Patient-Centered
Clinical Decision Support
Learning Network

A Stakeholder-driven Action Plan for Improving Pain Management, Opioid Use, and Opioid Use Disorder Treatment Through Patient-Centered Clinical Decision Support

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Acronyms

AMDIS — Association of Medical Directors of Information Systems

APA — American Psychological Association

AHRQ — Agency for Healthcare Research and Quality

CDC — Centers for Disease Control and Prevention

CDO —Care Delivery Organization

CDS — Clinical Decision Support

CDSS — Clinical Decision Support System

CE — Continuing Education

CHIME — College of Healthcare Information Management Executives

CMS — Centers for Medicare & Medicaid Services

EHR — Electronic Health Record

EHRA — Electronic Health Records Association

FAQs — Frequently Asked Questions

FHIR — Fast Healthcare Interoperability Resources

HIMSS — Healthcare Information and Management Systems Society

HIT — Health Information Technology

HITAC — Health Information Technology Advisory Committee

HRSA — Health Resources and Services Administration

IHE — Integrating the Health Enterprise

IHI — Institute for Healthcare Improvement

MAT — Medication Assisted Therapy

MEDD — Morphine Equivalent Daily Dose

MOUD — Medications for Opioid Use Disorder

NIH — National Institutes of Health

OAP — Opioid Action Plan

OAPWG — Opioid Action Plan Working Group

ONC — Office of National Coordinator for Health Information Technology

OUD — Opioid Use Disorder

PCCDS — Patient-Centered Clinical Decision Support

PDMP — Prescription Drug Monitoring Program

PHM — Population Health Management

1. Executive Summary

1.1 Introduction

1.1.1 Background

Opioid use for managing pain and non-medical purposes has reached epidemic proportions and has created a national crisis that causes staggering mortality, costs, and shattered lives. Patients and care teams could better address these challenges through timely, efficient access to evidence-informed information and tools that support safe and effective pain management, opioid use, and opioid use disorder (OUD) treatment. Patient-centered clinical decision support (PCCDS) refers to strategies and interventions that deliver such support in ways that enhance patient activation, education and engagement, and collaborative decisions and actions between patients and their care teams. The Patient-Centered CDS Learning Network (Learning Network) is an Agency for Healthcare Research and Quality (AHRQ)-supported initiative that focused its efforts in 2018 on developing this opioid action plan (OAP) to articulate and begin advancing progress toward a shared vision for applying PCCDS more broadly and effectively to address the opioid misuse crisis.

1.1.2 Strategy for Driving Change

The intention from the outset was to ensure that this OAP wasn't just a 'thought piece' document but rather the beginning of broad new collaborations that directly improve care delivery and outcomes. To achieve this goal, we sought to engage key stakeholders via an OAP Working Group (OAPWG) of the Learning Network in the following activities:

- developing a compelling vision of PCCDS-enabled pain management, opioid use, and OUD treatment;
- defining actions that stakeholders (and others) can take to achieve that vision;
- taking initial actions as a byproduct of OAP development; and
- laying a foundation for ongoing collaboration and progress after OAP publication.

1.2 Aims and Aspirational Goal

The ultimate goal of this OAP document—and collaborations and actions it seeks to directly trigger—is to fully realize PCCDS' promise for supporting the care of *all* patients and care teams addressing pain and opioid use or abuse. PCCDS interventions and related workflows must be widely deployed to drive more patient-focused, evidence-informed opioid-related care decisions and actions throughout the nation. Achieving this goal requires broadly activating those who receive or deliver care (and those who support these activities) to change care delivery processes so that they are more efficient and effective.

This initiative sought to synthesize a shared future vision—across diverse and influential stakeholders with a stated commitment to enhancing care processes and tools—to accelerate valuable PCCDS development and use for opioid-related care. The following aspirational goal was established to reinforce the urgent need to drive widespread progress toward a shared future vision:

> *By 2021, trigger OAP-driven support for two million people—and care teams that serve them—in improving pain management, opioid use and OUD treatment via PCCDS interventions.*

1.3 Methods

Learning Network leaders chartered and convened an OAPWG that included many diverse and influential stakeholders to develop the content for this action plan, i.e., the items needed to implement the Strategy for Driving Change (see above).

The OAPWG met via 1-hour web conferences 17 times from April 2018 through December 2018 to develop, discuss, and refine these OAP elements. Discussions and content development during these meetings were extended via digital collaborations using web-based document editing and collaboration tools (Google Drive, Google, Mountain View, CA) and group email. Draft OAP elements were also discussed and vetted in-person during several sessions at the Learning Network's Annual Conference on October 15, 2018. Lastly, two other Learning Network working groups—focused respectively on trust and technical considerations related to PCCDS use—contributed content to this OAP. Technical workgroup members also provided feedback on the future scenarios.

Draft versions of this report were made available to all OAPWG members for review and comment before it was finalized.

1.4 Results

1.4.1 Participants

The OAPWG leadership team (authors JAO, BHB, JER, and BL,) targeted 15 individuals from various public and private stakeholder groups and organizations for initial OAPWG membership. These groups included patient advocates, care delivery organizations, electronic health record (EHR) and CDS vendors, federal agencies, opioid guideline developers, and others. Fifteen participants attended the first meeting in April 2018. Over the ensuing months, additional members identified through OAP development efforts were added to the OAPWG based on anticipated mutual benefit. When this report was written, OAPWG had 51 members (see list of Opioid Action Plan Workgroup Members at beginning of this report).

1.4.2 Desired Future Scenarios and PCCDS Interventions

To develop a consensus future vision of how PCCDS could better address the opioid crisis, the OAPWG considered clinical situations that trigger opioid use and OUD treatment, workflows associated with those situations, and ways that PCCDS interventions could improve these care processes.

The OAPWG created five consensus-based, desirable future scenarios that illustrate various ways PCCDS could be used better to address the opioid crisis (see ***Figure 1*** for clinical scenarios covered). The scenarios contain personas with different patient ages, genders, and clinical conditions. Even though they are specific in this way, the scenarios are intended to exemplify broad opportunities for PCCDS to better support pain management, opioid use, and OUD treatment.

As part of outlining desirable workflows and information flow for each clinical scenario, the OAPWG defined specific PCCDS interventions that could be used to implement these enhanced care processes (see ***Table 1*** for overview). The scenarios reference where and how these interventions are used in the underlying workflow (see Section 5.2 for full scenarios and pointers to interventions).

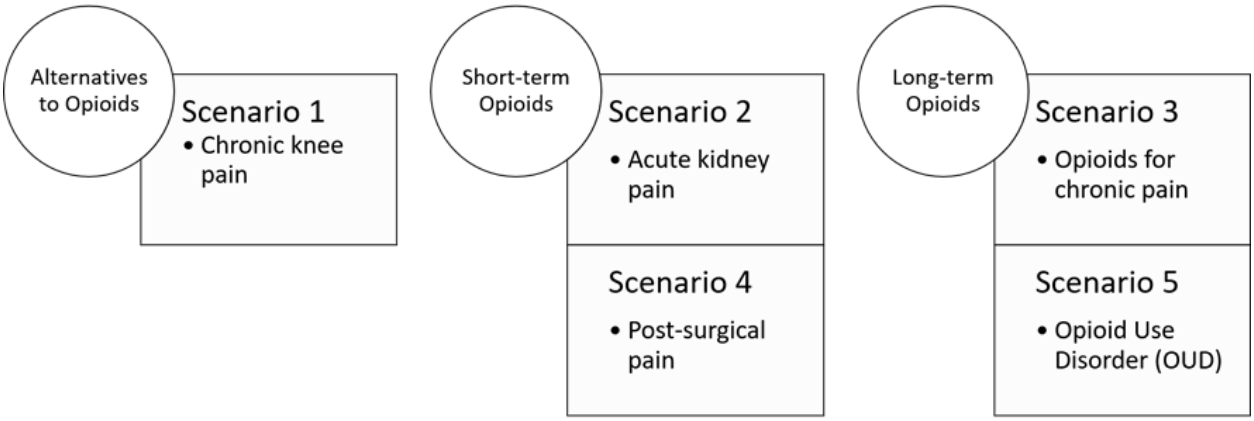

Figure 1: Overview of Future Scenario Focus Areas

Table 1:19 PCCDS Interventions Underpinning Future Scenarios (Overview)

PCCDS Interventions	
▪ Topic-specific evidence	▪ Pain management and opioid guidelines
▪ Function/pain tracking journal	▪ Registries with related patient outreach tools
▪ Shared decision-making tool	▪ Portals and websites
▪ Pre-visit questionnaire	▪ Morphine Equivalent Daily Dose (MEDD) calculators
▪ Documentation templates	▪ Dashboard
▪ Care plan development and tracking tool	▪ Medications for OUD (MOUD) order sets
▪ Symptom evaluation tool	▪ MOUD shared decision-making tool
▪ Prescription drug monitoring tool	▪ MOUD/OUD education and engagement materials
▪ OUD screening and assessment tool	▪ OUD detection and notification algorithms
▪ Condition-specific pain/opioid order sets	

1.4.3 Implementation Considerations

There are many challenges in developing and implementing PCCDS interventions to broadly achieve the future state that the five scenarios exemplify. For example, people, process, and technology issues must be addressed to successfully incorporate PCCDS interventions into information systems and clinical workflow. The Learning Network's Analytic Framework for Action describes the PCCDS intervention lifecycle, which includes activities such as authoring and implementing CDS, and helps organize major activities to realize value from the future scenarios (see Section 5.3, ***Figure 4***). Information in guidebooks and related tools and resources contain guidance and best practices that can likewise support effective pain and opioid-focused PCCDS intervention development and use.

Two Learning Network working groups that worked in parallel to the OAPWG also produced useful information for addressing future vision/PCCDS implementation challenges: The Technical Framework Working Group (see Section 5.3, ***Table 3***), focused on addressing the technical challenges to implementing PCCDS

and the Trust Framework Working Group (see Section 5.3, ***Table 4***) focused on identifying and formulating recommendations for the legal, policy, governance, and market factors that influence whether consumers of PCCDS will "trust" publicly available, standardized PCCDS artifacts.

1.4.4 Current PCCDS Resources and Activities

Because pressing opioid-related problems are widespread and generating substantial attention, this OAP can be applied to many initiatives and resources already in progress to achieve the aspirational goal. The OAPWG performed a preliminary survey to assess available clinical guidance, initiatives, interventions, and case studies; results are summarized in Section 5.4, ***Table 5***.

1.4.5 Recommended Stakeholder Actions to Achieve the Aspirational Goal

The OAPWG identified critical steps and other recommended actions that stakeholders could take to make the future scenarios widely implemented, highly valuable, and typical for care where opioids are, or could be, involved (see Section 5.6 *"Critical Steps and Other Actions Recommended for Stakeholder Groups"*).

1.4.6 How Action Plan Development Has Already Driven Progress Toward Achieving Desired Future Scenarios

By design, OAPWG members and stakeholders began taking action to drive progress toward realizing the future scenarios after they were developed; i.e., as part of drafting the stakeholder recommendations and other OAP elements. For example, many OAPWG participants shared the future scenarios with their teams and constituents to help develop and implement more fully and broadly the PCCDS interventions and scenarios they underpin. Section 5.7, *"How OAP Development Has Already Driven Action Toward Achieving Desired Future State,"* summarizes these OAP-driven actions that occurred during OAP development.

1.5 Discussion

The OAPWG created a compelling future vision of PCCDS-enabled care to address the opioid misuse crisis. This report also outlines key actions that stakeholders can take to support millions of patients and their care teams through the better care envisioned (see Section 5.6, *"Critical Steps and Other Actions Recommended for Stakeholder Groups"*). Importantly, this report also provides many examples of steps that OAPWG members and others *have already taken* toward making this vision a widespread reality (see Section 5.7, *"How OAP Development Has Already Driven Action Toward Achieving Desired Future State").*

The OAP and OAPWG were time-limited Learning Network activities, so the OAPWG considered enablers to foster ongoing work to build on the successful collaborations and progress reflected in this report. These enablers include widely disseminating this report, having an appropriate entity provide and nurture a forum for expanding the dialog and joint efforts started by the OAPWG, and others (see Section 6.1, *"OAP Execution Enablers"*). OAPWG members expressed interest in participating in such an ongoing collaboration forum and Section 6.2, ***Table 6***, *"Value Proposition for Ongoing Forum Identified by OAPWG Participants,"* summarizes the benefits from engaging they identified for their various stakeholder groups.

Elements of the OAP will be leveraged in other ongoing AHRQ-supported initiatives and in ongoing Learning Network activities. In addition, many OAPWG members will continue to leverage the OAP. The Learning Network will execute a sustainability plan that includes engaging organizations willing to take over the OAP execution leadership and support role that the Learning Network has played for these initial steps.

1.6 Conclusion

Through this OAP, the OAPWG successfully achieved the Learning Network's goal of promoting PCCDS use to address a national health improvement imperative. For example, dozens of significant actions were taken by many diverse stakeholders to advance development and application of PCCDS to address the opioid misuse crisis. This replicable approach to rapidly identifying a shared, future CDS-enabled vision for a national improvement imperative, and driving movement toward achieving it, could potentially be applied to other priority targets.

2. Introduction

2.1 Background

The United States is experiencing an opioid misuse and overdose epidemic that results in staggering costs, morbidity, and mortality [1-3]. In 2017 alone, opioids were involved in 47,600 overdose deaths [4]. Poor pain management—a highly prevalent and distressing symptom—is a key underlying driver for this epidemic [5], as is the underuse of effective treatments for opioid use disorder (OUD).[6]

Evidence-based guidance is available for pain management and opioid use and OUD treatment [7]; though putting this information into practice has been uneven. Clinical decision support (CDS) is a process for enhancing health-related decisions, actions, and outcomes; CDS aims to delivers critical guidance and support to the right people, in the right formats through the right channels at the right times [8]. In 2016, the Surgeon General distributed paper-based opioid prescribing guidelines via letters and information cards to over 2 million clinicians [9]. Although this was a well-meaning and potentially helpful approach to information dissemination, CDS strategies enabled by modern healthcare information technology offer more targeted opportunities to provide information when, where, and how it is needed to optimize patient and care team decisions, actions, and partnership [8].

PCCDS focuses on highly *patient-focused* strategies, interventions, and tools to improve communications, decisions, and actions by and between patients and clinicians [10]. PCCDS interventions include tools such as smartphone apps that patients can use to help them track and manage pain and function according to a care plan developed with their care team, shared decision-making tools for selecting pain management strategies, and screening tools to detect patients at high OUD risk.

This PCCDS Opioid Action Plan (OAP) has been produced as a central 2018 project of the Patient-Centered Clinical Decision Support Learning Network (Learning Network), an AHRQ-funded initiative to more fully leverage PCCDS in making care more patient-centered while broadly improving care delivery and outcomes.

2.2 Strategy for Driving Change

National healthcare roadmaps related to transforming care and better utilizing CDS typically stop at providing general recommendations [11-13], which can leave significant gaps to driving effective action. The Learning Network chartered the OAPWG so that its output would include—in addition to a useful report and recommendations—valuable OAP-driven actions toward care transformation *that were initiated during report development* [14]. The two key strategies for realizing this goal were: 1) select a clinical focus area that is already a top national improvement priority and where PCCDS offers great promise, and 2) establish as a workgroup goal: to "point to a set of specific, compelling instances where OAPWG activities and work products accelerated or improved development, dissemination, implementation, and successful

use of PCCDS interventions to manage pain/opioid use" [14].

The charter identified key stakeholder groups to engage in the OAPWG; individuals from selected organizations were invited to participate so that a critical mass of PCCDS and opioid-related capabilities, activities, and influence over the care delivery ecosystem would be available to ensure success. This work would create a shared PCCDS-enabled future vision that supports achieving individual and collective goals, and builds momentum to realize that vision by building on current activities and resources. If successful, the OAP recommendations—and efforts already begun to implement them—would then provide specific actions for change agents in other organizations to replicate and expand after OAP publication.

The Learning Network used this care transformation strategy with the OAPWG hoping that the learning generated could be applied in other efforts to leverage PCCDS (and CDS more broadly) to address many national improvement imperatives. The strategy elements include:

- identifying a healthcare domain requiring urgent improvement, where PCCDS approaches are highly valuable (e.g., pain management and opioid use);
- developing a shared vision of desirable care processes and outcomes in the domain;
- identifying current care processes and support in that domain that could be leveraged to support transformation; and
- generating stakeholder-identified actions needed for widespread and valuable PCCDS implementation to achieve the desired future state *while also stimulating early efforts to execute these actions* (see ***Figure 2***).

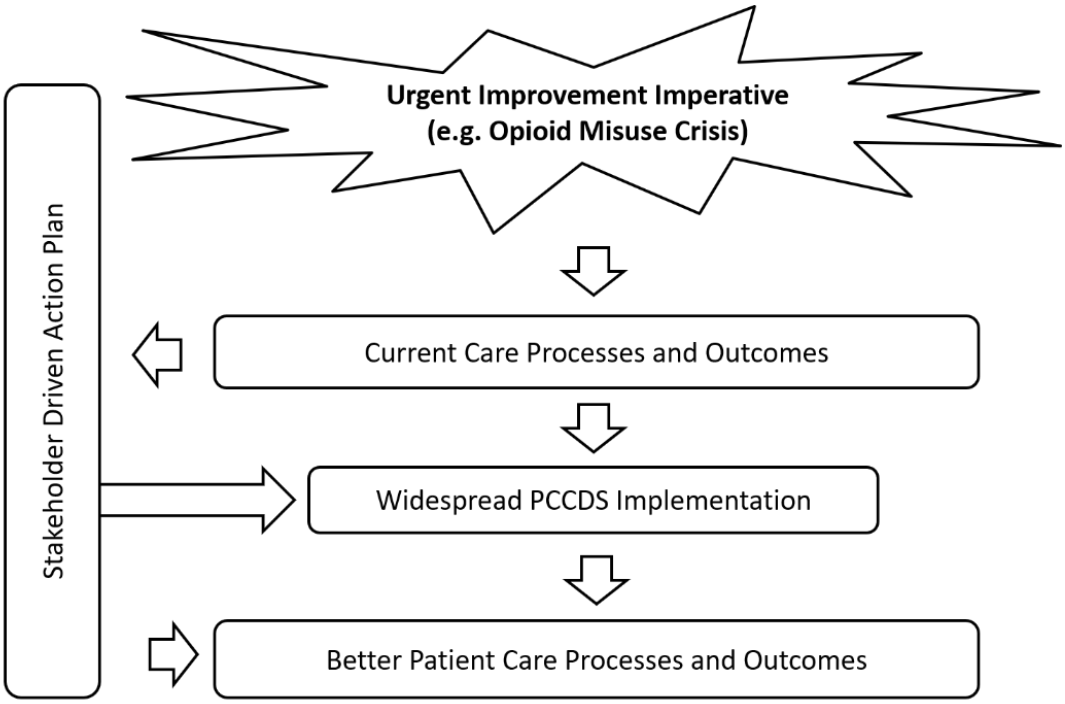

Figure 2: Generalizable OAP Strategy for Driving Change

3. Aims and Aspirational Goal

The ultimate goal of this OAP document—and collaborations and action it seeks to directly trigger—is to stimulate a multi-stakeholder dialog resulting in actions that fully leverage PCCDS to support care for *all* patients and care teams addressing pain, and opioid use/abuse. PCCDS interventions and related workflows must be widely deployed to drive more patient-focused, evidence-informed opioid-related care decisions and actions throughout the nation. Achieving this goal requires broadly activating those who receive or deliver care (and those who provide tools that support these activities) to change care delivery processes so that they are more efficient and effective.

This initiative sought to synthesize a shared vision across diverse and influential stakeholders in enhancing care processes and tools to accelerate valuable PCCDS development and use for opioid-related care. The shared vision aims to inspire stakeholders and help align their activities to address respective needs, much like fitting pieces of a puzzle together to create a compelling picture.

The following OAP aspirational goal was established to reinforce the urgency of driving widespread progress toward a shared future state vision:

> *By 2021, trigger OAP-driven support for two million people—and care teams that serve them—in improving pain management, opioid use and OUD treatment via PCCDS interventions.*

Clinical outcomes implicit in this statement include reducing opioid-related morbidity and mortality and better leveraging effective, non-opioid approaches to pain management. For example, thorough PCCDS interventions that empower patients (including those typically underserved) to manage pain better and support pain and opioid-related shared decision making and care plan execution in ways that simultaneously improve patient and care team experiences and results. "OAP-driven support" means direct effects of the shared future vision articulated in the OAP, and steps catalyzed during OAP development and follow-up to realize such a PCCDS-enabled future vision.

4. Methods

With approval from the Learning Network's Executive Team, OAPWG co-chairs (authors JAO and BHB), chartered and led this workgroup to execute the Strategy for Driving Change outlined above [14].

The OAPWG co-chairs leveraged the Learning Network members and their professional contacts to recruit initial volunteers to implement the change strategy. Informed, influential individuals and organizations from key stakeholder groups were initially targeted, and more participants were added based on mutual interest and value as the work progressed.

The OAPWG met via 1-hour web conferences 17 times from April through December 2018. These meetings focused on creating, refining and vetting key OAP elements such as the shared future vision, current state review, recommended actions, and steps members could take to begin executing those recommendations.

Discussions and content development during these meetings were extended via digital collaborations using web-based document editing and collaboration tools (Google Drive, Google, Mountain View, CA) and group email. Draft OAP elements were also discussed and vetted in-person during several sessions at the Learning Network's Annual Conference on October 15, 2018. Lastly, two other Learning Network working groups—focused respectively

on trust and technical considerations related to PCCDS use—contributed content to this OAP (see Section 5.3). Technical workgroup members also provided feedback on the future scenarios.

Draft versions of this report were made available to all OAPWG members for review and comment before it was finalized.

5. Results

5.1 Participants

Fifteen individuals from various public and private stakeholder groups and organizations were targeted for initial OAPWG membership, in addition to the leadership team (authors JAO, BHB, JER and BL). These groups included patient advocates, care delivery organizations, electronic health record (EHR) and CDS vendors, federal agencies, opioid guideline developers, and others. Fifteen participants attended the first meeting in April 2018. Over the ensuing months, additional members identified through OAP development efforts were added to the OAPWG based on anticipated mutual benefit. When this report was written, the OAPWG had 51 members (see list of Opioid Action Plan Workgroup Members at beginning of this report) and ***Figure 5,*** Section 5.5).

5.2 Desired Future Scenarios and PCCDS Interventions

To develop a consensus future vision of how PCCDS could better address the opioid crisis, the OAPWG first considered clinical situations that trigger opioid use and OUD treatment, workflows associated with those situations, and ways that PCCDS interventions could improve these care processes.

The OAPWG created five consensus, desired future scenarios that illustrate various ways PCCDS could be used better to address the opioid misuse/overdose crisis: 1) chronic knee pain management to avoid opioid initiation, 2) opioid initiation for acute kidney pain (and discontinuing medication when appropriate), 3) brief opioid use for post-surgical pain; 4) use of registries to enhance pain management and 'right-size' opioid use for individuals on long-term opioid therapies; and 5) detection and treatment of opioid use disorder (OUD) (see ***Figure 3***).

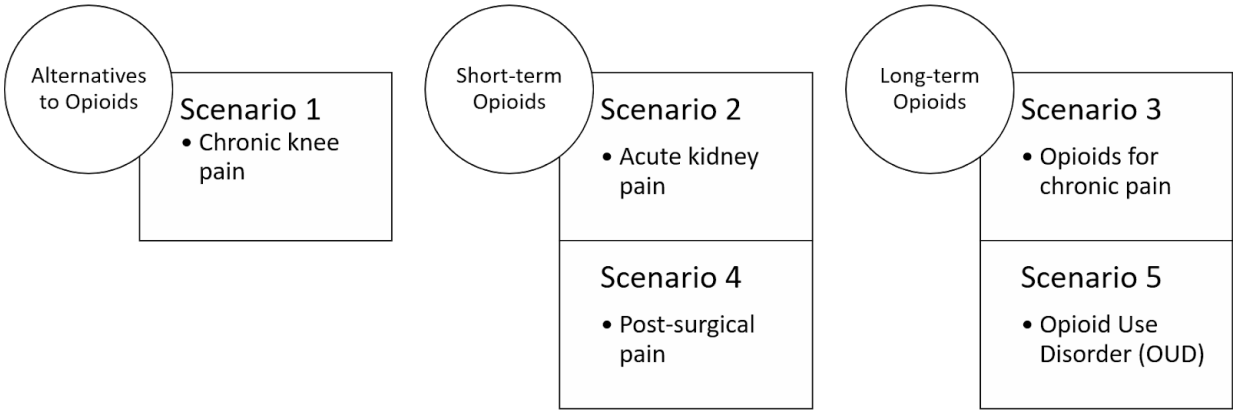

Figure 3: Overview of Future Scenario Focus Areas

As part of outlining desirable workflows and information flow for each clinical scenario, the OAPWG defined specific PCCDS interventions that could be used to implement these enhanced care processes (see ***Table 2***).

Table 2: 19 PCCDS Interventions Underpinning Future Scenarios (Details)

#	PCCDS Intervention	Clinical Need
1	**Topic-specific, evidence-informed information for patients**	Help patients understand their conditions (especially related to pain) and how they are best managed, e.g., via details of different treatment approaches and benefits, risks and costs of each
2	**Tracking journal** for pain and function	Track functional status and pain quality, duration, intensity, location, etc. over time, setting, and circumstances to optimize therapies and management
3	**Shared decision-making tool** for pain management	Promote shared patient-clinician decisions for patient-centered pain evaluation and treatment, e.g., including an ability for patients and providers to select treatments authorized by payer
4	**Pre-visit questionnaire**	Allow patient to summarize and share key data and goals/priorities to make patient visits more efficient and results-focused
5	**Documentation templates** for visits and procedures	Support care teams in gathering and documenting key condition-specific, pain-related data
6	**Care plan development and monitoring tool** that includes one or more of the following: ▪ Opioid use contracts ▪ Follow-up visit timing (e.g., monthly) ▪ Urine drug screen results ▪ Tapering plan ▪ Electronic/printable version signed by the primary treating clinician, with contact information	Document and guide shared goals, actions, and monitoring for the condition. Support care continuity and prevent under-treatment due to opioid stigma when requiring treatment away from primary pain management setting
7	**Symptom evaluation tool**	Provide patients with guidance on addressing new symptoms outside of clinical encounters; upload results to provider's EHR system
8	**Prescription drug monitoring program (PDMP) tool** that is integrated into systemwide data stores and clinical workflows	Review all past and currently prescribed controlled substances for the patient to help avoid and detect opioid misuse
9	**OUD screening and assessment tool**	Identify patients who have or are at risk for OUD
10	**Order sets** for pain and/or opioids that are condition-specific when appropriate and include preloaded, standardized e-prescriptions	Ensure safe and effective, condition-focused ordering of primary therapeutic interventions for pain and all key associated corollary orders and safety checks in outpatient, inpatient, and discharge settings
11	**Pain management and opioid guidelines**	Deliver authoritative guidance for clinicians on evidence-informed, patient-centered pain management and opioid use; related tools to implement these guidelines include other PCCDS interventions in this table that provide associated safety checks and approaches to 'making the right action/decision easy'
12	**Registries of patients prescribed opioids**	Identify patients receiving opioids so their care can be optimized as new guidance becomes available; can include related patient outreach tools to surveil opioid-related care e.g., patients due for PDMP review, new or renewed pain agreements, or urine drug screening

#	PCCDS Intervention	Clinical Need
13	**Patient portals and websites** for FAQs, status reports, pre-visit questionnaires, appointment scheduling, custom questions and concerns, self-management guidance and tools	Provide asynchronous communication channels between patients, caregivers, and care teams to address concerns and share information outside of office visits; leverage rich education/ communication approaches, e.g., audio/video, interactive systems to personalize responses, etc.
14	**Morphine Equivalent Daily Dose (MEDD) calculators**	Ensure prescribed opioid doses are appropriate for patient and within safe daily and cumulative limits; integrate with efficient workflow into e-prescribing/order entry systems and provide results prior to order signing and transmission
15	**Pain management dashboards**	Track and optimize opioid use and other pain management strategies and response (including functional status) over time to optimize pain management and related outcomes
16	**Medications for OUD (MOUD) order sets**	Support evidence-based implementations of MOUD and related corollary orders
17	**MOUD shared decision-making tool**	Support shared patient-clinician decision making on whether and how to implement MOUD
18	**MOUD/OUD patient education and engagement materials**	Support patients in understanding MOUD and related OUD management activities
19	**OUD detection and notification algorithms**	Detect high-priority unmet health needs such as possible OUD and return notifications for clinical action via workflow-friendly channels and mechanisms

The OAPWG was guided to develop consensus scenarios that would evoke statements from readers such as, "If this future state were broadly realized, healthcare would move closer to the quadruple aim [15] and be more patient-centered, my constituency and I would be much farther toward achieving priority goals, and we would make significant progress nationally in addressing the opioid crisis."

The scenarios contain personas with different patient ages, genders, and clinical conditions. Even though they are specific in this way, the scenarios are intended to exemplify very broad opportunities for PCCDS to better support pain management, opioid use and OUD detection and treatment.

In the scenarios below, bolded text indicated a PCCDS tool and the numbers in parentheses refer to a specific PCCDS intervention as described in ***Table 2***.

5.2.1 Scenario 1: An opioid-naive 65-year-old female with chronic knee pain from osteoarthritis

Key PCCDS goal: Use best pain management approach, ideally non-opioid

A patient is particularly bothered by knee pain she has had for years, which had been diagnosed as osteoarthritis. Her medical home practice enrolled her in its patient portal and ensured she was comfortable with it, so she checks **the portal and it directs her to helpful information, tools and guidance (1), (13)**. This includes information about osteoarthritis and **evidence-informed treatment approaches and results (1)**, a **function/pain evaluation tool (severity, alleviating and exacerbating factors, effects on daily life) (2)** and **a management decision guide (3)**. The patient completes the **evaluation and decision guide tools (with results recorded in portal (2), (3), (13)**, **schedules a primary care appointment using the portal (13)** to discuss with her care team and take next steps to managing the pain

better, and begins implementing some **self-care recommendations she reviewed (1)**. The portal guides her to fill in a **pre-visit questionnaire about her reason and goals for the visit (4), (13)**.

On the morning of the visit, her clinician and a medical assistant (MA) **huddle and review the pain evaluation and decision tool results and prepare for further review and discussion with the patient during the visit (2), (3)**. They view a summary that provides a **"human" snapshot of the patient, her goals, life circumstances, and attitudes regarding effects of past care events (4)**. They also explore data from the **Health Information Exchange via the EHR to see if there is a pain management dashboard (15)** from another provider with previous diagnostic studies and treatment plans, and for **Prescription Drug Monitoring Program (PDMP) information about opioid prescriptions (8)**. They see that the patient previously had an orthopedic consultation and was not considered a surgical candidate. The patient was given only minimal therapeutic options, so recommending or prescribing non-opioid alternatives to pain management is a possibility.

As she talks with the patient in the consultation room, the MA confirms and updates information in the **shared decision-making tool (3)**, confirms and refines patient expectations for the visit from the **pre-visit questionnaire (4)** (addressing questions and concerns about this information and the visit). She migrates this information into the **EHR visit note, which is generated using a documentation template (5)** optimized for this condition (i.e., osteoarthritis management).

During the clinician encounter, the patient and clinician review the **shared decision-making tool to support therapy selection (3)**. After the tool-supported and **evidence-informed discussion of risks-benefits-costs of different approaches and the patient's values and expectations (3),** they agree that a trial of physical therapy and topical diclofenac (a non-opioid medication) is the best approach, which is **prescribed electronically from an osteoarthritis pain order set (10) and documented in a care plan (6)**.

After the visit, the patient uses **mobile (smartphone or tablet) versions of tools to document progress (e.g., function, pain, and activity levels) (2)**, support adherence to **the plan (6)**, and address **questions and issues that arise (1)**. These tools interact seamlessly with the practice portal and EHR so that the clinician, MA, and patient each have **convenient methods to communicate (1), (13)**.

5.2.2 Scenario 2: An opioid-naive 40-year-old male who presents at an emergency department with sudden severe flank pain due to renal colic

Key PCCDS goal: Inform and monitor an opioid prescription

A 40-year-old male experiences sudden onset of severe flank pain with nausea and vomiting. His partner uses a smartphone-based **symptom evaluation tool that indicates it may be related to a kidney stone and could require medical evaluation (7)**. Data from **the evaluation tool is transferred to the patient portal and linked to the patient's health system EHR, which is available in the emergency department (ED) he visits (7), (13).**

In the ED, the **evaluation tool data are reviewed and discussed with the patient (7), (13)** as the physical evaluation is completed. The patient is diagnosed with acute renal colic. The physician conducts an EHR-integrated **PDMP check as part of the prescription generation (8),** and it reveals no documented history of opioid use. An EHR-integrated **OUD assessment tool identifies the patient as low risk for OUD (9)**. The patient is discharged from the ED with a **care**

plan, instructions, and e-prescriptions (6), (10) that include opioids to manage the pain, plus an appointment to follow up with his primary care clinician.

After ED discharge, the patient reviews personalized information in the **portal about renal colic (including pain management issues) generated from his care plan (13), (6), (1)**.

During his primary care visit one week after the ED visit, the patient is still experiencing severe pain. The clinician uses **tools with the patient for evidence-informed therapy selection (including risk-cost-benefit options) (3)**, **authorization (3)**, and **safety (e.g., a PDMP check that supports patient communication) (8)**. The clinician reviews **the PDMP results with the patient to discuss previous, current or overlapping prescriptions for controlled substances (8)** and completes an **OUD assessment (9)**. There are no red flags and the clinician records the discussion results in the EHR using a **structured documentation template (5)**. These PCCDS-facilitated steps ensure the patient, clinician, and payer are synchronized, agree on the care plan, and in this case, agree that **continuing the short-term opioids are indicated, agreed upon, and approved (3)**.

The clinician and patient use **a care plan template to build on the ED care plan to create a shared care plan for ongoing opioid use for acute pain management (6)**. The **template includes treatment goals, management plan, pointers to patient education materials, and tools the patient can reference after the visit for therapeutic and side-effect monitoring and management (e.g., coping with mood, gastrointestinal effects) (6), (13).** These details are provided to the patient in **a printed after-visit summary and via the portal (13)**. The clinician uses **a preloaded e-prescription tool linked to a standardized order set for opioid continuation. The prescription order set (10)** includes dosing per the **CDC's 2016 guideline (11)** on prescribing opioids for chronic pain (lowest dose, limited duration), interaction checks for drugs that can decrease opioid metabolism and increase adverse events (e.g., benzodiazepines); urine drug testing to ensure the patient is not already receiving opioids; and instructions for scheduling a follow-up visit.

5.2.3 Scenario 3: Chronic opioid use in patients of various ages and conditions

Key PCCDS goal: Use registry to drive outreach to relevant patients and other tools to 'right-size' opioid use for individuals

A clinician becomes aware of **evidence-based guidelines and tools (11)** (e.g., updated guidance and CDS tools related to the CDC's 2016 guideline on prescribing opioids for chronic pain), updated state laws governing pain management, and support for patients with chronic pain and long-term opioid use and/or high dose (i.e., high Morphine Milligram Equivalents [MME]). The clinician uses a practice **registry to identify patients this information could help (12)** and begins executing the steps outlined below with each patient, starting immediately with those already scheduled for visits soon. She next looks up patients who do not have appointments in the next two months and who the clinic's care coordinator believes could **benefit significantly from the updated information (11), (12)**. The following example illustrates PCCDS for one patient.

Before the visit, the clinician **sends a message to a relevant patient via an EHR portal (13)**. She writes that she would like to discuss with the patient during his next office visit **new guidance and evidence on how best to manage chronic pain (11)**. She sends the patient **related educational information (1)** and **decision aids (3)**, along with **a function/pain assessment journal (activities/function, severity, alleviating/exacerbating factors, effects on**

daily life) (2). She thinks the patient might find these tools helpful for better understanding and managing pain (for patients not using the portal, alternative outreach approaches such as phone calls are provided).

In pre-visit planning, the clinician huddles with her MA to go over results from the **patient's pain assessment (2)** and **opioid care plan template (6)** that includes links to a **screening tool for opioid misuse/ addiction/overdose (9)** as well as highlighted data on last **PDMP check (8)**, last urine drug screen, medications that could increase overdose risk, and other pertinent data collected in a **pain management dashboard (15)**. The **screening tool is prepopulated with the patient's opioid use history (8)**, non-opioid pain **treatment history and rationale and response (15)**, and the latest **function/pain assessment (2)**. These items are prepared in advance and will be used during the patient visit.

During the patient visit, the clinician and patient use a **shared decision-making tool that addresses chronic pain for the patient's condition (3)**, a dashboard with the latest function/pain information and **opioid use history (15)**, and a **PDMP check (8)** to identify the full scope of opioid use. With the information at hand, they develop a **shared care plan (6)** to consider pain management strategies that minimize potential adverse consequences of opioid use. The **shared decision-making tool identifies evidence-informed, non-opioid interventions (both medication and non-medication approaches) (3)** that both agree could be beneficial and should be added to the regimen. The **tool also includes plans for reducing opioid use (3)** if the patient responds well to the other interventions. The interventions are executed by an **order set (10)** that includes an opioid overdose safety kit (naloxone) and instructions for the patient to access pertinent educational and **support materials on the portal (13)**. The **order set (10)** includes a bowel function regimen of stimulant laxatives, stool softeners, oral hydration, and evidence-informed structured tapering of opioid dosing if and when appropriate.

The patient uses his **function/pain assessment journal (2)** and **after-visit support on the portal (13) to execute the shared care plan (6)**. This includes ongoing assessment and optimization of function, pain, associated life and environmental events, and mental and spiritual health; appropriate use of medications and other therapies; and assessment for opioid-induced constipation and other opioid-induced side effects.

The patient **receives via the portal (13)** and printed document a copy of the clinician-signed care plan (including opioid use agreement) to share with other clinicians outside his primary pain management setting. This document helps ensure that the evidence-informed, **shared care plan is taken into consideration should the patient require urgent care elsewhere, and provides a clinician point of contact should questions arise (6)**.

5.2.4 Scenario 4: A 20-year-old female undergoing joint surgery

Key PCCDS goal: Optimize opioid use for surgery-related pain

Prior to the patient's hospital admission for a left knee anterior cruciate ligament repair, a nurse in the surgeon's practice conducts a comprehensive pain/function history using a **documentation template (5)**. This nurse and patient together use an **evidence-informed shared decision-making tools (3)** that covers information about the typical severity of post-operative pain, and pain mitigation strategies such as using nonsteroidal anti-inflammatory drugs, opioids, mind-body techniques.

Their discussion includes whether the patient will need or want opioids after surgery. The

documentation template (5) prompts them to consider sensitive circumstances for when patients may not want a prescription, e.g., because a family member at home is currently in recovery for opioid addition. They together check **the PDMP (8)**, which indicates that the patient has not filled previous prescriptions (e.g., benzodiazepines or related psychoactive drugs) that could be dangerous in combination with opioids. The nurse and patient use this information to develop a **post-surgical care plan that addresses pain management (6)**. **Educational and support resources referenced by the care plan (6)** to help the patient learn more about and prepare for **post-post-operative pain (e.g., pain management tools and strategies analogous to birthing classes) are provided via the practice portal (13)**. The patient can also use the **practice portal to provide updates about preparation for surgery and ask questions (13)**.

On the day of surgery, the surgical team and patient review and discuss **the post-operative care plan, including pain management components (6)** and the patient's **surgery preparation and questions (13)** before the procedure.

After the procedure, the surgeon orders for the patient an opioid during the hospital stay by using **an order set per inpatient protocol (10),** which is also informed by **the patient-specific care plan (6)**. The patient's **pain and function are assessed during hospitalization (2)**, and **subsequent orders are modified per hospital protocol and patient's preferences and needs (10)**.

Prior to discharge, the care team uses **a shared decision-making tool with the patient to optimize post-discharge pain management and minimize opioid use (3)**. The resulting discussion covers benefits and risks of various approaches to pain management and leads the patient and clinician to agree on a prescription for the fewest number of opioid pills they feel are needed as one part of **an evidence-informed pain management regimen (3)**. In addition, the clinician provides guidance on avoiding bowel complications due to the pills. The clinician translates discussion results into **an order set/e-prescription tool that performs safety checks and prints the prescriptions (10)** and also into **a post-discharge care plan (6)**, which is provided to the patient on paper and **via the portal (13)**.

At home, the patient uses **the care plan and associated tools to guide recovery (6)**. She tries the prescribed opioid for pain at one point but becomes nauseated, and finds other strategies recommended in **the care plan (NSAID, guided meditation, etc.) (6)** are adequate for pain control. After her recovery, she disposes the unused opioids at a local pharmacy, as recommended in **the care plan (6)**.

5.2.5 Scenario 5: A 33-year-old male with a history of multiple opioid prescriptions presents with new symptoms for evaluation

Key PCCDS goal: Support OUD screening, diagnosis, and medication initiation

A 33-year-old man presents to a primary care clinic because of worsening pruritic rashes on both arms that have persisted for 4 days.

At intake an MA enters the patient's blood pressure values into the primary care clinic's EHR, which is linked to a web-based CDS system. The system **triggers an assessment of potentially high-priority unmet health care needs, e.g., related to screening, prevention, and chronic disease management. The OUD screening module within the assessment tool detects that the patient is at OUD risk (19)** because he had three opioid prescriptions in the last year: one each for dental work, low back pain, and knee injury. The **OUD risk factor algorithm returns a result to the EHR that in turn creates an "OUD**

notification" that is displayed in an "Action Items" section of the EHR (19).

The clinician reviews the **OUD notification (19)** at the beginning of the office visit and sees that the patient is at high risk for OUD based on assessment for risk factors such as a previous diagnosis of OUD, substance use disorders besides tobacco, and medication for opioid use disorder (MOUD). The clinician carries out the visit by addressing the patient's chief complaint, diagnosing the patient with allergic contact dermatitis, and prescribing an appropriate therapy.

After the patient's main concern is addressed, the clinician sensitively shares with the patient that **data in the EHR has suggested that OUD is a consideration (19),** and she asks the patient's permission to explore further because it may be an opportunity to improve the patient's wellness. The patient agrees and the clinician opens **an OUD screening and diagnosis module (9)** and asks the patient up to six questions about opioids and heroin by using a validated screening tool called the TAPS (Tobacco, Alcohol, and Prescription Medication and Other Substance Use Tool). The TAPS screen is positive for OUD because the patient has tried and failed to cut down on opioid pain relievers and he states that his family is concerned. The TAPS result is saved into **an EHR flow sheet at the close of the encounter (9)**. The **CDS algorithm automatically updates in the background so that clinician will not be interrupted with an OUD screening notification for three months (19),** when the follow-up TAPS screening will be due.

At the conclusion of the positive TAPS, the **assessment tool opens a linked online module with a questionnaire (9)** that walks the clinician and patient through an assessment of the DSM diagnostic criteria for OUD. This takes less than two minutes. The clinician and patient together review **information in the PDMP (8)** to quantify the details of the patient's opioid use, and its implications for management.

Since the patient meets the DSM OUD diagnostic criteria, the patient and clinician agree to explore patient readiness to change and identify clinically appropriate MOUD options using an **MOUD shared decision-making tool (17)**. This **tool displays treatment options based on comorbid conditions such severe liver disease, severe respiratory disease, active alcohol use disorder, use of benzodiazepines, chronic pain, and suicide risk (17)**. The conditions are identified using **EHR-derived data by algorithms connected to the tool and are prepopulated on radio buttons on the tool's display screen (17)**. The clinician can review and modify the **radio buttons and the treatment options are automatically updated (17)**. MOUD options for this patient to consider include suboxone, naltrexone (intramuscular injections or oral), or methadone. If the patient had been a pregnant woman, the system would have provided referral information to a high-risk perinatal specialist. The tool includes **shared decision-making materials that help the patient to decide which MOUD treatment option would be best (17)**.

Based on the clinician's recommendations and the patient's readiness to treat and preferences, they elect to proceed with MOUD using home initiation of suboxone. The clinician has taken an online course and is waivered to prescribe suboxone. The clinician then uses **an order set to generate prescriptions for: medication initiation (two milligrams suboxone starting dose in a patient with suspected low opioid tolerance) plus clonidine and ondansetron for breakthrough withdrawal symptoms (16)**. The **order set also includes an overdose prevention kit (naloxone) and suggests consideration of referrals to behavioral health and chronic pain resources as indicated (16)**, the latter

of which the clinician elects to defer to the next visit.

The clinician has run out of time and closes the visit in the EHR by reviewing and printing **at-home induction instructions for starting and titrating the suboxone (18)**; instructions are also sent to the **patient's portal (13)**. The results from using the shared decision-making tools, the orders, and the patient support materials populate an **OUD Care Plan (6)**. A return visit is scheduled with the same waivered clinician in two to three days. Along with a prescription, the patient leaves with instructions and a **safety kit for opioid overdose scenarios (16), (18)**.

At the return visit two days later, an updated **"Action Items" notification appears in the EHR based on the previous OUD diagnosis (19)**. The clinician clicks on the notification which, based on the OUD diagnosis and suboxone medication identified, opens to **guidance on suboxone maintenance (19)**. The clinician discusses the patient's suboxone dose and assesses for withdrawal symptoms. The patient has self-titrated to eight milligrams of oral suboxone a day and is no longer using opioid pain relievers or experiencing withdrawal, so the clinician asks the patient to remain on that dose. The clinician then opens the **algorithm tool that addresses other additional patient-specific National Institute for Drugs and Addiction-recommended clinical needs for this patient population (19)** such as screening for infectious diseases, mental health, and vaccine status.

The clinician then uses the **MOUD order set to order (16)**: a prescription for an additional 7-day supply of suboxone at the optimal dose, needed tests and vaccines as indicated by the algorithm tool, another visit for follow up in seven days with the treating clinician, and a referral to a behavioral health specialist. Due to time limitations, consideration of referral to chronic pain resources is deferred to the next visit. The **care plan is updated (6)** and both the clinician and patient discuss additional **OUD and MOUD support materials available that the patient might find helpful (18)** and access via the **portal (13)**.

5.3 Implementation Considerations

The future scenarios describe idealized situations for how patients and their care teams can use PCCDS to support efficient, evidence-informed decisions and actions for treating pain, using opioids, and detecting and managing OUD. Developing and implementing PCCDS to realize scenarios like these and their associated positive outcomes is complex [8]. During the two years before it chartered the OAPWG, the Learning Network considered these challenges and developed a framework for addressing them. This Analytical Framework for Action (AFA) [10] depicts a lifecycle of interacting components for developing, implementing, and measuring, evidence-based PCCDS (see ***Figure 4***).

The AFA is a useful way of outlining the many implementation considerations in executing this OAP. For example, keeping real-world patients and care teams as a central focus highlights personal circumstances, social determinants, workflow realities, and other factors that PCCDS developers, implementers, users, and evaluators must consider achieving desired outcomes. Unlike the smooth flow in the future scenarios, patient decisions and actions may be impaired by addiction. And their goals and priorities may change over time as their underlying conditions, treatments, and life experiences evolve. Likewise, for care teams, busy schedules and fee-for-service reimbursement models also make care planning and other time-intensive activities in the scenarios difficult to implement.

Figure 4: Analytic Framework for Action Depicts Interacting Components for Creating, Implementing, and Measuring Patient-centered CDS

With these issues in mind, PCCDS developers must process the complex and evolving knowledge base on pain management and opioid use into an array of interventions that enable implementers to 'get the CDS Five Rights right' for these targets. That is, the interventions together should deliver all the right information to all the right people in all the right formats through all the right channels at all the right times to optimize opioid-related care [16].

Implementers must select from, deploy, and manage these many PCCDS interventions to achieve the CDS Five Rights in their care settings. They need to do this in the broader context of health IT-enabled process management, e.g., via EHRs, population management systems, patient portals, and other systems to ensure that pain and opioid-related care over time is optimally efficient and effective.

Implementing and evaluating PCCDS-enabled care as outlined in the future scenarios will typically require significant changes to practice patterns and organizational processes and should therefore be informed by science and best practices supporting these changes. This support includes implementation science methods [17] and various resources supporting CDS implementation and quality improvement more broadly, e.g., the HIMSS Guide to Improving Outcomes with CDS [8], the GUIDES Checklist [18, 19], and the Guide to Improving Care Processes and Outcomes [20].

Payment models emphasizing service volume, and evolving business cases for PCCDS pose additional barriers to effective PCCDS application for developers and implementers. As payment models evolve to further emphasize value over volume, the outcome-improving care processes outlined in the scenarios will become more important.

Along with launching the OAPWG, in 2018 the Learning Network chartered and ran two other working groups to generate insights into addressing AFA components. One was a Technical Framework Working Group (TechFWG) to identify barriers, facilitators, challenges, and possible actions to improve the

technical aspects of PCCDS authoring and implementation [21]. The other was a Trust Framework Working Group (TFWG) to consider marketplace, governance, legal, and policy issues affecting PCCDS authoring and implementation—focusing especially on how trust underpins these dimensions [22]. Findings from these other working groups with implications for this OAP are summarized below.

Table 3 presents TechFWG results most relevant to implementing this OAP. In addition to developing this information, TechFWG members also provided input into the OAP future scenarios.

The TechFWG recommendations will be further developed and shared as a white paper in 2019 and will guide ongoing stakeholder discussions as relevant actions are proposed and taken [21].

The TFWG addressed developed 33 recommendations across nine "trust attributes" for building trust that CDS (including PCCDS) interventions are safe and reliable. Such trust is critical for PCCDS on any topic, including when supporting decisions and actions related to opioid use. ***Table 4*** contains a subset of these trust attributes and recommendations considered to be most relevant to the OAP.

A full discussion of the TFWG results and recommendations can be found in the TFWG's white paper [23].

Implementation considerations discussed in this section provide context for interpreting and executing the material in the following sections of this document, e.g., related to current activities and resources, and proposed actions to make widespread, effective, opioid-related PCCDS a reality.

Table 3: Actions for Improving PCCDS Technical Implementation to Address the Opioid Crisis (Sampling from TechFWG)

Category	Barriers	Facilitators	Needed Actions
Regulatory Environment	Federal, state, and even institutional regulations create variability and limitations on prescribing, confidentiality, and PDMP data.	Initiatives to connect PDMPs across states and state regulations requiring e-prescribing of controlled substances.	Advocate to address conflicts and overlap among federal, state, and local regulations regarding the prescribing and sharing of information about use of controlled substances.
Data Integration	Availability, format, matching, visualization, and quality of relevant source data are variable, restricted, or limited.	Opioids are an important use case with sufficiently constrained scope to be achievable and used as a guide for other areas.	Define data needs and interoperability requirements with achievable goals tied to clinical needs.
Scalability	Assuming data are available, tools to scale (e.g., SMART on FHIR or CDS Hooks) are nascent and need to be localized.	Emerging repositories to support availability of CDS artifacts (e.g., CDS Connect), as well as ongoing maturation of relevant standards and their support.	Reach agreement on desired PCCDS at scale and develop specifications for implementing accordingly.
Care Planning and Coordination	The complexity of patient care requires a shared understanding (and modelling) of care planning process, including and integrated data available, among all care providers.	The scale and impact of the opioid crisis could enable agreement on common approach to coordination and treatment.	Develop an approach to cross-institutional care planning to facilitate coordination.

Table 4: Trust Attributes, Descriptions, and Recommendations (Sampling from TFWG Whitepaper)

Trust Attribute	Description	Recommendation	
Competency	An actor is deemed to be competent in the role played in the CDS ecosystem. For example, an author of a knowledge artifact should be judged competent, qualified, and an appropriate authority to develop the artifact based on factors such as past performance, professional qualifications, or certifications.	1.1	Authors have descriptions with background information including affiliations, years participating, and frequency of participation.
		1.2	Authors promote respect and dignity when providing feedback.
		1.3	Authors are credentialed by an agreed-upon entity through education or training, experience, and dependability.
		1.4	Knowledge professionals are certified that they are competent in the knowledge management lifecycle, competently interpret, encode, and execute knowledge, and are competent of issues in conflict of interest.
		1.5	Competency should apply to both individuals and organizations.
Evidence-based	The evidence instantiated within an artifact must apply to the clinical condition it is meant to support. Limitations are stated clearly, and the evidence supporting the clinical guideline/ predictive model, etc. in an artifact is substantiated and has clear clinical appropriateness.	5.1	Metadata indicate the date that evidence was originally published, and the date that evidence was last reviewed.
		5.2	Metadata state any known limitations, restrictions, or exclusions to any given evidence.
		5.3	Artifacts contain references to the evidence base on which they are based, including both narrative guidelines and the data supporting those guidelines.
		5.4	Artifacts include metadata for all supporting citations.
		5.5	Artifacts include evidence about its method (e.g., order set v. alert), usage history, and available outcomes.
Transparency	A knowledge artifact should be applied and used ethically to clearly convey all potential conflicts of interest and disclosures of interest related to its development or recommendation to detect bias or discrimination in its use.	9.1	Clearly indicated policies describe the procedures for implementing, updating, revising, and removing artifacts.
		9.2	Clearly indicated policies address conflict of interest.
		9.3	Knowledge artifacts are consistently implemented with licensing agreements and any secondary use rights are explicit.
		9.4	Knowledge artifacts are consistently implemented in ways that support equity in health and healthcare.

5.4 Current PCCDS Resources and Activities

The opioid misuse and overdose crises have generated widespread efforts to improve pain management, opioid use, and OUD treatment. This 'current state' provides a springboard for the additional work and coordination that this OAP seeks to stimulate in driving progress toward its future vision and aspirational goal. To provide quick, rough insights into current work that could provide such momentum, OAPWG members shared examples of such offerings and activities. Items included:

- Clinical knowledge that could underpin PCCDS intervention development and use in workflow;
- Federal, state, and other initiatives that could increase the need for and value from PCCDS interventions and the future scenarios;
- Currently available PCCDS interventions that could be further enhanced, added to and implemented widely to fully deliver on the future scenarios; and
- Guidance and case studies for implementing increasingly sophisticated interventions that could support desired future state workflow.

Table 5 organizes into the categories above a sampling of the collected items. It outlines in a preliminary and partial way the extent to which the scenarios and interventions can be realized today, and the forces pushing toward the desired future. This outline can serve as a seed for follow-on efforts to more comprehensively catalog currently available precursors to the PCCDS future vision interventions, and enablers for widely realizing the scenarios and achieving the aspirational goal. For example, if an entity assumes responsibility for executing this OAP through broad multi-stakeholder engagement, that group can continue fleshing out this current state assessment as part of efforts to close the gap to its shared future vision (see section 6. *Discussion*).

5.5 Stakeholders in Achieving the Aspirational Goal

The essence of this action plan is to identify—and begin to execute—actions that various stakeholders can take to more fully leverage PCCDS to improve pain and opioid-related care processes and outcomes.

This desired future state where the aspirational goal is achieved by implementing PCCDS-enabled care similar to that outlined in the scenarios can be thought of as the picture on a puzzle box. Stakeholder actions in the next OAP section can be thought of as puzzle pieces that, when refined and interconnected, could produce that desired future state.

Figure 5 outlines key future vision stakeholder groups and their connections to one another. The bulleted items in the figure include many organizations whose staff/members participated in the OAPWG and/or organizations whose staff/members have otherwise supported OAP development and outreach.

The shaded boxes in ***Figure 5*** illustrate core actors who produce and use PCCDS interventions. Achieving the aspirational goal requires that the health information technology environment that supports patient and care team daily activities more broadly includes evidence-informed, workflow-friendly tools that deliver PCCDS interventions to enable processes such as those outlined in the future scenarios. It also requires that care delivery organizations successfully implement these tools and reengineer care to more closely resemble the future vision. Stakeholder actions already taken (see section 5.7 *How OAP Development Has Already Driven Action Toward Achieving Desired Future State*) demonstrate early progress on these fronts and provide models for fostering a broadly shared future vision, creating new PCCDS tools, implementing available tools better, and other key future vision enablers.

Table 5: Sampling of Information and Tools that Could Be Leveraged to Support Transition to the Future Vision

Topic	Examples
Clinical Guidance	
Pain/Opioid Guidance for Healthcare Professionals	▪ Information and resources related to opioids from CDC (including CDC Guideline for Prescribing Opioids for Chronic Pain and associated Quality Improvement Implementation Guide) ▪ National Institute on Drug Abuse resource web page ▪ A Team-Based Approach to Improving Opioid Management in Primary Care from Improvingopioidcare.org ▪ Intermountain Healthcare Care Process Model: Prescribing Opioids for Chronic Non-Cancer Pain ▪ SAMHSA Evidence-based Practices Resource Center (select "Opioid-specific Resources" under Topic Area, then press 'Apply') ▪ HHS Office of the Assistant Secretary for Health: Draft Report on Pain Management Best Practices: Updates, Gaps, Inconsistencies, and Recommendations ▪ CDS Connect: Pain Management Resources to Support Clinical Decision Support Artifact Development: An Environmental Scan (see sections 4-5 on pain management and resources) ▪ Article on Working and Communicating Effectively with Patients who have Chronic Pain ▪ Consensus Statement from the Society of Hospital Medicine on improving the safety of opioid use in hospitalized patients; Systematic review of guidelines on opioid prescribing for acute pain in hospitalized adults ▪ Research Study on mortality effects from OUD medications after overdose ▪ American Nurses Association Opioid Issues Brief ▪ American Physical Therapy Association Beyond Opioids: How Physical Therapy Can Transform Pain Management to Improve Health
Federal Initiatives to Improve Opioid Use	
Federal Initiatives	▪ US Surgeon General report, Spotlight on Opioids 2018; e.g., "Continuum of Care" section, p14-24 aligns with future scenarios; HHS.gov website: "Help, Resources and Information: National Opioids Crisis" ▪ AMA Overview of ways the 10/18 opioid law can help address the epidemic, e.g., support for MAT, improving PDMPs, telehealth for substance use disorder treatment, etc. ▪ Special Edition of HRSA Health Center Program Primary Health Care Digest devoted to sharing strategies and tools to address the opioid epidemic. ▪ National Academy of Medicine Action Collaborative on Countering the U.S. Opioid Epidemic ▪ USPSTF draft research plan on interventions for preventing OUD in patients not using opioids ▪ FDA is expanding requirements for making training available to healthcare providers who are involved in the management of patients with pain ▪ HHS information about using telemedicine to support MOUD
State Initiatives to Improve Opioid Use	
State Initiatives	▪ Prescription Drug Monitoring Programs & Electronic Prescribing of Controlled Substances: State-By-State Landscape 2018 report from EHRA; HealthData Management article with questions about practical use of PDMPs ▪ Michigan OPEN (Opioid Prescribing Engagement Network) ▪ A community pharmacy intervention in 3 states to reduce opioid adverse events through enhanced patient counseling within opioid dispensing workflow (see patient counseling materials)

Topic	Examples
Access to and Use of PCCDS Interventions	
Access to Health IT-integrated PCCDS interventions	▪ CDS interventions posted on CDS Connect ▪ KLAS blog about and executive summary of report examining the strategies and technologies that over 100 care delivery organizations are using to address the opioid crisis (more specific information about tools in this HealthIT Analytics article) ▪ Examples of interventions available in commercial EHRs; eClinicalWorks, Cerner, MEDITECH, Epic ▪ CDS Connect: Pain Management Resources to Support Clinical Decision Support Artifact Development: An Environmental Scan (see section 6 on pain management CDS efforts)
Patient information and decision aids on opioids	▪ Free information in multiple languages on opioids from the National Library of Medicine HealthReach ▪ Information and resources related to opioids from CDC ▪ Patient-facing website with pain management information and resources from Intermountain Healthcare ▪ Improving shared decision making in osteoarthritis ▪ Toward Patient-Centered Telerehabilitation Design: Understanding Chronic Pain Patients' Preferences ▪ It's About Me: Patients' Experiences of Patient Participation in the Web Behavior Change Program for Activity in Combination with Multimodal Pain Rehabilitation
Care team dashboards to support pain management/ opioid use	▪ Pain Management Summary implemented as a web-based SMART on FHIR application posted on CDS Connect ▪ Research at Indiana University to develop and test a chronic pain EHR dashboard
Pain/function tracking and goal setting	▪ Tracking tools from the American Chronic Pain Association ▪ Defense and Veterans Pain Rating Scale ▪ Brief scale for assessing pain intensity and interference ▪ Patient self-efficacy questionnaire on pain ▪ Establishing pain relief goals
OUD Screening and Assessment Tools	▪ National Institute on Drug Abuse (NIDA) Drug Screening Tool: NIDA-Modified ASSIST; there is also a 4-page PDF form and a NIDA-supported TAPS tool
PCCDS Intervention Implementation Guidance and Case Studies	
PCCDS Intervention Implementation Guidance	▪ EHRA CDC Opioid Guideline Implementation Guide for EHRs ▪ CDC/ONC Opioid Prescribing Support Implementation Guide for using FHIR/CDS Hooks to implement CDC Opioid Prescribing Guideline ▪ CHIME Opioid Taskforce Playbook ▪ ONC Health IT Playbook: Section 4: Opioid Epidemic and HealthIT with information on PDMPs and other ways health IT helps address opioid crisis
Opioid PCCDS Implementation Case Studies	▪ Use of an EHR-integrated toolkit for OUD screening and opioid use at Riverside University Health System ▪ Integration of EHR with state PDMP at UNC Health Care ▪ Surgical care redesign using order sets and other interventions at Geisinger Health to reduce opioid use ▪ Mercy Health wins 2018 HIMSS Davies Award of Excellence for applying health IT (including items related to PCCDS interventions) to opioid use

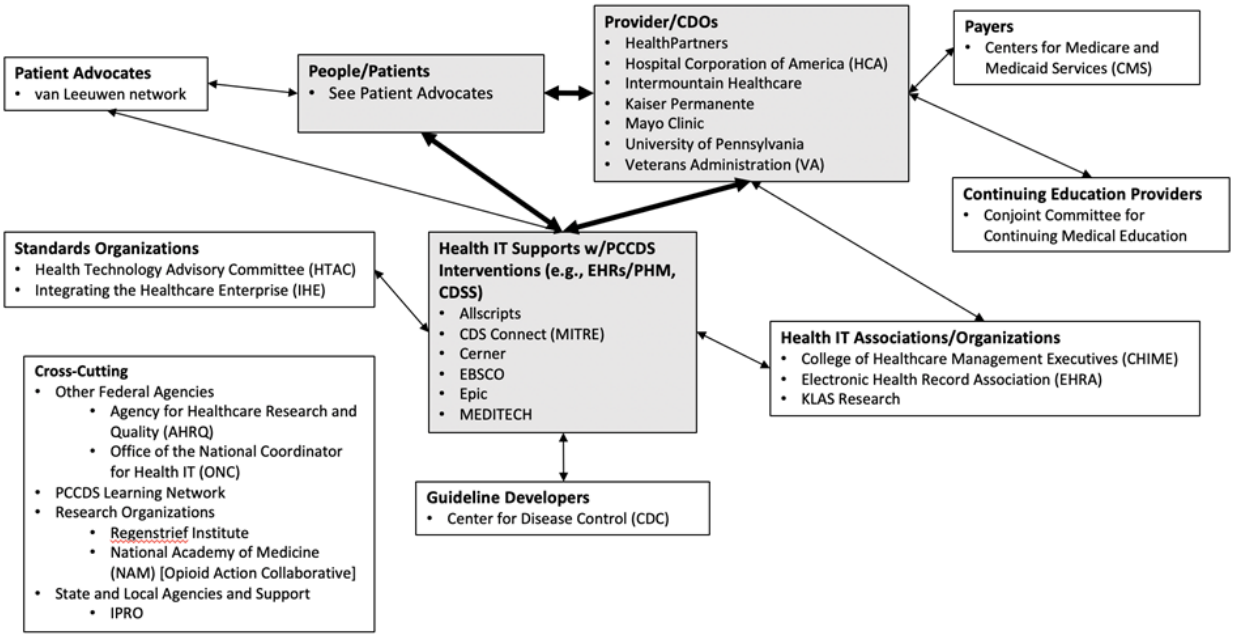

Figure 5: Stakeholder Groups and Interactions

(Shaded boxes represent groups most directly involved in realizing the future scenarios; CDO=care delivery organization, PHM=population health management systems, CDSS=clinical decision support systems)

The unshaded boxes in ***Figure 5*** illustrate other key stakeholders that can support core actions around creating, disseminating and successfully applying opioid-related PCCDS. Similar to the core actors, organizations whose members/staff participated in OAP development influence actions of many care teams, patients and health IT providers, and their actions also provide models for individual and collaborative steps to achieve the aspirational goal.

Organizations listed in the Provider/CDO (care delivery organization) and Health IT Supports boxes whose staff participated in the OAPWG care for—or support care for —many millions of patients. A subset of these organizations alone, building on the actions outlined in section 5.7 on OAP-driven actions already taken, could lead to the OAP aspirational goal of accelerating pain and opioid-related care transformation. If many other provider organizations focused on realizing care similar to the future scenarios—augmented by Health IT Support organization actions to more fully develop the needed interventions—then the aspirational goal could be achieved many times over.

Before outlining actions toward the aspirational goals already taken as part of OAP development, we next present higher-level critical steps and other recommended actions that the OAPWG developed for key stakeholder groups (see Section 5.6). The recommendations (like the puzzle pieces that will combine to create the future vision picture) are interrelated and we encourage readers to scan all the recommendations to contextualize steps any individual/organization might take. These recommendations are intended to further inspire and guide change agents in these stakeholder groups to take steps—and coordinate with other stakeholders/change agents—that make the future scenarios and interventions more widespread and helpful than they are today (or would otherwise be without this OAP).

5.6 Critical Steps and Other Actions Recommended for Stakeholder Groups

5.6.1 Health IT and PCCDS Suppliers (e.g., EHR, CDSS, PHM Vendors)

- Critical step
  - Provide PCCDS interventions within their systems; make sure providers and patients can use these effectively.
- Recommended actions
  - Refine future vision with clients, describe how offerings realize scenarios, cultivate cross-fertilization within client base about implementation success strategies and tools (e.g., checklists, workflow diagrams, education and testing resources).
  - Enhance and make widely available (e.g., in public or vendor-specific content repositories) and workflow-friendly interventions that realize future scenarios, e.g., through participation in CDC's "Adapting Clinical Guidelines for the Digital Age" initiative.[1]
  - Collaborate with each other and additional stakeholders to provide standards-based interventions that are interoperable across delivery platforms.
  - Be transparent throughout CDS lifecycle (e.g., development decisions, integration efforts) to facilitate trust and leverage design thinking in intervention development. Apply design thinking and related person-centered problem solving approaches.
  - Support future vision refinement via mechanisms for structured reporting to assess use and results for specific interventions. E.g., help produce a "Learning Health System."
  - Support provider compliance with 42 CFR Part 2 regulations requiring confidentiality of substance use disorder patient records.

5.6.2 Patients (and Advocates)

- Critical step
  - Use the PCCDS interventions independently and in collaboration with their care teams.
- Recommended actions
  - Participate in further future vision vetting to ensure scenarios and interventions meet healthcare experience and outcome goals.
  - Expect/demand that vetted future scenarios are the standard of care and achieve desired outcomes.
  - Engage in actions for other stakeholders outlined in this section to ensure the future state is valuable to patients and fully realized.

[1] The CDC Advancing Clinical Guideline initiative is a collaboration between guideline developers, implementers, and others that is redesigning the approach for getting guidelines into patient care based. It uses multi-stakeholder input to help ensure the new approach can work across the continuum from summarizing the evidence for guideline development to implementing tools at scale to support evidence-informed care. Resources being produced that can be applied to the opioid crisis include a standardized process and toolset for developing and implementing digital guidelines to help ensure that guidance output meets end user needs and is implementable in available systems.

5.6.3 Providers and CDOs

- Critical step
  - CDOs implement PCCDS interventions to realize future scenarios; providers use and realize value from the interventions in routine care delivery.
- Recommended actions
  - Those having success share strategies/tools (e.g., interventions and their configuration and deployment approach) with others.
  - All those working on pain/opioids review/apply success models—e.g., future scenarios and successes from other implementers farther along.
  - Identify most important "problems to solve" (e.g., as outlined elsewhere in this table) and engage with other stakeholders to address them.
  - Systematically measure success resulting from interventions and related strategies.

5.6.4 Guidance Content Suppliers (e.g., CDC, Clinical Specialty Societies)

- Critical step
  - Develop/enhance evidence-informed guidance to underpin pertinent PCCDS interventions and foster related collaborations so they get implemented effectively.
- Recommended actions
  - Describe how guidance offerings realize scenarios and evolve guidance to better address scenarios.
  - Prepare information that will help activate patients— and get it in the hands of local groups that can use it.
  - Learn requirements that intervention developers face and adapt guideline development processes to facilitate CDS development. Examples are author recommendation statements that are unambiguous, ideally with accompanying structured logic that expresses the recommendation and value sets to define each data element.
  - Make any implementable opioid-specific interventions widely available, e.g., in vendor-specific resources or publicly available repositories such as CDS Connect (an AHRQ-funded project to demonstrate how evidence-based care can be more rapidly incorporated into clinical practice through interoperable decision support).

5.6.5 Health IT Associations (e.g., CHIME, EHRA, AMDIS, HIMSS)

- Critical step
  - Foster best practices and collaboration among association members (e.g., health IT professionals and suppliers) to realize future scenarios.
- Recommended actions
  - Refine future vision with members, collaborate on realizing it.
  - Foster collaboration to make interventions more interoperable.
  - Vendors, such as those working with the Electronic Health Record Association (EHRA), can facilitate collaboration between organizations through sharing of implementation best practices and outcomes data through standardized reports across organizations.

- Create spaces (special presentations or exhibits) in national meetings to showcase these developments and foster learning.

5.6.6 Payers (e.g., CMS, State Medicaid Agencies, Private Health Plans)

- Critical step
  - Leverage funding available to address opioid crisis to support providers in procuring and implementing PCCDS tools and workflows that realize future scenarios.
- Recommended actions
  - Leverage state Medicaid agency Chief Medical Officer connections with each other and with other stakeholders in this table to influence efforts to realize future vision—e.g., by convening state Medicaid agencies to vet and accelerate progress toward future vision.
  - Support efforts to engage/activate patients, e.g., so they demand better care as in future scenarios.
  - States can leverage federal funding to apply HIT to address opioid crisis, e.g., to strengthen PDMPs as in this June 2018 letter from CMS to states.
  - Foster measurement efforts to document whether/how the action plan is driving progress toward the aspirational goal (e.g., extent to which providers/patients are better supported).
  - Support infrastructure development, e.g., to define IHE profiles to make interventions interoperable.

5.6.7 Standards and Interoperability Organizations (e.g., HL7, ONC, HITAC, IHE)

- Critical step
  - Foster development and use of standards that support intervention creation, interoperability, and use.
- Recommended actions
  - Collaborate with other stakeholders to ensure that standards-based interventions are highly useful, widely deployed and fully interoperable; modify standards as needed to achieve these goals.

5.6.8 Continuing Clinician Education Providers (Opioid Focus, e.g., Conjoint Committee on CE)

- Critical step
  - Ensure clinicians/care teams appreciate future scenarios and role for underlying PCCDS interventions and are motivated and prepared to utilize them effectively.
- Recommended actions
  - Leverage future scenarios in curriculum development and deployment, and collaborate with other stakeholders (e.g., healthcare professional societies and associations, healthcare IT suppliers, patient advocates), to create a virtuous cycle between scenario implementation and ongoing refinement.

5.6.9 Research Conducting and Funding Organizations (e.g., Regenstrief, AHRQ, NIH, CDC)

- Critical step
  - Drive and coordinate research to further refine and broadly execute

future vision, e.g., through scenario vetting and focus on developing, testing and scaling interventions and implementation strategies.

- Recommended actions
  - Help disseminate evidence-based opioid-related PCCDS scenarios and interventions (e.g., that are currently available or might be added to pain/opioid-related CDS interventions on CDS Connect).
  - Foster evaluation and assessment efforts to document whether/how the action plan is driving progress qualitatively and quantitatively toward the aspirational goal.
  - Support research to engage/activate patients regarding refining, demanding, and implementing future vision.
  - Help build evidence base around PCCDS for pain/opioids—e.g., actively seek connections between implementers and researchers as progress is driven toward the future scenarios so this work contributes to the evidence base for outcomes, satisfaction, etc. For example, AHRQ has a special emphasis notice for receiving grant applications for research to address the opioid crisis.

5.6.10 State and Local Agencies

- Critical step
  - Coordinate/accelerate stakeholder efforts in realizing future vision, e.g., by partnering with state and local entities that can foster successful PCCDS implementation in clinical settings.
- Recommended actions
  - Cultivate collaboration among stakeholders such as state Medicaid programs (see Payer Section 5.6.6), provider organizations, Health IT/PCCDS suppliers, and State/Regional Health Information Exchanges, and others.
  - Help leverage pertinent efforts and capabilities by State Health Information Exchanges funded by ONC and by "Qualified Entities" that feed into these state exchanges, such as in NY state. For example, in PDMP/HIE integration to provide opioid use information into EHRs (see WA example on page 49 of this Pew PDMP report), and aggregating PDMP data to provide local opioid use dashboards and benchmarks.
  - Disseminate evidence-based PCCDS interventions and scenarios through CDC's Overdose Prevention in States [OPIS] program in 45 states and the District of Columbia.

5.6.11 PCCDS Learning Network

- Critical step
  - Leverage its mission, activities and resources to foster successful OAP execution.
- Recommended actions
  - Support dissemination of OAP through presentations at national informatics and opioid-related meetings, social media, PCCDS-Learning Network website and events.
  - Cultivate opportunities to advance OAP implementation in context of Learning Network focus and activities for 2019 and beyond.

Output from the Learning Network's technical and trust workgroups (Section 5.3, ***Tables 3 and 4***), provide additional recommendations considerations pertinent to addressing many of these stakeholder-specific recommendations above.

Although OAP development has already fostered some of the steps outlined above, it is important to note that this action plan does not commit anyone to anything, since such control is beyond the OAP intent and funding. The goal is to begin articulating and sharing steps that stakeholder groups and individual organizations could take, or are already taking, to realize the desired future vision. In the puzzle analogy, we aim to help individual stakeholders and stakeholder groups understand how their puzzle piece fits in the context of others needed to achieve the future vision, and to build enthusiasm and momentum for refining and combining those pieces.

Section 5.7 provides examples of how the OAP development process has already started to drive stakeholder action toward the aspirational goal by encouraging new/enhanced PCCDS interventions as outlined in the future scenarios; driving broader, successful use of available PCCDS interventions; fostering research to evaluate and accelerate progress toward the future vision; and promoting broader, ongoing collaboration toward achieving it.

5.7 How Action Plan Development Has Already Driven Progress Toward Achieving Desired Future State Scenarios

5.7.1 Creating New and Enhanced Interventions

- EHR vendors (i.e., Epic, Allscripts, MEDITECH) using future scenarios to inform product development teams.
- EBSCO developed a decision aid generator within its 'Option Grid' offering to specifically support Scenario 1; a sample patient-facing decision aid generated from this new tool compares opioid and non-opioid alternatives for knee osteoarthritis.
- EBSCO, Epic, Kaiser Permanente (KP) exploring pilot project to integrate the EBSCO Knee Osteoarthritis "Option Grid' using FHIR into Epic to make additional portions of Scenario 1 live for KP clinicians and patients.
- VA exploring using the future scenarios as a template for describing their current robust PCCDS approach to pain/opioids that they would like to expand upon with their Cerner implementation. Such an outline of their current state could also support application of these tools/approaches beyond the VA.
- University of Pittsburgh Medical Center is leveraging the scenarios to guide development of the next-generation CDS support architecture for pain/opioids.
- HRSA/BPHC (which supports the US healthcare safety net) is exploring ways their health IT unit can share (e.g., leveraging the Health IT Evaluation and Quality Center it funds) the future scenarios with EHR vendors that serve the safety net. The goal is to drive development of new (and better use of current) EHR functionality to widely achieve a version of the future state most valuable to health centers and their patients.
- IPRO has reviewed the future scenarios and is incorporating them into its CDS development efforts (e.g., patient-facing apps and clinician prescribing tools) and implementation

support focused on improving opioid use. IPRO is the CMS-designated Quality Improvement Organization for New York State. It provides opioid-related information and technical assistance to primary care networks and is developing additional support including CDS interventions and related technical assistance to improve opioid prescribing patterns.

- OAPWG began cultivating synergies with CDC's Adapting Clinical Guidelines for the Digital Age initiative, including around its efforts to create a National Test Collaborative for Health IT. This test collaborative could be used for testing interventions in this OAP, which in turn creates a compelling use case for creating the test collaborative.
- Future scenarios are being used to inform use cases for next-generation information delivery within the "AHRQ evidence-based Care Transformation Support (ACTS)" initiative."
- IHE is receptive to receiving detailed use cases based on the future scenarios and potentially developing profiles that drive interoperability specifications for the PCCDS interventions within these use cases.

5.7.2 Driving Broader, Successful Use of Available PCCDS Interventions

- EHR vendors (i.e., Epic, Allscripts, MEDITECH) using future scenarios to inform implementation support teams.
- EHRA Opioid Crisis Task Force exploring ways to expand upon its CDC Opioid Guideline Implementation Guide for Electronic Health Records (published online in November 2018) to more fully address the future scenarios."
- Conjoint Committee on Continuing Education is exploring ways to leverage the scenarios in pain/opioid-related continuing education.
- The CHIME Opioid Task Force is exploring ways to leverage the future scenarios in its playbook on addressing the opioid crisis.
- Provider organizations (e.g., VA, KP) using future scenarios to inform their pain/opioid-related CDS efforts.
- Patient advocate Danny Van Leeuwen reached out through a post on his blog for input on the scenarios and summarized their responses which provide patients' perspectives on achieving a desired future state and a model for more deeply engaging patients in getting there.
- KP sharing via the LN Resource Center examples of PCCDS and related tools they've developed to realize portions of scenarios along with other resources that could underpin interventions/scenario implementation in other organizations (e.g., Excel template for patients on chronic opioids, job aid for using their chronic opioid order set, recordings of simulated patient conversations: "Words that work: Communicating with patients about chronic opioid therapy," and adult and family medicine training slides on using opioids).
- HRSA/BPHC will share via various channels (e.g., newsletters, quarterly conference calls) the future scenarios to stimulate dialog to vet and realize them. Outreach focus will be leads in organizations (i.e., PCAs/HCCNs) they fund to support ~1400 health centers that care for 27 million patients in the healthcare safety net.

- IPRO has shared the scenarios with the other 13 QIN-QIOs and their CMS project officer to inform their technical assistance activities and planning. IPRO is one of the 14 CMS-supported Quality Improvement Networks-Quality Improvement Organizations within which opioid use is a key focus.
- Patient Wisdom has developed a use case demonstrating how its solution for creating patient perspective summaries supports specific OAP future scenario PCCDS interventions.

5.7.3 Fostering Research to Evaluate and Accelerate Progress

- Dr. Chris Harle has reached out to other OAPWG members to explore joint research opportunities resulting in collaboration with EBSCO on a U18 proposal to test making a CDS Hooks/CQL method (using an authoring tool from CDS Connect) to access the EBSCO Health Knee OA Option Grid and demonstrate it in a clinical setting. More information about the CDS Connect open source authoring tool for creating CDS logic and exporting it in a standard format is here.

5.7.4 Promoting Broader, Ongoing Collaboration

- OAPWG members and others expressed interest in participating in an ongoing collaboration forum and identified the value proposition for them from such a forum (See Section 6.2).
- Exploring synergies around achieving desired future state are being discussed with National Academy of Medicine's Action Collaborative on Countering the US Opioid Epidemic.

6. Discussion

Dozens of stakeholders from diverse groups collaborated via the Learning Network's OAPWG to create this OAP for improving pain management, opioid use and OUD treatment through more widespread and effective PCCDS use. A pivotal OAPWG activity was synthesizing a shared future vision illustrated by five brief but compelling scenarios of how PCCDS could improve pain and opioid-related information flow, workflow, decisions, and actions for patients and their care teams. The scenarios are driven by 19 PCCDS interventions that enable the desired future state. Currently, these PCCDS interventions aren't adequately robust and/or widely implemented enough to make the future scenarios commonplace (see ***Table 3***, Section 5.3).

The OAPWG aspires for this OAP to ensure that at least two million people and their care teams have experiences much more like those outlined in the future scenarios. The critical steps and recommended actions outlined in Section 5.6 define a path to achieve this goal. By design, OAPWG collaborations led to many of these actions already being taken, even before this OAP was published (Section 5.7). This reinforces the motive power of the compelling shared future vision. These actions, together with the recommendations in Section 5.6, provide a model and springboard for additional action by OAPWG members and many others toward the shared future vision and the aspirational goal.

6.1 OAP Execution Enablers

In addition to recommending stakeholder actions and beginning to take them, the OAPWG distilled a list of high-level enablers for accelerating progress toward the aspirational goal after OAP publication. These are outlined below.

6.1.1 OAP Dissemination and Use

The Learning Network will publish the OAP on its website and widely advertise it to pertinent audiences. OAPWG members and other interested parties can circulate links to it to their constituency and encourage that it be considered as their PCCDS-enabled pain/opioid work unfolds. For example, scenarios and interventions could be leveraged to advance their efforts (such as others are doing as outlined in Section 5.7), and to identify other steps they could take to simultaneously advance their own goals and progress toward the OAP aspirational goal (see Section 5.6).

6.1.2 Ongoing Collaboration to Drive OAP Implementation

The OAPWG developed the OAP as a time-limited project under the auspices of the Learning Network. Ideally, an entity with appropriate focus and resources will assume responsibility for building on the OAPWG collaborations and actions already taken. The entity would likewise foster stakeholder efforts to address the recommended actions (see Section 5.6). Creating and leveraging a forum for ongoing stakeholder dialog and resource sharing should also be a centerpiece for any OAP follow-on effort (see section 6.2).

6.1.3 Specific "Burning Platform" to Motivate Action

While the national emergency created by the opioid misuse crisis drove the Learning Network's attention and OAPWG engagement on this topic, more specific urgencies are needed to stimulate the considerable attention and resources required to achieve the future scenarios. For example, considerable effort is under way to improve OUD treatment and detection, the importance of which is reinforced by studies indicating that strategies beyond reducing opioid prescriptions are key to reducing opioid deaths. Widely implementing care and interventions similar to Scenario 5 could help expand OUD treatment. Linking such scenario-related urgencies to positive financial and other implications for patients, providers, payers, HIT vendors, and other stakeholders will accelerate progress toward the desired future vision.

6.1.4 Intervention Test Collaborative

As part of its "Adapting Clinical Guidelines for the Digital Age" initiative, CDC is exploring development of a national test collaborative to pilot guideline-informed CDS interventions with multiple clinical organizations, EHR platforms, and other relevant organization types to scale intervention implementation. Initiative leaders have suggested that the OAP Future Scenarios/Interventions would be a good application for this potential resource. Currently, no funding exists to support development of the test collaborative or its use for opioid interventions, though such seed funding and use could be an outcome of implementing this OAP. Such a national test collaborative would complement the forum for ongoing sharing mentioned above in accelerating intervention development, testing and widespread implementation. Since the AHRQ ACTS initiative is addressing opioid-related use cases, then this test collaborative could play a key role in translating the use cases into pilot implementations that could then be replicated in many other settings.

6.1.5 Progress Evaluation

In follow-up work to implement this OAP, it will be important to further vet and refine the aspirational goal and specific success criteria with participants. Similarly, metrics should be developed, applied, and reported to track and enhance progress toward the success measures. Elements of the Learning Network's Analytical Framework for Action provide examples of potential metrics.

6.2 Fostering Ongoing Collaboration

As noted in the section above, the linchpin for accelerating progress executing this OAP is providing an *ongoing* collaboration forum; for example, to address the enablers outlined in Section 6.1, and to continue building on the stakeholder actions from Section 5.7 to implement the recommendations in Section 5.6. Building on the OAPWG collaboration approach, this forum could enable dialog via web meetings, discussion groups, face-to-face meetings, and group document editing. The forum could facilitate tool sharing via repositories, e.g., by building on approaches used in the Learning Network's Resource Center, CDS Connect, and others.

William Gibson famously observed that, *"the future is already here - it's just not very evenly distributed* [24]." Bringing people together in a pain/opioid PCCDS stakeholder forum could help foster further sharing to make portions of the future vision that have already been implemented partially and in a few places more robust and widely distributed. For example, by building out the 'current state' in ***Table 5***, Section 5.4 to identify places where 'the future already exists,' fostering sharing of proven strategies and tools, and accelerating innovation through collaboration. Section 5.7 illustrates that with modest resources and effort, the OAPWG has already made significant progress in these directions.

Although members from many different organizations participated in the OAPWG (see Contributors at the beginning of this document), these organizations are only a tiny fraction of all those with a major stake in this topic. Likewise, even though there were multiple OAPWG participants from the same organization in many cases, only a small portion of individuals with a major stake in the future vision from any given organization participated. A robust stakeholder forum could enable many more stakeholder types (e.g., community pharmacy organizations) and individuals within each organization to work together in achieving a shared, desired future state.

To begin establishing a case for organizations and individuals to invest time (and potentially resources) participating in such a stakeholder forum, OAPWG members shared preliminary ideas about the value proposition from such participation. ***Table 6*** summarizes this input.

The potential high value from such an ongoing forum is reinforced by the strong OAPWG member interest in participating, similar interest expressed by additional stakeholders that attended the Learning Network's 2018 Annual Meeting, and the preliminary value propositions outlined below. Although OAP development did not identify a specific organization to assume responsibility for developing and managing the forum, it is hoped that wide dissemination of this report will surface a path for supporting ongoing collaboration and progress on this important initiative.

6.3 Additional Next Steps

The OAPWG focused on PCCDS for addressing the opioid crisis because that is the scope for the Learning Network that charted this effort. If another entity assumes responsibility for executing this OAP, it may have a somewhat different, though likely related, scope. In any case, the activities and opportunities reported in Sections 5.5 through 5.7 suggest that fostering OAP next steps could fit into various public and private initiatives. Any entity taking on this work can leverage guidance and tools for achieving transformation at scale, e.g., as outlined in the IHI white paper "Planning for Scale: A Guide for Designing Large-Scale Improvement Initiatives." Even if no organization assumes overarching responsibility for executing this OAP, we hope and expect that the momentum described in Section 5.7 will increase and broaden as OAPWG members continue on this journey and as other

Table 6: Value Proposition for Ongoing Forum Identified by OAPWG Participants

Stakeholder Group	Value Proposition
Patient/Advocate	▪ Time and trust in patients' pain and opioid-related interactions with their care teams ▪ Better awareness of and access to non-medical pain management solutions ▪ PCCDS tools are patient friendly and meet their needs by including more patients and caregivers in the governance, design, operations, and research needed to achieve the future vision ▪ Success stories of patients participating in research, artifact development, and implementation to further promote this engagement ▪ Access to a library of relevant references and tools
Provider Organizations	▪ Access to best available evidence for CDS tools in terms of clinical effectiveness and patient decision-making process satisfaction ▪ Templates of effective patient-centered CDS tools, e.g., to support non-opioid treatment of acute and chronic pain, identification of OUD in primary care settings, and opioid tapering (including generating tapering schedule that provides realistic/attainable doses) ▪ An opportunity to network with and learn from other healthcare provider organizations who are addressing issues such as increasing the availability of MAT for OUD and working with primary care providers to improve treatment of chronic and acute pain
HIT Vendors (e.g., EHRs, CDSS)	▪ Innovative ways to integrate evidence-based PCCDS into EHRs and networking with other groups/individuals focused on the same ▪ Evidence-informed recommendations on ways EHR vendor's provider clients can leverage EHR vendor-supplied CDS tools ▪ Networking to identify partners for mutually beneficial solution development collaborations, and better coordination between evidence-based content/CDSS solution development and successful PCCDS implementation
Research Organizations	▪ Opportunity to cultivate mutually beneficial academic, industry, and healthcare delivery partnerships that drive innovation in PCCDS development, implementation, and rigorous evaluation ▪ Information about healthcare organizations' perceived gaps in their PCCDS toolkits ▪ Connections with industry thought leaders to help shape research and support offerings
Federal Agencies and Initiatives	▪ Greater integration of federal opioid-related offerings (e.g., CDC opioid guideline-based CDS into various EHR systems); for example, through collaboration to apply standards in a way that allows broad PCCDS dissemination and implementation across platforms with minimal to no manipulation needed from clinical sites ▪ •Expanded participation in CDC's multi-stakeholder "Adapting Clinical Guidelines for the Digital Age" to help apply the scientific evidence into practice more easily, quickly, accurately, and consistently across EHR platforms and implementation settings, e.g., to foster more pilots and widespread implementations ▪ Greater dissemination of PCCDS interventions (e.g., through public platforms or repositories) to support practice outreach on pain management and opioids use and reduce need to recreate these tools

stakeholders are exposed to the future scenarios and recommendations in this document.

For example, two other AHRQ initiatives will leverage this OAP in their ongoing work. First, the Learning Network is focusing its 2019 efforts on supporting development and implementation of patient-facing CDS interventions (i.e., decision support tools used directly by the patient) as part of its strategy for sustainability beyond AHRQ funding. The initial target area may be opioids, so it is expected that an output from this year will be support for patient-facing CDS that directly advances some portion of the OAP's patient-facing CDS interventions and the related scenarios.

In addition, the AHRQ evidence-based Care Transformation Support (ACTS) project seeded its Stakeholder Community with OAPWG members and will leverage the future scenarios in developing use cases for next-generation, fully CDS-enabled approaches for applying evidence-based information to broadly improve care and care transformation. Pain/opioids will be addressed in an ACTS pilot of next-generation AHRQ information delivery, and the OAP offers rich input for this work.

7. Conclusion

Through this OAP, the OAPWG successfully addressed the Learning Network's goal of promoting PCCDS use to address a national health improvement imperative. The Learning Network convened a broad and diverse stakeholder group to develop this OAP to drive better PCCDS use in making care more patient centered while addressing the national opioid misuse and overdose crisis. A compelling shared future vision—illustrated by five scenarios underpinned by 19 PCCDS interventions—was synthesized and used to identify steps needed to realize that vision. As part of developing the OAP, OAPWG members and others took dozens of actions that represent significant progress addressing those steps. It is expected this execution momentum will build as many others review this OAP after it is published. Having an entity assume responsibility for this ongoing work, including providing a forum for ongoing stakeholder collaboration, could substantially accelerate this progress and ensure that the goal of better supporting two million people with pain management and opioid use by 2021 is achieved or surpassed. The Learning Network will encourage and facilitate discussion with entities willing to continue this work. The repeatable OAP development approach to rapidly identifying a shared future CDS-enabled vision for a national improvement imperative—and driving movement toward achieving it—could potentially be applied to other priority targets as well.

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