



# The Active Implementation Frameworks: A roadmap for advancing implementation of Comprehensive Medication Management in Primary care



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## ABSTRACT

Implementation of evidence-based health services interventions is complex and often limited in scope. The Active Implementation Frameworks (AIFs) are an evidence-based set of frameworks to use when attempting to put into practice any innovation of known dimensions. This article describes the novel application of the AIFs to facilitate the implementation and improvement of Comprehensive Medication Management (CMM) in primary care practices to optimize medication use and improve care for patients.

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## 1. Introduction

Implementation of evidence-based health services interventions is complex and often limited in scope. Not only is there a documented lag time between the creation of new evidence and the translation of this evidence into practice, only a small portion of evidence-based health services interventions are actually implemented as intended.<sup>1</sup> Many factors contribute to this phenomenon. Notably, the creation and dissemination of evidence does not routinely consider what it takes to implement the evidence-based service or intervention in a real-world context. Many agencies, including the National Institutes of Health, the United States Department of Veterans Affairs and the Agency for Healthcare Research and Quality, have recognized the importance of closing this research-to-practice gap and are turning to implementation science as a potential solution.<sup>1</sup> Previous research supports the use

of implementation science in improving the quality of implementation and ultimately achieving desired patient outcomes.<sup>2,3</sup> Although use of implementation strategies in health care has been rapidly growing in recent years, there is limited literature on applying implementation frameworks and strategies within pharmacy practice.<sup>4–6</sup> This article describes the novel application of an implementation framework, The Active Implementation Frameworks (AIFs), to facilitate the implementation and improvement of Comprehensive Medication Management (CMM) in primary care practices to optimize medication use and improve care for patients.<sup>7</sup>

### 1.1. The Active Implementation Frameworks (AIFs): A brief description

The AIFs are an evidence-based set of frameworks developed following a systematic review and synthesis of the implementation evaluation literature.<sup>8–12</sup> The AIFs outline suggested mechanisms and strategies to use when attempting to put into practice any innovation of known dimensions and take into account the “formula for success.” The “formula for success” proposes that desired

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health outcomes are a result of multiplying an effective innovation (what needs to be done), effective implementation (how it will be done and by whom), and enabling contexts (where it will thrive). If either component is missing or not considered, the impact of implementation efforts will not be fully realized. Applying a model, such as the Active Implementation Frameworks, has been shown to successfully facilitate successful implementation of an innovation into practice. The AIFs consists of five core components: (1) a Usable Innovation, (2) Implementation Drivers, (3) Implementation Stages, (4) Improvement Cycles, and (5) Implementation Teams. Fig. 1 provides an overview of the AIFs and describes components for successful implementation.

One component of the framework, Implementation Stages, also serves to guide the entire implementation effort. It is well understood that implementation is not a one-time event, but a process, involving multiple decisions, supports, actions, and interdependencies. Thus, the stages are non-linear and often occur simultaneously.<sup>13,14</sup> Each stage includes key processes and activities that need to be completed, resulting in a step-by-step roadmap. The activities within each stage of implementation often overlap, with some activities still occurring as new activities in the next stage are beginning. Fig. 2 highlights the implementation stages as applied to this study.

## 1.2. Comprehensive Medication Management: A brief description and introduction to the study

Medication misuse, underuse, and overuse contributes to poor quality health care and accounts for nearly \$300 billion in health care spending each year, suggesting that any effort to improve national health care must address the growing problems around medication use.<sup>15,16</sup> The *Transforming Primary Care Practice through Comprehensive Medication Management (CMM)* study aims to advance the efficient and effective delivery of CMM in primary care in order to optimize medication use for patients, improve health, and control costs. The study also aims to build the business case for integrating CMM into new value-based care delivery models.

If the practice of CMM is to meet the growing medication-

related and health care needs of society, past work suggests it should be framed conceptually around the following three core components.<sup>17</sup>

- **A Shared Philosophy of Practice.** A shared philosophy of practice is an attitude or a mindset held by pharmacists and other health care providers that serves to guide ones actions and behaviors and instill trust in the care delivered. Without a philosophy of practice, it is unclear what the pharmacist values and, therefore, how the pharmacist will behave toward the goals of optimizing medication use for patients.
- **The CMM Patient Care Process.** Articulating the essential functions of the CMM Patient Care Process and explicitly defining the steps necessary to operationalize CMM is essential. Establishing this “common language” is important to ensure that the service is delivered consistently and with fidelity.
- **Practice Management and Operations Supports.** Articulating the essential functions that support integration of CMM within the primary care medical practice is important. This includes the structural and system level supports that will ensure the efficiency, effectiveness, and sustainability of CMM.

CMM, the Patient Care Process, is a patient-centered clinical service provided by pharmacists in collaboration with other health care providers that is designed to optimize medication outcomes and improve patient health. CMM is a standard of care that ensures each patient's medications (whether prescription, nonprescription, or herbal) are individually assessed to determine that each medication is appropriate for the patient, effective for the medical condition, safe given the comorbidities and other medications being taken, and able to be taken by the patient as intended. CMM includes an individualized care plan developed in collaboration with the health care team and the patient that achieves the intended goals of therapy with appropriate follow-up to determine actual patient outcomes. This all occurs because the patient understands, agrees with, and actively participates in the treatment regimen, thus optimizing each patient's medication experience and clinical outcomes.<sup>18,19</sup>

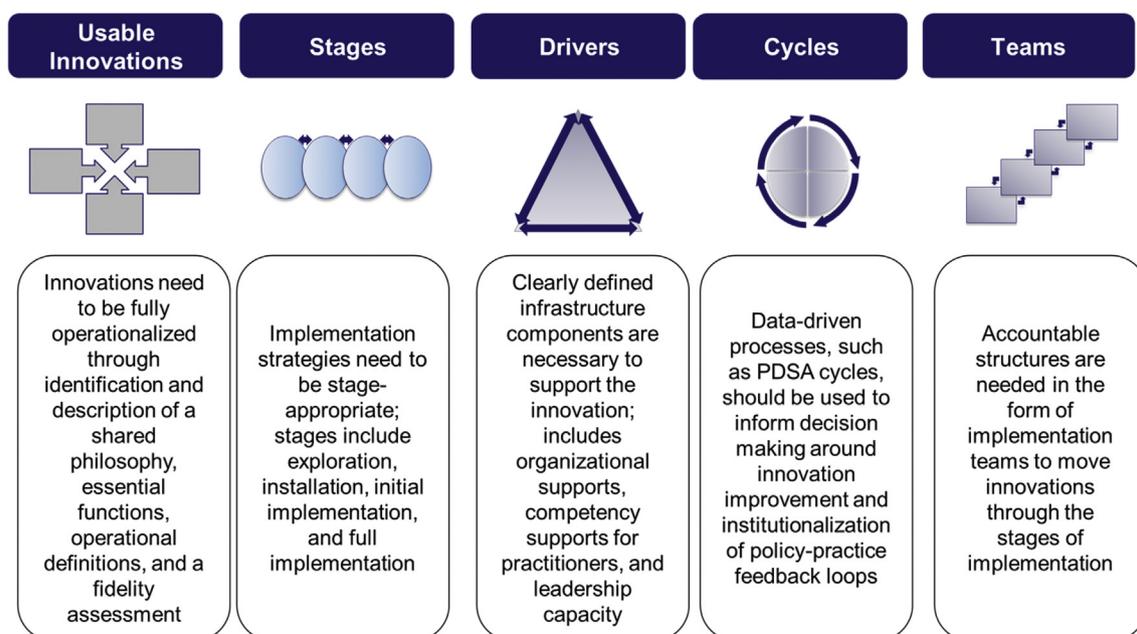


Fig. 1. Overview of the Active implementation frameworks.

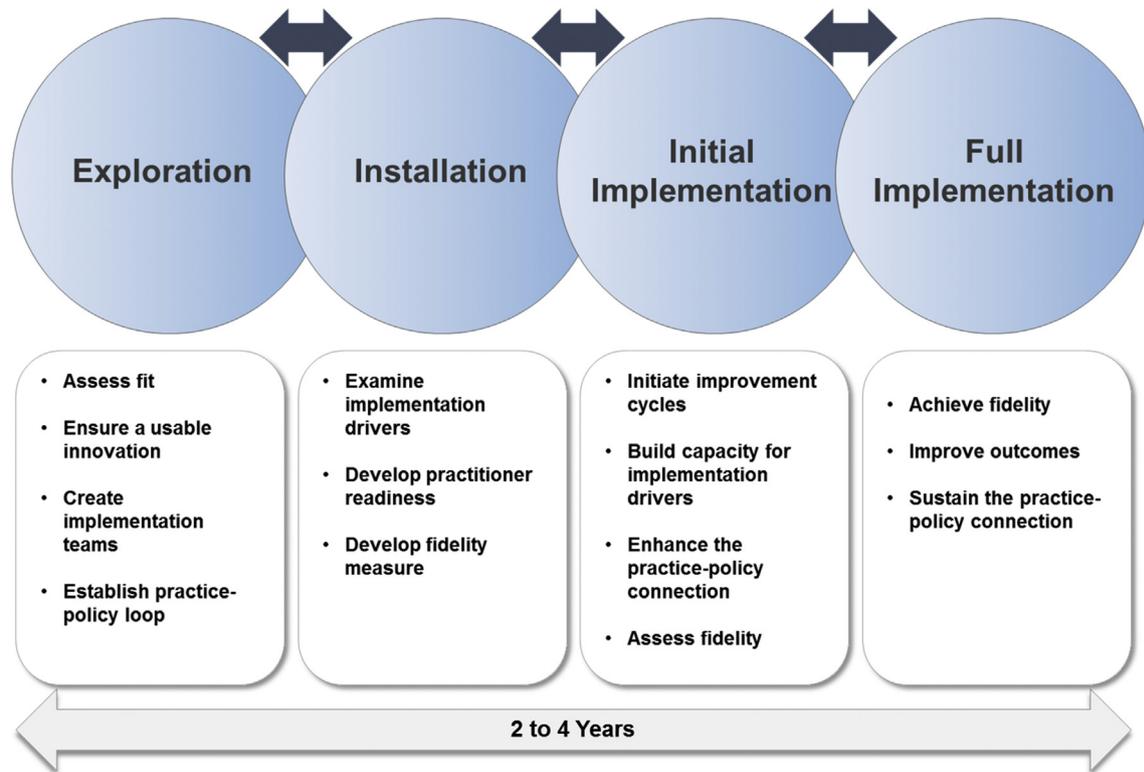


Fig. 2. Active implementation frameworks: Implementation stages.

Despite this thorough definition, CMM remains poorly understood, is not operationalized consistently, and lacks a measure of fidelity. Although some research has demonstrated improved clinical and economic outcomes associated with CMM, these studies are limited and findings across multiple studies are inconsistent.<sup>20,21,22</sup> In order to realize maximum positive impact, CMM must be explicitly defined, consistently implemented, and replicated across a variety of settings.

In 2016, nearly \$3 million in funding was awarded to the study team to accelerate the identification of best practices in CMM and accelerate the scale and sustainability of CMM in primary care. The project aims to: 1) examine pharmacist and site readiness for CMM implementation; 2) establish the CMM Patient Care Process and philosophy of practice; 3) build the practice management and operation supports necessary to facilitate CMM implementation within a primary care practice; 4) evaluate the impact of CMM on clinical, economic, and patient-reported outcomes; and 5) build the business case to scale and sustain CMM.

To carry out this study, a multi-site network of 40 primary care practices across the United States was established through a unique partnership between the UNC Eshelman School of Pharmacy, the University of Minnesota College of Pharmacy, the American Academy of Family Physicians National Research Network (AAFP NRRN), the National Implementation Research Network (NIRN), and the Alliance for Integrated Medication Management (AIMM). A practice advancement center at one of the Schools of Pharmacy serves as the coordination and evaluation hub for the study. A CMM in Primary Care Grant Steering Committee (GSC) and a Payer and Policy Advisory Board (PPAB) provide critical insight and support to the study team. Established and embedded pharmacists delivering CMM within primary care practice sites were selected for participation in the study based on a commitment to share their experience, apply principles of implementation and improvement science to advance CMM in their practices, and engage in research activities

to evaluate the impact of CMM use on relevant outcomes. Given the overall goals of this study, the Active Implementation Frameworks will be used to guide the implementation efforts of CMM in primary care.

## 2. The Active Implementation Frameworks in guiding CMM implementation and improvement

The purpose of this article is to describe how the Active Implementation Frameworks are being used to guide the study. As outlined in the introduction, the Active Implementation Frameworks have been shown to facilitate successful implementation of an innovation into practice. As noted above as well, the AIFs consist of five core components: (1) a Usable Innovation, (2) Implementation Drivers, (3) Implementation Stages, (4) Improvement Cycles, and (5) Implementation Teams (Fig. 1). Using the implementation stages as a roadmap (Fig. 2), this article highlights the role of each of the Active Implementation Frameworks (underlined in the text that follows) in implementing CMM in primary care. Finally, Fig. 3 serves to summarize the overall alignment of the study aims as well as the core components of the AIF within the context of the stages of implementation.

### 2.1. Stage I: exploration

The aim of the exploration stage is to assess whether implementation is feasible and to create readiness for implementation by: assessing needs and examining fit of each site; ensuring a usable innovation; creating implementation teams, and establishing a practice-policy loop. The result of this stage should be a clear implementation plan to facilitate the installation and initial implementation of the innovation.

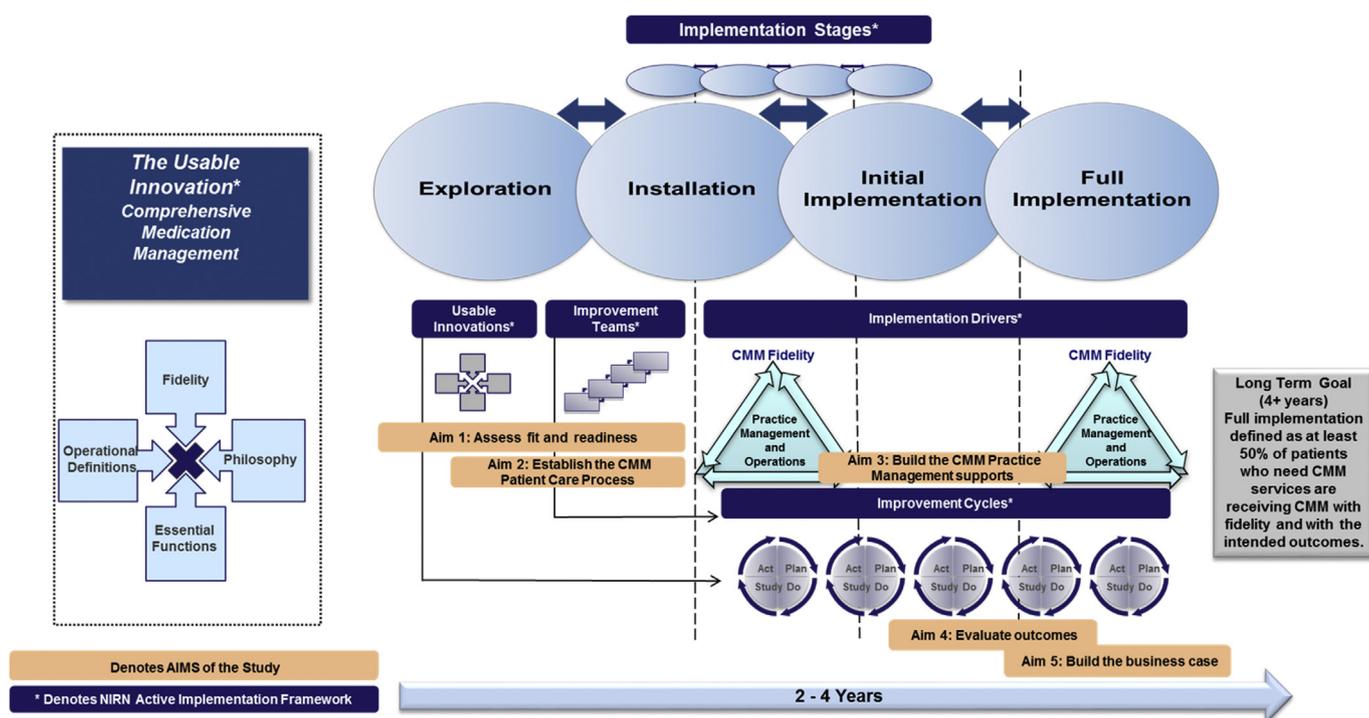


Fig. 3. The Active implementation frameworks applied to comprehensive medication management in primary care.

### 2.1.1. Assess fit

Prior to the launch of this study, sites were recruited to participate in the CMM study. Through convenience sampling, we recruited primary care practice sites with an embedded pharmacist delivering CMM.<sup>18,19</sup> Pharmacists providing targeted disease statement management programs or offering other services were excluded. In recruiting sites, we were able to assess fit and alignment of the study goals with the pharmacist's motivations and goals. It is worth noting that while all pharmacists within the study were engaged in delivering CMM, their experience ranged from one year to over twenty years.

### 2.1.2. Ensure a usable innovation

The application of the **Usable Innovation framework** (one of the five key components of the Active Implementation Frameworks) is the first step to defining the innovation (in this case CMM) and ensuring it is teachable, learnable, doable, and readily assessable. The innovation must meet the following criteria to be defined as usable: a) espouse a philosophy and a set of values and principles; b) articulate essential functions that frame the innovation; c) explicitly describe how each essential function is operationalized; and d) include an assessment of fidelity of the innovation to ensure that it is implemented as intended.

Although all pharmacists in the study expressed that they provided CMM and study investigators confirmed that the pharmacists were engaged in CMM, it was apparent in the early phases of the study that no one was speaking a common language. Despite several CMM guidance documents and published standards of practice, CMM lacked clear operational definitions.<sup>18,19,23,24</sup> Thus, additional development work was needed to ensure that CMM was a usable innovation. A documented methodology was applied over the course of several months to define a common language for the CMM Patient Care Process.<sup>25</sup> This methodology followed a multi-step iterative process to identify the philosophy of practice; essential functions; and operational definitions of CMM. Briefly, a shared commitment to a philosophy of practice that underlies the

CMM Patient Care Process\* was established through a reflective exercise. Next, the project team conducted semi-structured interviews, a literature review, and a document review to identify the essential functions of CMM and operationally define them. These essential functions and operational definitions were vetted with key stakeholders (e.g., clinical pharmacists, physicians, primary care practice managers, and pharmacy educators). This work resulted in the development of a common language for the CMM Patient Care Process (i.e., a usable innovation). This common language document reinforced while also expanding existing CMM literature, and provides a framework for assessing fidelity (i.e., the degree to which practitioners are delivering CMM as intended). A multi-faceted assessment of fidelity to CMM was then developed and is described in greater detail under the stage entitled, *Full Implementation*.

Finally, the CMM common language document is serving as the basis for the creation of a CMM self-assessment tool, which will provide pharmacy practitioners with an opportunity to assess their adherence to the usable innovation (i.e., the CMM common language document), and identify opportunities for improvement.

### 2.1.3. Create implementation teams

A program champion or lead pharmacist was identified at each site. In addition, the **Implementation Team framework** (one of the five key components of the Active Implementation Frameworks) was applied to identify those individuals who would support CMM implementation efforts at the practice sites throughout all stages of the implementation effort. The role of a team has been found to be a critical component of successful implementation efforts.<sup>8</sup> Each implementation team consists of a pharmacist with expertise in delivering CMM, an individual serving in a leadership role within the practice, a quality improvement expert, and other key stakeholders identified by the teams. Teams range from 3 to 6 individuals. With the pharmacist as the team lead, each team created a Terms of Reference, which is a document that outlines the team's purpose, objectives, membership, and ways of working. Teams are

responsible for facilitating CMM implementation and improvement.

#### 2.1.4. Establish a practice-policy loop

A critical component of the Exploration Stage is the process of connecting practice to policy, that is, engaging stakeholders to ensure that change happens on purpose within a system and is sustainable. Establishing a practice-policy loop is important because all too often effective interventions are changed to fit the system rather than the existing system changing to support the effective intervention.<sup>12</sup>

The project team organized two different stakeholder groups to advise and inform the study and also help with dissemination of key learnings, the CMM Grant Steering Committee (GSC) and the Payer and Policy Advisory Board (PPAB). The GSC consisted of some of the nation's leading experts in CMM and medication optimization, health services research, implementation science, and a physician champion. The PPAB brought together national and regional experts in the federal and commercial healthcare payer and policy areas. Both groups are responsible for helping to ensure that the work being done is aligned with changes ongoing nationally within health care and that proactive approaches are taken to align the work with emerging primary care value-based payment models.

Finally, the study team developed a strategic communication plan to ensure a well thought out and purposeful plan was in place to begin to communicate learnings and share insights in an effort to accelerate the advancement of CMM. Communication strategies include writing white papers; presenting learnings at congressional briefings; engaging in discussion with key payer and policy makers as well as health care providers; developing and disseminating change packages; creating a community of learning among healthcare providers; publishing social media briefs and peer-reviewed research manuscripts; planning and hosting a stakeholder CMM summit; and attending and presenting at key conferences.

## 2.2. Stage 2: installation

Installation activities usually occur once the decision has been made to adopt an innovation. The purpose of the Installation Stage is to ensure that pharmacists are prepared to engage in the delivery of the usable innovation and that the structural and system-level supports are in place to facilitate successful implementation of CMM within the primary care practice or organization. In this case, CMM was already a part of the care delivery model in the selected primary care practices. The practices were not committing to adopting something new, but engaging in a study that examined best practices in CMM in an effort to both improve upon and scale the service. Although practices were assessed to ensure that the basic supports were in place (i.e., the pharmacist was embedded within the practice, space was provided for delivery of CMM, pharmacist had access to the electronic health record), it is well recognized that insights into the essential structural and system-level supports necessary to integrate and sustain CMM within a practice are poorly understood.

### 2.2.1. Examine implementation drivers

The **Implementation Drivers framework** is being applied to help identify the infrastructure and supports necessary to ensure the capacity to implement CMM.<sup>26</sup> The study team is employing a two-part assessment of implementation supports. The first is a rigorous, qualitative approach using a series of focus groups and interviews with pharmacy managers and pharmacists across all study sites to arrive at essential practice management supports

(e.g., leadership support, adequate clinic space, availability of staff, documentation systems) felt essential to support the efficient, effective, and sustainable use of CMM in primary care. Learnings from this assessment will inform recommendations and action plans for further improvements and sustainability at the level of each primary care practice site. Similar to the CMM Self Assessment tool, this work should result in a Practice Management Self-Assessment tool, which will provide practices with insights into the infrastructure and supports necessary to implement CMM. It will also result in an action plan that sites will use to build capacity for implementation of CMM.

The second is application of the Drivers Best Practices Assessment (DBPA), a team-based, validated assessment tool designed to evaluate implementation supports.<sup>26</sup> The tool will be contextualized for application to CMM and will be administered via interviews to a subset of sites by a trained individual. Administration of this tool will yield insights into the role of the DBPA in future CMM studies. We will also use learnings from the DPBA to further inform the development of the Practice Management Self-Assessment tool.

### 2.2.2. Develop practitioner readiness

Ensuring that the pharmacists and the leadership within the primary care practices are prepared to engage in the implementation and improvement of CMM is key to ensuring successful implementation. To provide ongoing support for the implementation teams as they prepared to engage in the study, study investigators developed a training and coaching plan. The training plan includes a series of live, monthly webinars designed to build knowledge around all aspects of the study, guide teams through improvement work, and provide a forum for sharing lessons learned throughout the improvement cycles. In addition, a number of tools and assessments were developed to assist the sites with planning, implementing, and evaluating their improvement work. For support in between training webinars the study team established coaching calls, which utilized four trained coaches and were designed to assist sites in identifying key learnings in their improvement work, address any concerns the sites may have, provide additional assistance as needed, and keep the sites on track with their deliverables.

### 2.2.3. Develop fidelity measure

In order to ensure that CMM is implemented with fidelity and with intended outcomes, a multi-faceted approach to the assessment of fidelity was developed.<sup>27–29</sup> Relying on evidence from the literature on fidelity measurement, we considered fidelity measurement along 3 constructs: content, context, and competence. Measures of fidelity must be developed to assess a) adherence to content (i.e., the pharmacists adherence to the CMM Patient Care Process as outlined in the common language document); b) the contextual supports necessary to sustain CMM services (i.e., Practice Management Supports); and c) competency (i.e., the pharmacists ability to operationalize the CMM Patient Care Process). The assessment of fidelity of CMM will consist of interviews, a patient engagement survey, product review, and self-assessment, and examines the three components of CMM holistically.

## 2.3. Stage 3: initial implementation

The initial implementation stage aims to integrate the innovation into everyday practice and relies on the preparatory work started in the exploration and installation Stages. The study sites had been engaged for years in delivering CMM, but lacked a consistent approach and common language. Thus, our goal was to focus on implementation of a consistent approach to CMM, which

focused on improving delivery of CMM in practice according to an established common language. During the initial implementation stage, key activities necessary to implement the innovation include continued training, coaching, and rapid cycle problem solving. During this stage, implementation teams began implementing the CMM Patient Care Process through application of the **Improvement Cycles framework**. Improvement Cycles support the process of purposeful small tests of change and allow implementation teams to identify challenges, solve problems, improve processes, and build infrastructure within the primary care practice.<sup>30</sup> One type of improvement cycle is the Plan-Do-Study-Act (PDSA) cycle of improvement. The PDSA cycle was selected as an implementation strategy for its ability to easily integrate into the primary care practice workflow. In training primary care practice sites on PDSA cycles, the study team emphasized the importance of purposeful small tests of change, while also illustrating how these cycles fit into the Institute for HealthCare Improvements (IHI) Model for Improvement.<sup>31</sup> Alignment of the PDSAs with the IHI Model for Improvement was important as several of the primary care practice sites had prior experience with this model.

#### 2.3.1. Initiate improvement cycles

All sites were introduced to the general principles of improvement cycles and PDSA cycles. For their first PDSA, the implementation teams were free to choose the essential function of the CMM Patient Care Process that they wanted to improve upon. Learnings from the PDSA cycles are captured via PDSA planning and tracking forms as well as run charts submitted by the implementation teams prior to webinar sessions and at the end of improvement cycles. These forms assist sites in capturing the changes they are making at their respective organizations and inform monthly coaching supports and training webinars. The first series of webinars were designed to provide them with the background knowledge and skills necessary to successfully improve upon the CMM Patient Care Process using PDSA cycles. Topics included: introduction of the CMM Patient Care Process through the common language document, purpose and functions of a PDSA Cycle, writing measurable goals, developing a measurement strategy including elements of a data collection plan, problem analysis, interpreting results, and using data-based decision rules for changes. Once sites started engaging in PDSA work, the webinars featured just-in-time training topics identified from the coaches and PDSA forms as well as real-world examples provided by different practice sites to facilitate shared learnings.

#### 2.3.2. Build capacity for implementation drivers

Efforts to build the practice management and operations supports continue throughout this stage and the role of implementation drivers in facilitating this work is further elucidated. PDSA Cycles may be utilized to accelerate improvement around practice management supports.

#### 2.3.3. Enhance the practice-policy connection

The study team gathers valuable learnings from the sites, which are then shared with the PPAB and GSC in an effort to maintain open lines of communication and enhance the practice-policy connection. Learnings throughout the study must be constantly communicated and disseminated through appropriate channels and must reach the right audience in order to influence change at a local, regional, and national level. This also helps to ensure that we are proactively working within an evolving and emerging value-based health care delivery system.

#### 2.3.4. Assess fidelity to the CMM Patient Care Process

The assessment of fidelity to CMM will consist of interviews, a

patient engagement survey, product review (i.e., SOAP note review), and pharmacist's self-assessment to the CMM Patient Care Process, and examines the three components of CMM holistically.

### 2.4. Stage 4: full implementation

Full implementation occurs as new learnings become integrated into practice and practitioners are appropriately providing the program or service with skill and quality. Full implementation of any innovation may take 2–4 years to fully realize impact. With respect to the delivery of CMM in primary care practice, we define full implementation as “at least 50% of patients who need CMM services are receiving CMM with fidelity and with the intended outcomes”. While full implementation is beyond the scope of this study, this aspirational goal allows us to strive for continued implementation and improvement of CMM in primary care practice.

#### 2.4.1. Achieve fidelity and improve outcomes

Full implementation creates the opportunity to demonstrate fidelity to CMM and impact of CMM on important clinical and patient outcomes. In this study, clinical, economic, and patient-reported outcomes will be assessed and include identification and resolution of medication-related problems, improved quality of care, reduction in health services utilization, reduction in total cost of care, and improved patient experiences and well-being. In addition, and driven by the insights of the PPAB, the study team will be developing flexible return on investment (ROI) models to facilitate the integration of medication optimization strategies, such as CMM, into emerging value-based care models. These health outcomes will be analyzed in alignment with fidelity and other implementation outcomes, thereby allowing for a more accurate reflection of impact.

#### 2.4.2. Sustain the practice-policy connection

The goal is to ensure that the systems of care within which CMM is being delivered, whether at the practice level, the health system or organization level, or at the regional and federal level support the scale and sustainability of CMM and alignment of CMM with evolving value-based health care models.

## 3. Discussion

To accelerate implementation of pharmacy services, such as the CMM Patient Care Process, it is helpful to apply and use implementation science frameworks and strategies. The purpose of this article was to describe a novel application of such a framework, the AIFs, to define and improve implementation of CMM in primary care practice. This study will add to the current literature on the usefulness and applicability of the AIFs, in this particular case, for implementing pharmacist-led care delivery models. To our knowledge, this is the first application of the AIFs to healthcare, and, in particular, pharmacy. In addition, it highlights a potential roadmap for pharmacists interested in implementing or improving a new care delivery model.

This study also brings to light several considerations when applying implementation science frameworks to pharmacy services. First, while implementation science frameworks are useful guides that can inform effective implementation, they will most likely need to be contextualized based on need. For instance, while the AIFs recommend that practitioners be carefully selected based on the competencies needed to carry out the project, the current study participants were pharmacists already embedded in primary care settings and were selected based on convenience sampling. Working with existing staff that have not been carefully selected

into the process is often encountered in practice. In these cases, other competency supports such as training and coaching provide a compensatory function for the lack of selection. Second, while all of the AIFs strategies are important, the stages of implementation are foundational. While it is easy to overlook planning, careful attention to completion of activities within the exploration and installation stages, such as ensuring that the innovation is usable, is key to successful implementation. Finally, given the increased emphasis on team-based care, the creation of implementation teams is of particular relevance to pharmacy practice. Not only does this process encourage interprofessional collaboration towards a common goal, but it has also been linked to greater institutionalization of the innovation. Finally, creating communication and practice-policy feedback loops at multiple levels (study sites-project team, study sites-study sites, experts-project team, payers and policymakers-study sites) serve a number of purposes. It increases buy-in and interest in this work, creates a community of learning, integrates accountability mechanisms into the study, allows rapid and purposeful dissemination of information and lessons learned, and helps to ensure system and policy level alignment with our work.

While this study highlights application of the AIFs, some limitations should be noted, which can be addressed in future research. First, results on the effectiveness of this approach in this study are yet to be determined, since post-implementation and health outcomes data have not yet been collected. The AIFs, however, were found to be highly applicable by the project team, and have been found useful in other contexts.<sup>11,12,32</sup> Rigorously testing and validating such frameworks is an important direction for implementation-focused research in pharmacy practice. Second, the amount of resources needed to apply the AIFs is substantial, potentially limiting its use for resource-poor settings. As a comprehensive framework, however, it does include all of the implementation steps believed to impact quality implementation. Developing a briefer, more practical, and more focused version of this approach to implementation might be helpful for busy practitioners as well as for less complex innovations. Finally, this study illustrates only one potential operationalization of the AIFs to the field of pharmacy. Further understanding of its utility will be achieved through replication across pharmacy studies.

Finally, the field of implementation science has grown exponentially in the past decade. Over 30 different implementation frameworks have been developed in addition to numerous dissemination frameworks.<sup>3,33</sup> In this study, we had a unique opportunity to work with individuals from the National Implementation Research Network, where the AIFs were founded. Through this unique partnership, we came to appreciate the potential benefit of the AIFs to our work and, early on, recognized the likely relevance of the AIFs to implementation and improvement of CMM in primary care. Hence, our selection of the AIFs to guide this study. It is likely that other implementation frameworks are relevant as well, but we were drawn to the evidence-based and systematic nature of the AIFs.

In summary, using the AIFs to frame and guide the study is allowing the project team to move toward achievement of the study aims in a methodical and rigorous way. Anticipated impacts of the study are successful acceleration of best practices in CMM in primary care; development and replication of a consistent, standard, and evidence-based approach to the CMM Patient Care Process; and the development and customization of transferrable implementation strategies and tools (e.g., fidelity assessment) for use in pharmacy. In addition, it is expected that use of the AIFs implementation activities will increase fidelity to the CMM Patient Care Process common language, thereby increasing the likelihood of achieving the desired health outcomes. The AIFs focus on usable innovations, the drivers needed to support implementation of the

usable innovation, improvement cycles, improvement teams, and implementation stages – all of which are well-aligned with efforts to advance pharmacy services in diverse care delivery models. As a well-operationalized and transferable implementation science model, the AIFs have significant potential to optimize medication optimization and improve health care delivery.

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## References

- Glasgow RE, Vinson C, Chambers D, Khoury MJ, Kaplan RM, Hunter C. National Institutes of Health approaches to dissemination and implementation science: current and future directions. *Am J Public Health*. 2012;102(7):1274–1281. <http://dx.doi.org/10.2105/AJPH.2012.300755>.
- Durlak JA, DuPre EP. Implementation matters: a review of research on the influence of implementation on program outcomes and the factors affecting implementation. *Am J Community Psychol*. 2008;41(3–4):327–350.
- Meyers DC, Durlak JA, Wandersman A. The quality implementation framework: a synthesis of critical steps in the implementation process. *Am J Community Psychol*. 2012;50(3–4):462–480.
- Watkins K, Wood H, Schneider CR, Clifford R. Effectiveness of implementation strategies for clinical guidelines to community pharmacy: a systematic review. *Implement Sci IS*. 2015;10:151.
- Cavanaugh Jamie Jurkiewicz, Jones Christine D, Embree Genevieve, et al. Implementation science workshop: primary care-based multidisciplinary readmission prevention program. *J General Intern Med*. 2014;29(5):798–804.
- Moullin JC, Sabater-Hernández D, Benrimoj SI. Qualitative study on the implementation of professional pharmacy services in Australian community pharmacies using framework analysis. *BMC Health Serv Res*. 2016;6(1):439.
- Fixsen D, Blase K, Metz A, Van Dyke M. Implementation science. In: *International Encyclopedia of the Social & Behavioral Sciences*. 2015:695–702.
- Fixsen DL, Blase KA, Timbers GD, Wolf MM. In search of program implementation: 792 replications of the Teaching-Family Model. In: Bernfeld DP, Farrington Leschied AW, eds. *Offender Rehabilitation in Practice: Implementing and Evaluating Effective Programs*. London: Wiley; 2001:p.149–166.
- Fixsen DL, Naom SF, Blase KA, Friedman RM, Wallace F. *Implementation Research: a Synthesis of the Literature*, vol. 125. Univ South Florida, Louis la Parte Florida Ment Heal Inst Natl Implement Res Netw (FMHI Publ 231); 2005. <http://nirn.fmhi.usf.edu>.
- Metz A, Bartley L, Ball H, Wilson D, Naom S, Redmond P. Active implementation frameworks for successful service delivery: catawba county child wellbeing project. *Res Soc Work Pract*. 2015;25(4):415–422. <http://dx.doi.org/10.1177/1049731514543667>.
- Fixsen Dean, Blase Karen, Metz Allison, Van Dyke Melissa. Statewide implementation of evidence-based programs. *Except Child*. 2013;79(2):213–230. <http://dx.doi.org/10.1177/001440291307900206>.
- Metz A, Bartley L. Active implementation frameworks for program success: how to use implementation science to improve outcomes for children. *Zero Three*. 2012;32(4):11–18.
- Romney Stephanie, Israel Nathaniel, Zlatevski Danijela. Exploration-stage implementation variation. *Z für Psychol*. 2014;222(1):37–48. <http://dx.doi.org/10.1027/2151-2604/a000164>.
- Saldana L, Chamberlain P, Wang W, Hendricks Brown C. Predicting program start-up using the stages of implementation measure. *Adm policy Ment health*. 2012;39(6):419–425. <http://dx.doi.org/10.1007/s10488-011-0363-y>.
- QuintilesIMS. *Avoidable Costs in U.S. Health Care. The \$200 Billion Opportunity from Using Medicines More Responsibly*; February 2017. Accessed at: [https://www.imshealth.com/en/about-us/news/ims-health-study-identifies-\\$200-billion-annual-opportunity-from-using-medicines-more-responsibly](https://www.imshealth.com/en/about-us/news/ims-health-study-identifies-$200-billion-annual-opportunity-from-using-medicines-more-responsibly).
- New England Health Care Institute. NEHI Research Brief, “Thinking outside the Pillbox: A System-wide Approach to Improving Patient Medication Adherence for Chronic Disease.”. [http://www.nehi.net/writable/publication\\_files/file/pa\\_issue\\_brief\\_final.pdf](http://www.nehi.net/writable/publication_files/file/pa_issue_brief_final.pdf) (Accessed 6 February 2017).

17. Cipolle RJ, Strand L, Morley P. *Pharmaceutical Care Practice: The Patient-centered Approach to Medication Management*. third ed. New York, NY: McGraw-Hill Education; 2012.
18. *Comprehensive Medication Management in Team-based Care*. American College of Clinical Pharmacy; 2016. <https://www.accp.com/docs/positions/misc/CMM%20Brief.pdf>.
19. McInnis T, Webb E, Strand L, Patient-Centered Primary Care Collaborative (PCPCC). *The Patient-centered Medical Home: Integrating Comprehensive Medication Management to Optimize Patient Outcomes Resource Guide*. second ed. Washington, DC: PCPCC; 2012. Available from: [www.pcpcc.org/sites/default/files/media/medmanagement.pdf](http://www.pcpcc.org/sites/default/files/media/medmanagement.pdf) (Accessed 2 December 2015).
20. Greer Nancy, Bolduc Jennifer, Geurkink Eric, et al. Pharmacist-led chronic disease management: a systematic review of effectiveness and harms compared with usual care. *Ann Intern Med*. 2016;165(1):30. <http://dx.doi.org/10.7326/m15-3058>.
21. Viswanathan M, Kahwati LC, Golin CE, et al. Medication therapy management interventions in outpatient settings: a systematic review and meta-analysis. *JAMA Intern Med*. 2015;175(1):76–87.
22. Chisholm-Burns MA, Kim Lee J, Spivey CA, et al. US pharmacists' effect as team members on patient care: systematic review and meta-analyses. *Med care*. 2010;48(10):923–933.
23. American College of Clinical Pharmacy (ACCP). Standards of practice for clinical pharmacists. *Pharmacotherapy*. 2014;34:794–797.
24. *Pharmacists' Patient Care Process*. Joint Commission of Pharmacy Practitioners; May 29, 2014. <https://www.pharmacist.com/sites/default/files/files/PatientCareProcess.pdf>.
25. Metz A. *Practice Profiles: A Process for Capturing Evidence and Operationalizing Innovations*. 2016.
26. Fixsen DL, Naoom SF, Metz A, Louison L, Ward C. *Implementation Drivers: Assessing Best Practices*. Chapel Hill; 2015.
27. Durlak JA, DuPre EP. Implementation matters: a review of research on the influence of implementation on program outcomes and the factors affecting implementation. *Am J community Psychol*. 2008;41(3-4):327–350.
28. Naleppa MJ, Cagle JG. Treatment fidelity in social work intervention research: a review of published studies. *Res Soc Work Pract*. 2010;20(6):674–681.
29. Mowbray Carol T, Holter Mark C, Teague Gregory B, Bybee Deborah. Fidelity criteria: development, measurement, and validation. *Am J Eval*. 2003;24(3):315–340.
30. Taylor MJ, McNicholas C, Nicolay C, Darzi A, Bell D, Reed JE. Systematic review of the application of the plan-do-study-act method to improve quality in healthcare. *BMJ Qual Saf*. 2014;23(4):290–298.
31. *Institute for Healthcare Improvement: How to Improve*; 2016. <http://www.ihl.org/resources/Pages/HowtoImprove/default.aspx> (Accessed 7 February 2017).
32. Metz A, Naoom SF, Halle T, Bartley L. *An Integrated Stage-based Framework for Implementation of Early Childhood Programs and Systems (OPRE Research Brief 2015-48)*. Washington (DC). 2015.
33. Tabak RG, Khoong EC, Chambers DA, Brownson RC. Bridging research and practice: models for dissemination and implementation research. *Am J Prev Med*. 2012;43(3):337–350.