



# Assessing the Impact of Comprehensive Medication Management on Achievement of the Quadruple Aim

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## ABSTRACT

Nonoptimized medication regimens cost patients and payors in the United States more than \$528 billion in additional health care expenses each year. Comprehensive medication management is a patient-centered approach to medication optimization delivered by a clinical pharmacist working with the patient, physicians, and other members of the health care team. Comprehensive medication management ensures medications are assessed for appropriateness, effectiveness, and safety given the patient's clinical status, comorbidities, and other medications, as well as the patient's ability to take the medications as intended and adhere to the regimen. This article reviews the growing body of literature demonstrating the value of comprehensive medication management in achieving the quadruple aim of health care: better care, reduced health care costs, an improved patient experience, and provider well-being.

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## INTRODUCTION

Health care in the United States overwhelmingly relies on medication therapy with 73.9% of primary care visits involving prescribing medication.<sup>1</sup> It has been estimated that non-optimized prescription medications cost patients and payors

more than \$528 billion annually in additional health care expenses.<sup>2,3</sup> A consistent process is needed to produce medication regimens that achieve therapeutic goals while facilitating optimal use by the patient (Figure). Although many medication optimization strategies have been developed, most are limited in scope to a specific disease state, a specific patient population, or focused care setting. The Medicare Prescription Drug, Improvement and Modernization Act of 2003, an early attempt to promote medication optimization, introduced the term “medication therapy management” as a covered benefit under the Medicare Part D prescription drug plan.<sup>4,5</sup> Prescription drug plans were mandated to develop medication therapy management programs for their Medicare beneficiaries; however, the definition of the service was

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ambiguous, resulting in inconsistent delivery.<sup>6</sup> In 2017, the Part D Enhanced medication therapy management model increased eligibility and added payment incentives, but variations in the implementation and provision of medication therapy management limited their impact.<sup>7</sup>

In response to the shortcomings of medication therapy management, a more well-defined medication optimization process that produces consistent results has been developed.<sup>8-10</sup> Comprehensive medication management is a patient-centered approach to optimizing medication use and improving clinical outcomes delivered by a clinical pharmacist working with the patient, physicians, and other members of the health care team.<sup>10</sup> Comprehensive medication management ensures medications are assessed for indication, effectiveness, safety, adherence given the comorbidities, and other medications being taken and that the patient is able to take the medications as intended and adhere to the regimen as prescribed. Unlike medication therapy management, comprehensive medication management approaches medication optimization with a holistic approach, including an assessment of the patient’s clinical status. Although intended for patients at risk for medication-related problems, poor outcomes, or increased health care utilization, comprehensive medication management is also applicable to any patient. Comprehensive medication management work has been underpinned by the tenet of implementation science ensuring that clear definitions of the intervention and components required to support adoption of comprehensive medication management exist. These tenets include a shared

philosophy of practice, a defined patient care process, and a practice management system to ensure its fidelity.<sup>10-15</sup> This article provides an overview of research conducted in practices using comprehensive medication management to highlight its value, improvement in decreasing waste in the health care system with a goal to promote more widespread implementation.

The presentation of comprehensive medication management research will be quantified by examining the effect of comprehensive medication management on achievement of the quadruple aim of health care to provide better care, reduce costs, improve the patient experience, and improve clinician well-being.<sup>16</sup>

### CLINICAL SIGNIFICANCE

- Implementation of comprehensive medication management has been associated with higher rates of achievement of treatment goals for a wide range of chronic diseases.
- Primary care practice sites using comprehensive medication management have achieved a positive return on investment resulting from reductions in health care expenditures.
- Greater patient satisfaction and reports of improved physician and staff work-life support the value of comprehensive medication management in achieving the quadruple aim.

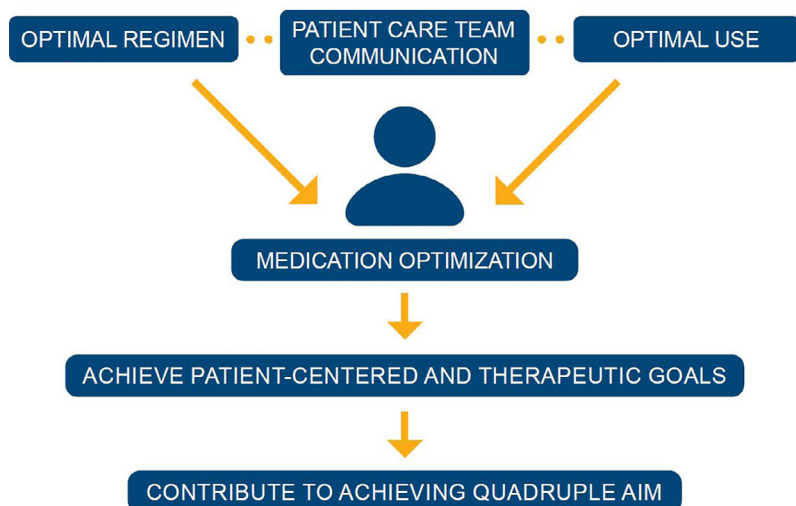
### IMPACT OF COMPREHENSIVE MEDICATION MANAGEMENT ON THE QUADRUPLE AIM OF HEALTH CARE

Integration of comprehensive medication management enriches team-based patient care. Over the past decade, a growing body of evidence has documented these benefits using

metrics including disease biomarkers, health care utilization and expenditures, measures of adherence, patient satisfaction, and impact on provider work-life.<sup>17-37</sup>

### Better Care

The sustained benefit of medication optimization was demonstrated in an assessment of 10 years of interventions made by clinical pharmacists embedded in 48 primary care clinics at Minnesota’s Fairview Health System, which was



**Figure** The process of medication optimization. \*Adapted with permission from the American College of Clinical Pharmacy

published in 2010.<sup>17</sup> This early work used a well-defined process of care for providing medication therapy management that would become the model for comprehensive medication management. Data were analyzed from 33,706 encounters in more than 9000 patients. Patients had an average of 6.8 medical conditions, with 73% taking 10 or more medications. During these encounters, 85% of patients had at least 1 medication therapy problem identified, with 29% having 5 or more medication therapy problems. The most frequent were a need for an additional medication (28.1%), adjustment of subtherapeutic doses (26.1%), and nonadherence due to cost (36%). Of the patients not meeting disease-specific goals at enrollment, 55% improved after medication optimization. In a subset of patients with diabetes, the percentage achieving all treatment goals (A1c < 7%, blood pressure < 130/80 mm Hg, low-density lipoprotein [LDL] < 100 mg/dL, tobacco cessation, and aspirin use) increased from 17.3% at baseline to 42.7% at study completion. In comparison, statewide achievement of these goals ranged from 8% to 13%.

Subsequent studies from the Fairview Health System have found significant improvement in medication adherence and reduced readmissions with comprehensive medication management implementation.<sup>18,19</sup> A recent paper evaluated whether a formal transition of care process implemented in 2012 that included a comprehensive medication management visit within 30 days of discharge would impact readmissions.<sup>19</sup> A total of 43,711 patients from 57,000 hospitalizations were included, with 1291 opting to enroll in the comprehensive medication management cohort. At 30 days postdischarge, patients who had received comprehensive medication management had a significantly lower rate of readmissions compared to those who did not (8.6% vs 12.8%,  $P < .001$ ). The comprehensive medication management cohort 60-day readmission rate remained lower but did not reach statistical significance (15.6% vs 17.6%,  $P = .0528$ ).

The utility of comprehensive medication management in improving transitions of care was demonstrated in the Pharm2Pharm study.<sup>20</sup> This study involved a hand-off between pharmacists at 6 hospitals and community pharmacists aided by the Hawaii Health Information Exchange for shared access to patient medical records. The study enrolled 2083 adults at discharge and compared their results to similar patients at 5 hospitals not providing this service. Medication optimization, achieved through comprehensive medication management and communication between hospital and community pharmacists, was associated with a 36% reduction in medication-related hospitalizations in the patients older than age 65 ( $P = .01$ ). The intervention hospitals had a predicted rate of 46 medication-related hospitalizations per 1000 admissions, and the comparison hospitals had a rate of 72 medication-related hospitalizations per 1000 admissions.

The Veterans Health Administration (VA) integrated the patient-centered medical home (PCMH) model with the development of patient-aligned care teams (PACTs) to

provide primary care to our nation's veterans in 2010.<sup>21</sup> More than 1850 clinical pharmacists provide comprehensive medication management in primary care clinics between provider visits. In a 2019 review of VA practice, 2,561,124 comprehensive medication management interventions were provided during 1,248,635 face-to-face and virtual encounters. Mean A1c decreased from 10% (interquartile range [IQR] + 0.7) at baseline to 7.7% (IQR + 0.5,  $P < .001$ ) at the last assessment. Median systolic and diastolic blood pressure (SBP, DBP) were reduced from a baseline of 142/83 mm Hg (IQR + 10 for SBP and 8 for DBP) to 134/79 mm Hg (IQR + 7 for SBP and 7 for DBP;  $P < .001$ ). In addition, an estimated 27% of return appointments could be avoided as a result of these comprehensive medication management interventions provided to veterans, freeing primary care providers to see other patients.

Attainment of diabetes treatment goals was assessed in a comparison study of the effect of pharmacist-led comprehensive medication management in 7 clinics within a primary care network in California designated as a PCMH.<sup>22</sup> A total of 225 patients were enrolled in either the intervention or usual care group, with goal attainment defined as an A1c  $\leq 8\%$ , blood pressure  $\leq 140/90$  mm Hg, and placement on statin therapy. Over the 13-month study, 40% of patients receiving comprehensive medication management reached the combined treatment goal versus only 12% of the controls ( $P < .001$ ). Patients receiving comprehensive medication management also had significantly greater improvement in attainment of individual goals in A1c (54% vs 36%,  $P = .01$ ), blood pressure (93% vs 77%,  $P = .001$ ), and use of a statin (79% vs 63%,  $P = .01$ ).

A series of studies from Brazil demonstrate that clinical benefits of comprehensive medication management can be replicated in a national health care system.<sup>23-25</sup> In 2008, Brazil's Ministry of Health established multidisciplinary teams consisting of pharmacists, nutritionists, physical therapists, and social workers to support the existing family health strategy teams made up of a primary care physician and nurse.<sup>23</sup> The effectiveness of comprehensive medication management was assessed using a quasi-experimental study design in 2 primary care clinics in Belo Horizonte over a 2-year period. A total of 55 patients were included in the study; 68.9% had 3 or more health problems, and 47.8% were taking 8 or more medications. A total of 441 medication therapy problems were identified, with 50% of patients having 4 or more problems documented. Nonadherence accounted for 28.1% of the medication therapy problems, with a need for additional medication in 21.8% and subtherapeutic dosing in 19.5%. All biomarkers showed significant improvement at study completion (A1c 8.4 vs 7.8 at baseline,  $P < .001$ ; SBP 136.5 mm Hg vs 132.2 mm Hg,  $P = .02$ ; DBP 82.8 mm Hg vs 79.7 mm Hg,  $P = .992$ ; LDL 119.7 mg/dL vs 109.1 mg/dL,  $P < .001$ ; and high-density lipoprotein [HDL] 45.3 mg/dL vs 50.4 mg/dL,  $P < .001$ ).

A larger study of the impact of comprehensive medication management in Lagoa Santa, Brazil, provided further

evidence of improved clinical outcomes.<sup>24</sup> Results from 1057 patients over a 2-year period were included. A total of 1642 medication therapy problems were identified, with nonadherence being the most common (31.9%). Identification of medication therapy problems correlated with the use of 5 or more medications and the presence of 3 or more chronic diseases. Adjusted mean difference from initial to final visit revealed significant improvement in A1c ( $-0.8 \pm 0.4$ ,  $P = .046$ ), LDL ( $-19.5 \pm 6.0$ ,  $P = .002$ ), total cholesterol ( $-21.0 \pm 7.3$ ,  $P = .005$ ), and SBP ( $-3.3 \pm 1.5$ ,  $P = .029$ ). These authors also demonstrated the utility of comprehensive medication management in identifying clinically significant drug interactions in a subsequent study.<sup>25</sup>

### Reduced Health Care Costs

In addition to better clinical outcomes, implementation of comprehensive medication management has resulted in reductions in health care utilization.<sup>20,26-33</sup> An early analysis of Minnesota's Fairview Health System revealed a 12:1 return on investment (ROI) when health care costs of 285 BlueCross BlueShield health plan beneficiaries receiving comprehensive medication management in 6 clinics were compared to a matched cohort not receiving comprehensive medication management. This ROI was achieved primarily through reductions in health care utilization, with a mean reduction of \$3768 per person per year ( $P < .001$ ). These savings represent a 57.9% reduction in facility costs and an 11.1% reduction in professional claims, occurring despite a 19.7% increase in prescription drug expenditures.<sup>26</sup>

In the Pharm2Pharm study, described previously, implementation of a medication optimization program incorporating comprehensive medication management and a pharmacist hand-off at the transition from hospital to community produced a 36.5% reduction in medication-related rehospitalizations for patients 65 years and older ( $P = 0.01$ ) with an estimated \$6.6 million in annual costs avoided due to prevented readmissions.<sup>20</sup> The program cost \$1.8 million to implement, resulting in a 2.6:1 ROI. These findings have been replicated in other settings and patient populations. Comprehensive medication management services provided to 154 patients with psychiatric conditions referred from their physicians over a 28-month period resulted in a 2.8:1 ROI.<sup>27</sup> These were medically complex patients with an average of 10 medical and psychiatric conditions taking an average of 13 medications. The estimated cost savings generated through this program totaled \$90,484, with total expenditures of \$32,186, resulting in a mean cost savings of \$586.55 per patient. In a paper describing comprehensive medication management services provided as part of an interprofessional geriatric care continuum in clinics, skilled nursing facilities, and an assisted-living facility resulted in a cost avoidance of \$335,862 to \$338,239 over a 15-month period for 452 patients.<sup>28</sup>

The Comprehensive Health Management Patient Service program in Florida reported a cost benefit in 312 patients receiving comprehensive medication management services

compared to a matched cohort who did not. The \$700,721 difference in annual savings produced ROI values ranging from 2.1:1 to 2.6:1.<sup>29</sup> Similar results were reported for implementation of comprehensive medication management in clinics participating in a Texas delivery system reform incentive payment program.<sup>30</sup> The authors estimated that \$1,185,610 in health care expenditures were avoided over a 1-year period. A scenario-based sensitivity analysis, where only 1 avoided medical service was counted per medication therapy problem resolved, provided a cost savings of \$48,077 to \$1,106,426.

A comprehensive medication management-based transitions of care service provided to a high-risk Medicaid population in California resulted in \$2139 in savings per patient, inclusive of program cost, realized through a 32% reduction in hospital readmissions.<sup>31</sup> A budget impact analysis showed a potential for the health plan to save \$4.3 million in total health care costs, or \$3 per member per month, within 6 months. With expansion of the program, an estimated \$25.6 million in health care cost savings, or \$4 per member per month, could be realized in 2 years.

Revenue generated directly from comprehensive medication management pharmacist services and from enhanced physician productivity can further increase the total cost benefit of comprehensive medication management programs beyond cost avoidance. In a pilot project at South Carolina's Palmetto Primary Care Physicians, the addition of a clinical pharmacist into the PCMH was not only sustainable but also provided an economic benefit. Integration of the pharmacist, with an average of 11 patient visits per day, demonstrated an estimated cost avoidance of \$164,500 per month and \$1.9 million annually.<sup>32</sup>

Although these studies have demonstrated a positive impact on reducing health care expenditures, ROI within single health care systems variations in billing procedures and a lack of interoperability limits the accuracy and generalizability of estimates of the ROI for comprehensive medication management. Adding to the inability to fairly assess the financial benefit of comprehensive medication management, there is no literature evaluating the impact of medication optimization on reducing missed days of work due to inadequate treatment or adverse drug events.

### Improved Patient Experience

Patients in the Fairview study were sent a satisfaction survey after their second pharmacist visit.<sup>17</sup> The survey contained 7 items with a 5-point Likert-type scale and 1 free text response. A total of 1132 surveys were mailed, with a 28% response rate. Patients expressed high levels of satisfaction with the care provided by the pharmacist; 97.1% agreed or strongly agreed that the pharmacist provided the education they needed to achieve their goals of therapy, 98.1% would recommend the service to family or friends, and 99% felt that health care benefits should include this service. More than 95% gave a rating of agree or strongly agree to the statement that their overall health and well-

being had improved as a result of the service. Nearly 100% agreed or strongly agreed that the pharmacist helped them understand the indications for their medications and how to correctly and safely take them. Patient satisfaction scores were also reported in the study describing comprehensive medication management use in patients with psychiatric disorders.<sup>27</sup> Of 154 patients, 46 (30%) completed the survey, with 93% reporting comprehensive medication management services were extremely or very helpful. A majority (63%) reported changes in their medications, and 89% would refer friends or family to the service. Patients also reported that comprehensive medication management helped them learn more about their medications. Additionally, in the VA patient satisfaction with pharmacist care was assessed with a validated survey.<sup>33</sup> A total of 627 patients completed the survey, with a mean overall score of 90.6% (standard deviation [SD] = 10%). Mean scores within the service, knowledge, and self-management domains were 92.0% (SD = 10.8%), 89.7% (SD = 11.35%), and 89.2% (SD = 12.0%). In a subsequent study conducted within the VA system, pharmacist-provided comprehensive medication management telehealth was evaluated using a modified version of the Satisfaction with Pharmacists scale, with a median patient satisfaction score demonstrated of 39.5 (IQR 36-40) out of a maximum score of 40.<sup>34</sup>

### Improved Clinician Well-Being

Primary care physicians, advanced practice providers, and nurses have reported that working with pharmacists providing comprehensive medication management significantly improves their work life and well-being.<sup>35-37</sup> In a recent publication of structured interviews conducted with 16 primary care providers, participants reported satisfaction with the comprehensive medication management services their patients received and highlighted increased achievement of quality measures.<sup>35</sup> They described a decreased workload and a decrease in mental exhaustion resulting from the reassurance of having a clinical pharmacist available for consultation and professional learning. This study also produced a conceptual framework for assessing the impact of comprehensive medication management on physician well-being and burnout to guide future research. Interviews were also conducted with 6 primary care providers in the Fairview Health System to assess their views on comprehensive medication management.<sup>36</sup> The responses demonstrated the value providers placed on the pharmacists' medication expertise, the education they provide, and their ability to manage patients' medications.

Additional findings come from a single-center cross-sectional study that evaluated perceptions from medical providers, medical support assistants, and nurses of clinical pharmacists providing comprehensive medication management in the VA.<sup>37</sup> A total of 91 responses were received. The value of the contributions of the pharmacist received an average score of 4.2 (with 4 being moderate and 5 being significant contributions). Scores for physicians, nurse

practitioners, and nurses were 4.27, 4.78, and 4.33, respectively. On the item "decrease(s) the time patients have to wait for primary care services," the average score was 4.02, with scores of 4.36, 4.00, and 4.03 for the 3 practitioner groups. On evaluation of whether integration of pharmacists into the patient-aligned care teams model "improve(s) your job satisfaction," the overall rating was 4.29 with group scores of 4.59, 4.67, and 4.43, respectively. The impact of adding a clinical pharmacist to the health care team on the well-being of team members may become a key factor in promoting expansion of comprehensive medication management, but replication of these studies in larger practice settings with diverse patient populations is crucial to ensuring that this message is heard by leaders within health care.

### CONCLUSIONS

Comprehensive medication management is a well-defined process for medication optimization to ensure achievement of treatment goals. A growing body of literature has demonstrated the value of comprehensive medication management in achieving the quadruple aim. Although these studies have documented consistent and sustainable clinical benefit, widespread adoption of comprehensive medication management has been limited by traditional payment models and modes of care delivery. The stresses faced by primary care practices call for innovative approaches to optimize medication use, maximize productivity, and reduce health care costs. Implementation of comprehensive medication management can be a part of the solution.

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