodes/bundled payments*, and *global capitation*, the intent at a holistic level remains similar by focusing on value through the lens of quality and cost.[40]

Transition to these value-based payment models will create significant opportunities for pharmacists to demonstrate positive outcomes as part of the patient care team. Connections between quality metrics and the development of pharmacy services are increasingly apparent, especially now that clinical pharmacists have already begun to leverage these models in developing and expanding services. However, the diversity of these arrangements and contracts will make it

challenging to elucidate a single model for the financial opportunities provided by pharmacist engagement in value-based reimbursement. Hence, an understanding of payment dynamics is essential to developing a sustainable business model for AC clinical pharmacists. Therefore, in the following paragraphs, the authors summarize three reimbursement structures with examples of how pharmacists can participate in each.

ACOs are groups of physicians, hospitals, and other health care providers that agree to be responsible for quality, cost, and overall patient care. The ACO model is rapidly expanding, with an estimated 11.2 million individuals currently enrolled in Medicare's largest ACO program, the Medicare Shared Savings Program (MSSP).[41] To participate in the MSSP, an ACO must accept at least 5000 Medicare fee-for-service beneficiaries, agree to participate for at least 3 years, and commit to developing processes that promote evidence-based medicine, patient engagement, and reporting on CMS quality and cost measures, among other criteria.[42] Leveraging this reimbursement framework, pharmacists practicing in primary care have mapped their services and associated interventions to MSSP benchmarks.[42] For example, AWVs for Medicare beneficiaries provide pharmacists the opportunity to address the ACO preventive health measures by overseeing patient immunization needs and coordinating patient screenings for colorectal and breast cancer.[43]

Similar to the MSSP are Medicare Advantage plans, an alternative to fee-for-service Medicare whereby private health insurers assume responsibility and financial risk for managing Medicare benefits. Medicare Advantage plans receive payments according to the number of enrollees, or a per capita payment, plus funds tied to a quality rating.[42] The quality rating is intended to reflect all dimensions of plan performance, including the quality metrics related to clinical process and health outcomes.[44] Although Medicare Advantage quality ratings and bonus payments are controversial, they are tied to millions of dollars and can help attract and retain enrollees.[44,45] As a result, efforts to design interventions focused on improving performance measures are part of Medicare Advantage. For example, clinical pharmacists embedded in primary care teams have been shown to improve osteoporosis measures, such as patients screened for osteoporosis with a bone mineral density test or initiated on an anti-osteoporosis medication after a fracture.[46]

Complementing these federal programs are state Medicaid programs, which vary in the use of value-based payment models. Efforts in Oregon are well developed through locally governed organizations, termed *coordinated care organizations* (*CCOs*), to provide comprehensive care for Oregon's Medicaid population.[47] Each CCO receives funds to pay for the care of Medicaid enrollees residing in a geographic area and is then incentivized through quality pool dollars determined by performance on 16 metrics.[48] Like in MSSP and Medicare Advantage plans, many of the metrics used in CCOs are linked to preventive health recommendations and management of chronic diseases, thus providing new opportunities for pharmacists. For example, in 2015, a measure that focused on effective contraceptive use was integrated into the CCO reimbursement structure whereby CCOs needed to achieve a 50% benchmark or CCO-specific improvement target to receive quality pool funds at the end of the measurement year. This resulted in efforts to leverage pharmacists' prescriptive authority for providing hormonal contraception to achieve these targets.[49]

5 | STANDARDIZATION OF CMM FOR ACHIEVING OPTIMAL QUALITY AND PERFORMANCE

Given the benefits already described in this paper, a standardized process for pharmacist delivered CMM is crucial for widespread CMM adoption in AC and a step toward more substantial payer recognition. Until now, CMM has been implemented with a broad definition, resulting in many adapted versions in practice, variable implementation, and inconsistent effects on health outcomes.[20]

Reasons for variability in CMM implementation are multifaceted and include lack of clarity in the CMM intervention and the target patient population as well as state-level differences in scope of practice. For example, laws guiding CDTM agreements, which often serve as the regulatory framework for CMM, vary by state and may limit CMM practices in states where laws are more restrictive.[16]

The CMM in Primary Care Study team has developed several pragmatic solutions to decrease the variability in CMM implementation. Among these solutions include a clear definition of CMM and a fidelity assessment tool that can be applied in diverse practice settings.[20] CMM is framed around three core components: a shared philosophy of CMM practice among pharmacists, a CMM patient care process, and system-level support that ensures CMM is delivered effectively and efficiently. The PPCP-based guidance document offers five essential functions of the CMM patient care process (see Table 2), including operational definitions in the full report, which serve as a starting point to challenge the next step of aligning CMM performance with payment. With practices adopting a standard definition for CMM, implementation efforts must carefully consider the quality metrics and performance indicators that will be used to demonstrate pharmacists' impact on the quadruple aim.

6 | IMPORTANCE OF PARTNERSHIP WITH STAKEHOLDERS FOR INTEGRATION AND IMPLEMENTATION

Implementation of quality metrics and performance indicators is key to capturing and analyzing clinical pharmacists' CMM services in order to demonstrate a positive return on investment and support clinical pharmacist position expansion.[50,51] The decision of which metrics to implement and how to standardize implementation should involve all key stakeholders, including institutional leadership (pharmacy, clinic level, and executive), information technology services, and the pharmacists providing and documenting the CMM services. Interdisciplinary stakeholders should be involved so that the metrics implemented are of value to the institution and result in accurate and complete data capture.[50]

Metric implementation should leverage the ability to track metrics via administrative data query of either electronic health records (EHR) or claims databases in order to provide a cost-effective, robust, systematic process for data collection and extraction. Many institutions with an EHR can document the clinical pharmacist's interventions, and it is important to delineate those specific to CMM. Documentation processes need to be developed in a manner that ensures the data captured are meaningful and easily extracted for analysis and dissemination.[22,50] Although each institution's culture and infrastructure will lead to institution-specific preferences for and means of metric tracking, of utmost importance is that the data can easily be queried and are meaningful to the institution. The data generated by clinical pharmacists providing CMM services should be linked to institutional performance indicators to demonstrate the improvements in patient care and value of the clinical pharmacists providing the care.[52]

Value can be defined as the health outcome per dollar spent, and the CMM metrics collected by clinical pharmacists can demonstrate better clinical and financial outcomes for the institution.[50] Billable encounter data for CMM visits demonstrate revenue generation by clinical pharmacists. In 2019, a pilot project showed that 65% of a clinical pharmacist's expenses could be covered through revenue generated from billable encounters.[53] Similarly, clinical pharmacist CMM metrics can be used to demonstrate cost avoidance. Using published methods to estimate the financial metrics for each type of clinical pharmacist intervention, the same pilot project demonstrated $1.9 million in annual cost avoidance by 1.0 full-time equivalent of clinical pharmacists' time.[53] Another recent paper includes a well-referenced list of clinical pharmacist interventions and the associated cost-avoidance values that can be used to link CMM metrics to dollar amounts of costs avoided.[51]

Clinical pharmacists' quality and performance CMM metrics should not only be linked to institutional goals and deliverables, but also used to demonstrate performance on national measures such as those set by AHRQ, HEDIS, the National Quality Forum, PQA, and others. Clinical pharmacists' CMM metrics should align well with national measures that track an institution's performance in many areas, such as SUPD, use of high-risk medications in older adults, and the Medicare Star Rating System.[26]

Institutions and practices should determine the core measures and related evaluations for outcome achievement. Although the diversity of institutions, clinical processes, EHR capabilities, and metrics tracked makes it challenging to set a standard for implementing quality metrics and performance indicators for clinical pharmacists providing CMM services,[26] many common practices are described within the published literature. These publications highlight key aspects of successful metric implementation: interdisciplinary support for which metrics to implement; use of electronic systems to capture, query, and analyze data; and use of pilot processes to ensure accurate and meaningful metric collection and data outputs before large-scale rollout.[22,26,50,52,53] Clinical pharmacists providing CMM services have the opportunity to implement quality metrics and performance indicators in a standardized fashion that can be used to support the continuation and expansion of their work by demonstrating improvements in institution-based and national clinical and financial measures.

7 | EVALUATION OF PHARMACISTS IN CMM

Evaluating CMM performance indicators in AC ensures that the work and effort of pharmacists remain aligned with the quadruple aim following implementation.[15] Evidence of the positive impact of CMM on the quadruple aim is growing.[54] However, as noted earlier, standardizing and measuring CMM performance indicators can be especially challenging in AC.[55] In fact, care that is tailored to strict quality metrics may lead to a substandard quality of care (eg, appeasing patient requests to increase patient satisfaction scores). Therefore, it is important to carefully consider the performance indicators used to evaluate CMM in primary care for widespread implementation.

Pharmacist-delivered patient-centered CMM is a nonlinear, complex, adaptive care process that, unlike the isolated management of single diseases, is informed by numerous variables (eg, shared decision-making, patient goals, and behaviors).[55] In addition, care plans often represent a compromise between patients and health care providers. By comparison, preventing central line-associated infections using central line bundles is a linear mechanical process with limited procedural variability, for which clinicians maintain a high level of control. Therefore, process and quality in CMM should be evaluated differently and should include measuring exception ("shared decision") reporting targeting ranges instead of absolute goals, conducting peer reviews on patterns of care, and determining the comprehensiveness of the available services. One barrier to this approach is that the metrics for CMM are not easily quantified, posing a challenge to pharmacists and data stewardship teams. Although measuring the effects on health outcomes remains the best way to evaluate the impact of CMM in AC, appropriately crediting pharmacists with individual contributions remains a barrier.[56] Therefore, pharmacists must ensure that their efforts are meaningful at the organizational level as well as to prospective payers.

8 | PROPOSED QUALITY METRICS AND PERFORMANCE INDICATORS FOR CMM IN AC PHARMACY PRACTICE

This section recommends a set of foundational, universal quality metrics and performance indicators for CMM to measure those provided by AC clinical pharmacists, as shown in Table 4. However, because of substantial differences in the quality metrics as well as the expected performance levels included in value-based and other reimbursement models, they will likely require customization according to each practice's payer mix and other site-specific factors.

Nonetheless, these recommendations will apply across many practice sites. Metrics should follow the five tenets proposed in the original 2011 ACCP white paper: (a) include measures of structure,

TABLE 4 Proposed quality metrics and performance indicators for CMM in AC practice

Donabedian component	Quality metrics	Performance indicators	Short-term goal (<3 years) (%)	Long-term goal (>3 years) (%)
Structure	Incorporation of quality metrics into clinical practice for CMM services	>3 quality metrics to describe quality of CMM		
	Incorporation of quality metrics for performance evaluation	Rate of annual use for all AC clinical pharmacists within organization		
Process	Comprehensive medication review (CMR)	CMR completion rate for eligible patients	≥90	100
	Medication therapy review, problem resolution	Percentage of interventions that resolve medication therapy problems	≥50	≥75
	Patient engagement after hospitalization	Rate of communication within 2 days of discharge and face-to-face visit within 7 or 14 days of discharge	≥60	≥80
	Medication reconciliation post-discharge	Completion of medication reconciliation within 30 days of discharge	≥60	≥80
	Glycemic monitoring for diabetes	Percentage of adults age 18 to 75 years with diabetes who had annual A1C testing	≥90	100
	Statin use for specific disease	Percentage of patients age 40 to 75 years dispensed medications for diabetes and a statin medication	≥65	≥90
	Influenza vaccinations	Percentage of adults who receive an influenza vaccination each year	≥60	≥80
Outcome	BP control	Percentage of adults who have hypertension and BP < 140/90 mmHg	≥65	≥85
	Diabetes control	Percentage of adults age 18 to 75 years with diabetes with A1C < 8%	≥65	≥80
	Adherence to statin therapy	Percentage of individuals with a PDC threshold ≥80% for statin therapy	≥60	≥80
	Readmission of patients provided MTM services post-hospital discharge	Percentage of patients readmitted within 30 days who received MTM services	<20	<5
	Use of validated tool to elicit patient experience	Patient response rate and satisfaction on annual basis		
	Use of validated tool to elicit provider experience	Provider response rate and satisfaction on annual basis		
	Use of the EHR for documentation and data query	Percentage of documented pharmacy interventions on annual basis for patients receiving CMM		
	Use of information through payer channel for data query	PDC for medications		

process, and outcomes; (b) hold individual practitioners accountable for their components of the care process; (c) be feasible to track and document within the usual process of clinical care; (d) produce reliable and valid results; and (e) be understandable to the target audience so that the results could be used in decision-making. Process and outcome metrics spanning multiple organizational frameworks should be selected for their applicability to multiple payment models. More research on assessing the patient and provider experience is also needed and developing and validating tools to gather this information in a standardized fashion should be included in the CMM metric framework. This information will establish the appropriate structure, process, and outcome metrics for these areas. Institutions are encouraged to create an approach for how often surveys are employed depending on how CMM services are delivered, which will in turn allow for institution-specific flexibility with respect to needs, resources, and processes. The quality metrics endorsed by numerous associations or integrated into multiple reimbursement models should be selected because they are most likely to be applicable to services using AC clinical pharmacists. Both short- and long-term goals should be developed and implemented to track process and outcome metrics pertaining to each organization's payer mix, patient population, and priorities. A baseline standard should be set to determine future goals for quality metrics and performance indicators related to structure and outcomes unique to AC. Finally, institutions and practices should commit to continuous quality improvement for AC pharmacy practice and ensure the opportunity to build on and streamline these recommendations.

9 | CONCLUSION

This paper summarizes the available information and primary literature on current quality metrics and performance indicators in AC settings.

In the ever-changing landscape of pharmacy practice, AC clinical pharmacists are integral in both achieving targeted goals for chronic disease state management and working as part of interprofessional team-based care. However, significant variations in the delivery of CMM interventions, the measures used to describe pharmacists' impact, and the reimbursement models in place have led to inconsistent outcomes. Hence, further clarification is needed in both quality metrics and performance indicators. In addition, although AC practice has significantly progressed, standardization is still needed to elevate the pharmacist's role in direct patient care, improve clinical outcomes, and recoup financial incentives for both valued efforts and outcomes. Moreover, although implementing metrics in practice should continue to incorporate the five core tenets, additional opportunities such as advancing postgraduate training and revising board certification in AC will strengthen their usefulness.

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CONFLICT OF INTEREST

The authors declare no conflicts of interest.

ORCID

Jennifer N. Clements https://orcid.org/0000-0003-2431-6651
Roshni P. Emmons https://orcid.org/0000-0002-1075-7459
Sarah L. Anderson https://orcid.org/0000-0002-8420-9527
Scott Coon https://orcid.org/0000-0002-1534-6114
Adriane N. Irwin https://orcid.org/0000-0002-2086-4493
Julie M. Sease https://orcid.org/0000-0001-5772-6097

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