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## Patient-centered clinical decision support – Where are we and where to next?

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## Overview

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- Introduction to PC CDS
- Relevant Use Cases
- Adoption and Use
- Relevant Initiatives



## What is patient-centered clinical decision support?



### Knowledge

Evidence-based research findings (CER and PCOR)



### Data

Patient-reported outcomes and other patient-generated health data; patient preferences; patient-specific data; and/or SDOH data that affect individual patient health



### Delivery

Directly engages patients or caregivers (patient-facing) via apps or patient portals in different settings (e.g., at home, community, or doctor's office)



### Use

Patient and/or caregiver involvement in understanding and applying the decision support provided



## Methods

**Purpose:** To explore the emergence of PC CDS tools that significantly incorporate patient-centered factors related to knowledge, data, delivery, and use.



**Literature review:** We reviewed 139 articles from our published literature and 36 resources from our grey literature review.



**Key informant interviews:** We conducted 18 key informant interviews on the current state of PC CDS and areas for future PC CDS research and initiatives.



## Knowledge Base

- Clinicians and patients need evidence to make informed decisions about patient care.
- The knowledge base for PC CDS tools should ideally be derived from patient-centered outcomes research or comparative effectiveness research that includes patients.

We found no studies of PC CDS that discuss how evidence-based guidelines were assessed and prioritized for inclusion in CDS, such as whether patient input was sought in this process.



## Data

- PC CDS incorporates patient-contributed data, including:



Patient-generated health data



Patient-specific information



Patient-reported outcomes and preference



Social determinants of health

In recent years there has been a proliferation of patient-contributed data. Data sources have seen a varying degree of standardization and integration into electronic health records.



## Delivery

PC CDS can be delivered in various technical modalities



Digital apps



Websites



Patient Portals



Texts



EHRs

PC CDS interventions can be used in different settings.



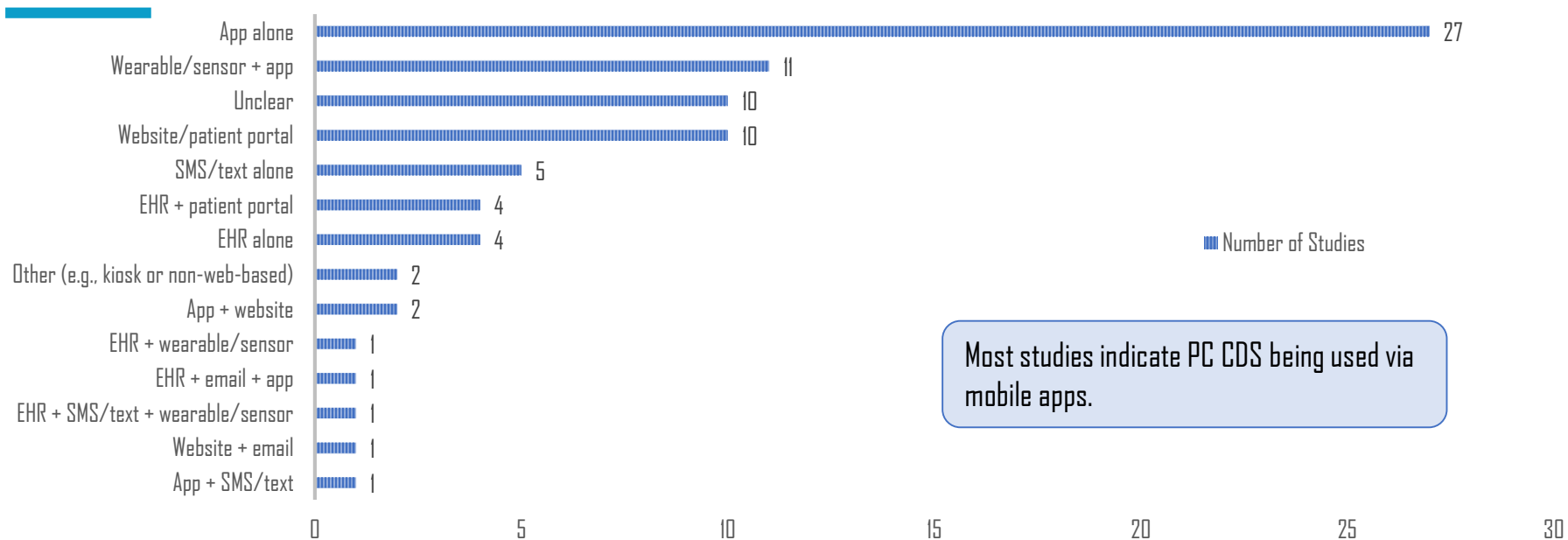
Inside the clinical setting



Outside the clinical setting (in the community)



## Technical Modalities for PC CDS Delivery and Number of Studies





## Setting of PC CDS Use

Setting	Number of Studies
At home/in the community	46
Clinician office – primary care/pediatrics	28
Clinician office – specialty care	18
Emergency department	4
Inpatient setting	1

Most studies cited the patient's home or community as the setting for PC CDS use. Most studies indicate PC CDS being used via mobile apps.



## Use

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- The ultimate vision of PC CDS efforts is to support dialogue between patient and clinician that fosters shared decision-making (SDM) between the patient and clinician.
- Patients and providers interact differently with PC CDS. In reviewing the studies included in our analysis, we found a continuum of engagement, from low to high, for both patients and providers.



# Patient Engagement Continuum

Engagement Level	PC CDS Intervention Description	Number of Studies
Low	Patient access to data or education materials sent to the patient by the provider via apps; is commonly a one-way push of information or communication	4
Moderate	PGHD data collection commonly collected via mobile app, device, sensor, or wearable; interventions provide a mechanism to engage in two-way communication or prepare the patient for SDM	24
High	Facilitates SDM during the patient encounter; includes opportunities to discuss patient preferences and/or values	13



## Provider Engagement Continuum

Engagement Level	PC CDS Intervention Description	Number of Studies
Low	Automatically triggered alerts to the patient or provider; these alerts may result in a discussion with the patient	14
Moderate	Review of PGHD or other external data sources presented to the provider in a meaningful way during the patient encounter	11
High	Facilitates SDM during the patient encounter; includes opportunities to discuss patient preferences and/or values	14



## PC CDS Shared Decision-Making by Condition

Type	Condition	Number of Studies
Chronic	Diabetes mellitus	3
	Cancer	2
	Chronic Pain	2
	Cardiovascular disease	1
	Chronic Obstructive Pulmonary Disease	1
	Chronic Pain	2
	End-stage renal disease	1
	Osteoarthritis	1
Acute	Head injury	1

We found many examples of the ways PC CDS is being used to support SDM across a variety of clinical conditions



## Use

Almost two-thirds of PC CDS interventions included in our study were designed with components for **patient and clinician interaction**, while about one-third were designed for only patient interaction.

*"I think that is important to figure out when and how we should be engaging patients outside of the office. Different technologies can enable different things and I think we first need to figure out what we want, when do we want providers communicating live with patients, when do we want them communicating asynchronously with patients, when might patients just benefit from going through a chatbot. I think that needs to happen."*

*–Health Care Provider Key Informant*



## More research is needed across components

### Knowledge Base

- More research is needed to determine the best methods for capturing patient input in PC CDS development.

### Data

- The inclusion of patient preference data is still nascent.
- Across all patient-contributed data sources there remain numerous technical challenges.

### Delivery

- Research is needed to determine optimum methods and technical modalities for PC CDS.

### Use

- There are unanswered questions regarding how to engage patients using PC CDS technology.



## The Agency for Healthcare Research and Quality (AHRQ)'s Patient-Centered Outcomes Research (PCOR) CDS Initiative



### Clinical Decision Support Innovation Collaborative (CDSiC)

- A diverse community of experts at the forefront of using technology to better engage patients in their own care.
- <https://cdsic.ahrq.gov>



### CDS Connect

- An online platform focused on CDS that includes a repository of CDS artifacts, an authoring tool to enable the creation of CDS, and prototype tools for sharing and testing CDS.
- <https://cds.ahrq.gov/cdsconnect>



### CEDAR

- A standards-based application programming interface (API) designed to make PCOR evidence more findable, accessible, interoperable, and reusable that is used to support the dissemination of PCOR research.
- <https://cde.ahrq.gov/cedar/>



## The CDSiC's Vision

*A world where patients, caregivers, and care teams have the right information at the right time to make evidence-informed decisions that improve health and well-being for all individuals.*



*Stay connected with the CDSiC project at [clinicaldecisionsupport@ahrq.hhs.gov](mailto:clinicaldecisionsupport@ahrq.hhs.gov)*



<https://cdsic.ahrq.gov/cdsic/cdsic-about>