Environmental Scan on Using Data and Health Information Technology to Transparently Empower Consumers and Support Providers

July 29, 2025

This environmental scan was prepared at the request of the Office of the Assistant Secretary for Planning and Evaluation (ASPE) as background information to assist the Physician-Focused Payment Model Technical Advisory Committee (PTAC) in preparing for a theme-based discussion on using data and health information technology to transparently empower consumers and support providers. This environmental scan provides background on patient empowerment; the use of digital tools to empower patients and support providers; and patient empowerment and value-based care. Appendices include tables detailing features of select submitted PTAC proposals and Center for Medicare and Medicaid Innovation (the Innovation Center) models.[i]

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Exhibits

List of Acronyms

AAHPM	American Academy of Hospice and Palliative Medicine
AHC	Accountable Health Communities
AI	Artificial intelligence
API	Application Programming Interface
APM	Alternative Payment Model
ASPE	Assistant Secretary for Planning and Evaluation
BMI	Body mass index
C2S	Consent2Share
CAH	Critical Access Hospital
CHD	Coronary heart disease
CHIP	Children's Health Insurance Program
CMS	Centers for Medicare & Medicaid Services
CNA	Cota Nodal Address
ED	Emergency department
EHR	Electronic health record
EMR	Electronic medical record
FFS	Fee-for-service
FHIR	Fast Healthcare Interoperability Resources®
HaH	Hospital at Home
HHS	Health and Human Services
HIE	Health information exchange
HIN	Health information network
HIPAA	Health Insurance Portability and Accountability Act
HL7	Health Level 7®
HRSN	Health-related social need
IBH	Innovations in Behavioral Health
IOBS	Innovative Oncology Business Solutions
IT	Information technology
LDL	Low-density lipoprotein
MACRA	Medicare Access and Children's Health Insurance Program Reauthorization Act
MASON	Making Accountable Sustainable Oncology Networks
MDPP	Medicare Diabetes Prevention Program
MIPS	Merit-based Incentive Payment System
ONC	Office of the National Coordinator for Health Information Technology
PACSSI	Patient and Caregiver Support for Serious Illness
PACT	Patient-Aligned Care Team
PCDT	Preliminary Comments Development Team
PCP	Primary care provider
PCT	Palliative care teams
PFPM	Physician-focused payment model
PHR	Personal health record
PRC	Personalized Recovery Care
PROM	Patient-reported outcome measure
PRT	Preliminary Review Team

PTAC	Physician-Focused Payment Model Technical Advisory Committee
QPP	Quality payment program
RFI	Request for Input
RPM	Remote patient monitoring
RTS	Report to the Secretary
SAMHSA	Substance Abuse and Mental Health Services Administration
SME	Subject matter expert
TCOC	Total cost of care
TEFCA	Trusted Exchange Framework and Common Agreement
TMaH	Transforming Maternal Health
U.S.	United States
UNMHSC	University of New Mexico Health Sciences Center
VA	Veterans Affairs
VSAS	Veteran Symptom Assessment System

I. Introduction and Purpose

Under the bipartisan Medicare Access and Children's Health Insurance Program (CHIP) Reauthorization Act (MACRA) of 2015, Congress significantly changed Medicare fee-for-service (FFS) physician payment methods. The law also specifically encouraged the development of Alternative Payment Models (APMs) known as physician-focused payment models (PFPMs) and created the Physician-Focused Payment Model Technical Advisory Committee (PTAC) to review stakeholder-submitted PFPM proposals and make comments and recommendations on them to the Secretary of Health and Human Services (HHS; "the Secretary").

Since its inception, PTAC has received 35 proposals for PFPMs from a diverse set of physician payment stakeholders, including professional associations, health systems, academic groups, public health agencies, and individual providers.[ii] PTAC evaluates the PFPM proposals based on the extent to which they meet the Secretary's 10 regulatory criteria for PFPMs (specified in federal regulations at 42 CFR § 414.1465). Among the 35 proposals that were submitted to PTAC between 2016 and 2020, including 28 proposals that PTAC has deliberated and voted on during public meetings, nearly all of the proposals address patient choice and health information technology (IT). Committee members found that 25 of these proposals met Criterion 8 (Patient Choice) and 22 proposals met Criterion 10 (Health IT). Seven proposals were selected for this environmental scan: four proposals describe specific strategies to support patient choice, and three proposals describe innovative health IT approaches that promote data standardization, interoperability, and transparency.

Given the increased emphasis on developing larger, population-based APMs that encourage accountable care relationships, PTAC has conducted several theme-based discussions between 2021 and early 2025 that have examined care delivery and payment issues as they relate to value-based care and APMs. Key themes that have emerged during these theme-based discussions are the use of health IT and patient empowerment. Relevant topics identified for investigation in this environmental scan include:

- Background on patient empowerment;
- The use of digital tools to empower patients and support providers; and
- Patient empowerment and value-based care.

This environmental scan provides PTAC members with background information and context reflecting expert perspectives on issues related to using data and heath IT to transparently empower consumers and support providers. The environmental scan is expected to help PTAC members review strategies in proposals previously submitted to the Committee. In addition, the environmental scan can inform the Committee members' review of future proposals and future comments and recommendations that Committee members may submit to the Secretary relating to using data and health IT to transparently empower consumers and support providers.

This environmental scan summarizes relevant information from PTAC's review of proposals from previous submitters and findings from relevant literature, selected Center for Medicare and Medicaid

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[ii] The 35 proposals submitted to PTAC represent an unduplicated count (i.e., proposals with multiple submissions are counted only once) of the number of proposals that have been voted and deliberated on by the Committee (28) and the number of proposals that have been withdrawn by stakeholders (seven, including one proposal that was withdrawn prior to any review by the Committee).

Innovation (the Innovation Center) models, and other Centers for Medicare & Medicaid Services (CMS) programs, state models, and demonstrations.

Section II provides key highlights of the findings from the environmental scan. Section III describes the research questions and methods used in the environmental scan. Subsequent sections provide background on patient empowerment (Section IV); the use of digital tools to empower patients and support providers (Section V); patient empowerment and value-based care (Section VI); relevant features in previously submitted proposals (Section VII); and areas where additional information is needed (Section VIII). Additionally, a list of abbreviations can be found at the beginning of the environmental scan, following the Table of Contents.

II. Key Highlights

The following section highlights key findings from this environmental scan on using data and health IT to transparently empower consumers and support providers.

Background on Patient Empowerment

Patient empowerment refers to a patient's ability and desire to have an active role in their own health and health care. Empowering patients to take control over the factors that influence their health and to work with their clinicians to make informed decisions about their health and treatment are essential to patient-centered care. There is limited but promising evidence showing that patient empowerment is associated with better clinical outcomes (e.g., fewer hospitalizations), patient-reported outcomes (e.g., quality of life), and patient experience.[1,2,3]

One area in which patients can be empowered is regarding choices about their health care providers and health insurance plans. There is an increasing amount of information, such as quality indicators, available to patients to allow them to compare and select their health care providers and insurance plans. However, some patients may not use this information when selecting a provider or insurance plan. For example, patients may not use the information available to them when selecting a provider because they may have difficulty finding the information they seek, are unable to understand the information, and/or feel overwhelmed by the extensive amount of information that is available.[4,5,6]

A second area of patient empowerment includes patients' abilities to make decisions about their health and treatment. A patient and their clinician can work together to make informed decisions about the patient's health and health care, often referred to as shared decision-making.[7] Shared decision-making helps to ensure that medical decisions align with a patient's personal health goals, values, and concerns.[8,9]

Patient, organizational, and societal level factors can influence the extent to which patients are empowered to make decisions about their health and treatment.[10,11] For example, at the patient level, patients with low education levels and limited health literacy may be less likely to understand their health data or use their electronically stored health information.[12,13,14] Organizational policies and practices, such as policies related to providing patients with the ability to edit their electronic medical records (EMRs), can impact how easy it is for patients to be involved in their care.[15] At the societal level, patients can partner with community leaders or policy makers to address community issues and inform health care policy. Local, state, and national policies and programs can impact the extent to which patients are involved in making decisions about health and health care. For example, some states have mandates for hospitals to establish patient advisory councils to encourage patient participation in health care.[16]

Different strategies can be used to promote patient empowerment and engage patients to make decisions about their health and treatment. Educating patients and providing them with resources about health conditions and treatment choices can empower patients, as knowledge about one's health and treatment options allows a patient to make informed decisions that support their health goals.[17] Collaborative patient-clinician partnerships that leverage open communication and shared decision-making also promote patient empowerment. Shared decision-making can be facilitated through the use of patient-centered clinical decision support. Decision support includes digital tools that support the collaboration between patients and clinicians while they work together to make informed decisions about the patient's health and treatment.[18] Such tools and health data are critical to empowering patients because they support them in managing their care, facilitate communication with their clinician, and help patients better comprehend their health conditions and treatment choices.

The Use of Digital Tools to Empower Patients and Support Providers

Digital tools can help promote patient empowerment by providing patients with access to their health data, facilitating shared decision-making, and personalizing care. The way patient health information is created, accessed, and edited has evolved from the use of paper medical records, to digitizing paper records in EMRs, to adopting electronic health records (EHRs), which allow for the sharing of patient health information across care settings.

Data interoperability refers to the capability of different information systems from different organizations to access, exchange, integrate, and use data in a harmonized way.[19] Exchanging health data between different hospital systems allows clinicians to view patients' complete medical histories, including results from tests performed at different provider organizations.[20] Many hospital systems face challenges with exchanging health information with other systems. For example, adopting modern interoperable systems can require substantial resources and costs.[21] Different strategies have been implemented to improve data infrastructure and interoperability, including regulatory and policy initiatives as well as incentive programs that support organizations that adopt and implement modern systems.

The emergence of digital health tools has expanded the resources and information patients and their clinicians can use to make informed decisions about the patient's health and treatment.[22] For example, patient portals allow patients to access their medical records and communicate with their providers. Mobile applications (apps) and wearable health technology allow patients to actively participate in their own health by providing them with real-time access to their health data (e.g., blood glucose, heart rate). These tools can help to diagnose or treat health conditions, remotely monitor patients, and promote wellness.[23]

Digital health tools can also support shared decision-making, a model of care that fosters collaboration between a patient and their clinician to make an informed decision about the patient's care that considers the patient's health goals and preferences.[24,25] While shared decision-making broadly encompasses many types of digital health tools, there are two types of digital tools that particularly promote shared decision-making: care support tools–which help patients with self-managing their health through clinical education, recommendations, and reminders–and patient monitoring tools–which collect and send patient health data (e.g., patient-reported outcomes, biometrics) to providers to track patient progress.[26] Although evidence is limited, there are encouraging research findings showing a positive impact of digital health tools on clinical outcomes and patient empowerment.

Patient Empowerment and Value-Based Care

A pillar of value-based care is to actively empower patients in care decisions and improve patients' overall health care experience.[27] Several models tested by the Innovation Center have included patient engagement and/or empowerment strategies, including the Accountable Health Communities (AHC) Model,[28] the Innovation in Behavioral Health (IBH) Model,[29] the Medicare Diabetes Prevention Program (MDPP),[30] and the Transforming Maternal Health (TMaH) Model.[31] For example, models provided opportunities for patients to provide feedback on services received, employed person-centered approaches, and provided patient self-management support. Medical home models that leverage interdisciplinary primary care teams also promote patient empowerment. For example, the Veterans Health Administration began the Patient-Aligned Care Team (PACT) in 2010, which used the medical home model to provide veterans with coordinated, comprehensive, patient-driven, team-based health care.[32]

Patient engagement and empowerment strategies included in the design of CMS Innovation Center models will increase as the Innovation Center is currently expanding existing models and designing new models that focus on empowering patients to achieve their health goals.[33]

Relevant Features in Previously Submitted PTAC Proposals

Among the 35 proposals that were submitted to PTAC between 2016 and 2020, including 28 proposals that PTAC has deliberated and voted on during public meetings, nearly all the proposals address patient choice and health IT. The goal of the criterion on "Patient Choice" is to "encourage greater attention to the health of the population served while also supporting the unique needs and preferences of individual patients," and the goal of the criterion on "Health Information Technology" is to "encourage use of health information technology to inform care."

Committee members found that, of the 28 proposals that PTAC deliberated on, 25 of these proposals met Criterion 8 (Patient Choice) and 22 proposals met Criterion 10 (Health IT). Seven proposals were selected for this environmental scan: four proposals describe specific strategies to support patient choice, and three proposals describe innovative approaches to health IT that promote data standardization, interoperability, and transparency.

III. Research Approach

This section provides a brief review of the research questions and methods that were used in developing this environmental scan.

III.A. Research Questions

Working closely with the Office of the Assistant Secretary for Planning and Evaluation (ASPE) staff and with input from a subset of Committee members known as a Preliminary Comments Development Team (PCDT),[iii] the following high-level research questions were developed to inform this environmental scan:

- What information do patients need to support their involvement in decisions affecting their health (e.g., providers, treatment options, care management, insurance navigation)?
- What are approaches that enable patients to make independent care decisions?
- What is the evidence on the relationship between health outcomes and patient engagement and empowerment?
- What approaches to patient empowerment address the needs of a broad range of patients and how do these differ from approaches most effective for patients with chronic conditions?
- What is the current state of IT and EHR support for patient empowerment?
- What are solutions to improving patient data standardization, transparency, and access?
- How can electronic health record vendors work together to improve data interoperability?
- How can data infrastructure be improved to ensure the availability of patient data?
- What funding mechanisms can be used to promote improvements in patient data?
- How can digital technology be used to inform and empower patients?
- How can patients be empowered to:
    - better understand the health care data they can access through tools such as patient portals?
    - make better decisions regarding their health?
- What is the impact of the use of patient digital tools on patient quality, outcomes, and TCOC?
- What are effective approaches for using patient navigators to support patients in managing their health care?
- What are best practices for encouraging shared decision-making between clinicians and patients?
- What is or can be the role of artificial intelligence (AI) in improving the effectiveness of patient digital tools?
- How can providers help to engage patients and promote patient empowerment?
- What are innovative patient empowerment techniques (e.g., shared decision-making, open communication, patient education, patient activation) used by care delivery teams?
- What are current patient engagement strategies within value-based care?

[iii] A Preliminary Comments Development Team (PCDT) comprised four PTAC members: Krishna Ramachandran, MBA, MS (Lead); Lawrence R. Kosinski, MD, MBA; Joshua Liao, MD, MSc; and James Walton, DO, MBA.

These research questions, organized by the environmental scan section, are provided in **Appendix A.**

III.B. Research Methods

The environmental scan included information gathered from a targeted review of the literature, an analysis of previous PTAC proposals, and an analysis of select value-based CMS programs and Innovation Center models.

This environmental scan was specifically focused on three pertinent topics: background on patient empowerment; the use of digital tools to empower patients and support providers; and patient empowerment and value-based care.

The analysis of select PTAC proposals (**Appendix B**) included a review of past proposals, PTAC reports to the Secretary, and content available in other PTAC process documents (e.g., public meeting minutes, Preliminary Review Team [PRT] reports).

The analysis of select Innovation Center models (**Appendix C**) was based on a review of publicly available resources, including the description of and technical documents related to each selected program on CMS websites, descriptions on the Innovation Center website, and recent Innovation Center model evaluation reports when available.

IV. Background on Patient Empowerment

Traditionally, clinicians have used their clinical knowledge and skills to make medical decisions on behalf of their patients, such as deciding which medical tests or treatments the patient should follow.[34] Once a decision has been made, the clinician then presents the information to the patient and encourages the patient to consent to the selected intervention. In this approach, often referred to as the paternalistic model, patients take a passive role in making decisions about their health and treatment. This model relies on an underlying assumption that clinicians and patients share the same criteria for determining what is best for the patient, without including the patient in the decision-making process.[35]

Within the past 50 years, there has been a shift away from this traditional model toward an approach that embraces patient empowerment.[36] Patient empowerment refers to a patient’s ability and desire to have an active role in their own health and health care. Empowering patients to take control over the factors that influence their health and to work with their clinicians to make informed decisions about their health and health care are essential to patient-centered care.[37,38,39,40] A patients-as-partners approach views patients as experts in their health experiences, such as their severity of symptoms. Patients’ experiences and knowledge about their health are not only considered complementary to clinicians’ knowledge but are considered key to successfully meeting patients’ health care needs, preferences, and goals.[41]

There is limited but promising evidence showing that patient empowerment improves clinical outcomes, patient-reported outcomes, and patient experiences. Hibbard and colleagues have contributed a large body of evidence focused specifically on the connection between patient activation and health outcomes.[42,43,44] Their definition of patient activation refers to the patient’s knowledge, skills, and confidence in managing their own health and health care independently.[45] (Definitions of patient empowerment and patient activation, and their relationship, are described in more detail in the following section.) Relative to less activated patients, more activated patients tend to have systolic blood pressure within the normal range, fewer emergency department (ED) visits, and fewer hospitalizations.[46] Among patients with chronic health conditions, more activated patients tend to better adhere to their recommended treatments, engage in regular at-home self-monitoring, and receive care for their chronic conditions (e.g., foot and eye exams for patients with diabetes) compared with less activated patients.[47]

Additionally, there is some evidence showing that patients who are more involved in making decisions about their health and health care have better patient-reported outcomes and experiences. Relative to patients who are less engaged in their health and treatment, patients who are highly engaged tend to report higher-quality interactions with their providers, perceive their treatments to be free from bias based on their sociodemographic characteristics, and have more frequent communication with their providers outside of regularly scheduled visits, such as contact from their physician via telephone, mail, and/or email.[48,49] In addition, a review by Mora and colleagues (2022) showed positive associations between patient empowerment and patient-reported health status, quality of life, self-efficacy, self-esteem, and social support.[50]

The limited number of research studies that have focused on understanding the associations between patient empowerment, health outcomes, and patient experience have primarily relied on cross-sectional research designs.[51] Additional research is needed to disentangle the relationships between patient empowerment, outcomes, and experience and the direction of the effects.

IV.A. Exploring Definitions of Patient Empowerment and Other Commonly Used Terms

The literature on patient-centered health care is replete with myriad related terms such as patient empowerment, patient engagement, and patient involvement. Harrington et al. (2020), for example, identified 24 different terms associated with the concepts of patient-centered care, patient engagement, patient involvement, and patient activation, and noted that each term has varying definitions. Some researchers have suggested that patient engagement is the most developed of the patient-centered care concepts (see, for example, Carman et al., 2013)[52] and it is most frequently used in the literature.[53,54] Exhibit 1 lists six common terms in the patient-centered and personal health care space—patient enablement, patient activation, patient empowerment, patient engagement, patient involvement, and patient participation. Differing definitions of each concept are provided from systematic literature reviews and conceptual analyses involving these terms (see Bravo et al., 2015; Fumagalli et al., 2015; Castro et al., 2016; Higgins et al., 2017; Pekonen et al., 2020; Hickmann et al., 2022; and Mora et al., 2022).[55,56,57,58,59,60,61]

Exhibit 1. Definitions of Patient Empowerment, Patient Engagement, and Related Concepts

Definitions from the Literature

PATIENT ENABLEMENT

- The most recurrent use of ‘patient enablement’ is linked with the process of “enabling” patients, by (i) providing appropriate knowledge, skill and abilities to understand their condition and make decisions; and (ii) developing appropriate contexts that allow patients to learn such knowledge, skill and abilities [30,64,65,47]. (Fumagalli et al., 2015)
- Patient enablement regards the acquisition of sufficient knowledge and skills for meaningful self-management, but not necessarily sufficient motivation. (Fumagalli et al., 2015)
- Patient enablement focuses on the general acquisition of skills and knowledge to engage in healthcare. (Hickmann et al., 2022)
- Patient enablement only focuses on procuring these assets [knowledge and skills], meaning that enablement is a preliminary competence, which can potentially progress into patient empowerment. (Hickmann et al., 2022)

PATIENT ACTIVATION

- Patient activation has a quite clear and universally recognized definition (e.g., [26–28,34]): “an activated patient is someone who knows how to manage their condition and maintain functioning and prevent health declines; and they have the skills and behavioural repertoire to manage their condition, collaborate with their health providers, maintain their health functioning, and access appropriate and high-quality care”. (Fumagalli et al., 2015)
- Patient activation measures refer instead to a tighter domain, collecting information on patients’ knowledge, skills, and motivation on specific healthcare-related behaviours, rather than on lifestyle. (Fumagalli et al., 2015)
- Patient activation can be conceived as a subset of the larger concept of patient empowerment. (Fumagalli et al., 2015)
- Activation is patient-focused and indicates the patient’s confidence and skills to engage in their care [16]. (Higgins et al., 2017)
- Patient activation refers to the ability to manage one’s illness, collaborate with the healthcare provider, maintain health functioning and access appropriate care [11]. (Mora et al., 2022)

PATIENT EMPOWERMENT

- Definitions of patient empowerment identified in the literature were diverse, with some definitions focusing on patient empowerment as a transformative process that patients go through as they gain control of their health and healthcare and adapt to having a chronic disease (LTC), others focusing on principles or ethos underpinning patient empowerment (e.g., autonomy, self-determination), and others defining patient empowerment in terms of interventions that aim to foster self-management of LTCs (Tables 3 and 4). (Bravo, 2015)
- Analysis identified that patient empowerment can be conceived of as a patient “state” and by patient behaviours. Empowered patients “feel like they have got the ability and are given confidence to be able to manage their condition” (Healthcare provider - interview). This “state” can be indicated by (1) Patient capacities, beliefs or resources including self-efficacy, sense of meaning and coherence about their condition, health literacy, perceived control and feelings respected by their healthcare providers (2) Activities or behaviours (things patient do) e.g., participate in shared decision-making by taking an active role and making informed decisions about their health and healthcare, self-manage their condition by choosing meaningful and realistic goals and taking steps to achieve those goals, participate in collective activities such as patient support or advocacy groups, and search for information about their health condition e.g., on the internet. (Bravo et al., 2015)
- Most definitions recognize empowerment as the combination of ability, motivation and power opportunities. (Fumagalli et al., 2015)

Definitions from the Literature

- Past research has developed three interpretations of patient empowerment as (i) emergent states that allow patients to have an active role in their own care; (ii) processes leading to patients' acquisition of these emergent states; (iii) behaviours through which patients participate in self-management and shared decision-making (Fig. 2). (Fumagalli et al., 2015)
- Patient empowerment has been defined also as the process leading to personal transformation [7,45] The dual view of patient empowerment as both emergent state and process underlies the notions that "knowledge, skills, attitudes and self-awareness" do not emerge spontaneously, but from socially-constructed development processes where such knowledge, skills and attitudes are provided and evaluated differently by patients and providers, as well as valued differently by different kinds of patients. (Fumagallli et al., 2015)
- A third interpretation conceives patient empowerment as the actual behavioural change that follows the acquisition of "knowledge, skills, attitudes and self-awareness". Patient empowerment does not reflect a state of "being empowered" or a process of "getting empowered", but the "exploitation" of power in real-life contexts, where the patients assume the responsibility of self-care and decision-making [7,29]…. two arguments suggest caution in equating empowerment with participation. (Fumagalli et al., 2015)
- As a result, we made sense of the varied interpretations of patient empowerment, by combining key definitions into the following: "Patient empowerment is the acquisition of motivation (self-awareness and attitude through engagement) and ability (skills and knowledge through enablement) that patients might use to be involved or participate in decision-making, thus creating an opportunity for higher levels of power in their relationship with professionals". (Fumagalli et al., 2015)
- Individual patient empowerment is a process that enables patients to exert more influence over their individual health by increasing their capacities to gain more control over issues they themselves define as important. (Castro et al, 2016)
- Empowerment represents the patient's increased desire and ability to participate in care as a function of their confidence of their status within the healthcare system [15]. (Higgins et al., 2017)
- In the existing definitions include patients' capacity [5,7,13,14,20,21], power [6,7,15,22], knowledge [5,7,16,20], patients' activities/ behaviours, e.g. rational decision, shared decision-making [5,7,13,20,21] and management of own illness and own lives [4,5,7,16,21]. In addition, support by health care professionals has been highlighted in patient empowerment [7,22,23]. Patients have to empower themselves; health care professionals can only support patients in their empowerment process [16]. (Pekonen et al., 2020)
- Patient empowerment relates to a patient's proliferation of knowledge, skills, attitudes, or self-awareness, combined with the confidence to participate in their care [12]. (Hickmann et al., 2022)
- Two different implications of patient empowerment can frequently be found in the literature. The first describes patient empowerment as a process (i), which enhances the patient's capacity to think critically and make autonomous, informed decisions. The second depicts patient empowerment as a patient's state of being empowered (ii). As a state (ii), patients are empowered if they feel confident enough to participate actively in consultations or self-management. (Hickmann et al., 2022)
- The most common definitions in the literature were the ones written by Funnell and Anderson [22,23] and Rappaport [24]. Surprisingly, the definition from the WHO [32] was not used more frequently, since these definitions are usually well known, such as the definition for health. (Mora et al., 2022)
  - Funnell and Anderson definition: Patient empowerment is defined as 'a process whereby patients have the knowledge, skills, attitudes and self-awareness necessary to influence their own behavior and that of others in order to improve the quality of their lives.'
  - Rappaport definition: A process by which people can gain control over their lives and enables patients to take on increased responsibilities for their daily self-care

Definitions from the Literature
PATIENT ENGAGEMENT
• Two distinct interpretations can be recognized [12,39,62]: (i) patient engagement as the participation of patients in self or shared management, i.e. engagement as the consequence of empowerment; (ii) the behaviours that patients perform to improve their role in healthcare, i.e. engagement as a cause of empowerment. (Fumagalli et al., 2015) • Engaged patients are instead those who express a strong motivation, but do not necessarily have already sufficient ability and power for self-care. (Fumagalli et al., 2015) • The analysis revealed four defining attributes of patient engagement: personalization, access, commitment and therapeutic alliance. Patient engagement is defined as the desire and capability to actively choose to participate in care in a way uniquely appropriate to the individual, in cooperation with a healthcare provider or institution, for the purposes of maximizing outcomes or improving experiences of care. (Higgins et al., 2017) • The most prevalent characteristics among definitions of patient engagement were "process: active," "patient involvement," and "patient as participant." (Harrington et al., 2020) • It can be summarised that for a patient to engage, they must be empowered, as they need motivation and the ability to participate in care…Both patient and provider aim to reach a shared healthcare goal [18]. (Hickmann et al., 2022) • Parts of engagement encompass patient participation [12]. A central aspect of patient engagement is the therapeutic alliance, which is the realm of patient participation. (Hickmann et al., 2022)
PATIENT INVOLVEMENT
• In these studies, involvement relates to those activities that could help patients to reach a more active role in choices about own healthcare (e.g., [8,19]). Here, patient involvement is interpreted as "getting patients involved", by providing information on national standards and possible treatment, quality of service delivery, patient satisfaction and consultations with healthcare professionals [15]. (Fumagalli et al, 2015) • Self-care and self-management are examples of patient involvement. (Hickmann et al., 2022) • Patient involvement is not necessarily in cooperation with the healthcare provider. (Hickmann et al., 2022)
PATIENT PARTICIPATION
• Participation is "where professionals and patient values are integrated to arrive a final decision", p. 19 and where professionals can inform patients about health conditions, treatments, risks, etc. and take into account their preferences and opinions [59,49]. (Fumagalli et al., 2015) • Participation represents a different sub-set of involvement—one that is co-determined by both patients and professionals and materializes in the forms of dialogue or shared decision-making. It follows that making autonomous decisions is not participation if patients and professionals do not engage in two-way communication. (Fumagalli et al., 2015) • Patient participation is a strategy to achieve a patient-centered approach in health care. (Castro et al., 2016) • Individual patient participation revolves around a patient's rights and opportunities to influence and engage in the decision making about his care through a dialogue attuned to his preferences, potential and a combination of his experiential and the professional's expert knowledge. (Castro et al., 2016) • There is some indication that participation involves a greater degree of self-management in care compared to involvement [15]. (Higgins et al., 2017) • Shared decision-making is an example of patient participation. Several sources agree that patient participation depends on an established relationship with the healthcare provider, meaning that autonomous actions or decisions by the patient are not forms of patient participation [4, 6, 13, 14]. (Hickmann et al., 2022)

Note: All definition information presented in this table is verbatim from the cited sources.

Patient enablement appears to be the most consistently agreed-upon of the six terms, focusing on the process of patients acquiring the necessary health-related skills and knowledge, and therefore having the competence, to understand and participate meaningfully in their own health care. However, patient enablement is related to other terms, such as health literacy, which the HHS's Healthy People 2030 defines as "the degree to which individuals have the ability to find, understand, and use information and services to inform health-related decisions and actions for themselves and others."[62] A clear distinction between patient enablement and health literacy has not been made, but health literacy could be conceived as a component of patient enablement.

Each of the other five terms presented in Exhibit 1 has differing definitions and overlaps with other terms.

Patient activation vs. empowerment. Both patient activation and patient empowerment generally refer to having the ability (knowledge/skills) and motivation (confidence) to engage in one's own health care. Fumagalli et al. (2015) distinguish the two concepts noting that measures of patient empowerment have tended to focus more broadly on "lifestyle" (e.g., perceived power, self-efficacy), whereas measures of patient activation have tended to focus more specifically on a particular health care domain.[63] The authors also suggest that patient activation is a subset of patient empowerment.

Patient empowerment vs. engagement. Both patient empowerment and patient engagement have been defined as having the capability and motivation to participate in one's own health care.[64,65] Both terms also have been defined as involving a behavioral component, although this is uncommon among definitions of patient empowerment. Instead, patient engagement is distinguished from patient empowerment by some level of active participation or involvement by the patient,[66] most notably emphasizing patient-provider interaction.[67] Higgins et al. (2017) focused on the conditions of personalization of intervention strategies for individual patient needs and therapeutic alliance (i.e., a connection with a health care provider) as critical components of patient engagement.[68] In contrast, patient empowerment is considered more generalized and internally patient-focused rather than tailored and externally patient/provider-focused.

Two possible relationships between patient empowerment and patient engagement also have been postulated.[69] One perspective identifies patient empowerment as a necessary precursor to patients' engaging in management of their own health. Through this lens, patient engagement can be viewed as the more general and broader concept, whereby patient activation, empowerment, participation, and involvement are seen as contributors of patient engagement.[70] The second perspective casts patient empowerment as the result of both patient enablement and patient engagement processes. From this standpoint, engaged patients may be motivated to take action but may not necessarily have the capability or power to meaningfully act on their health.[71] Rather than viewing patient engagement as the cause of patient empowerment, or vice versa, multiple researchers have suggested that it may be best to consider these concepts as recursive whereby empowerment (viewed as ability and motivation) can facilitate engagement (viewed as action), and engagement (active participation) can enhance a feeling of empowerment (self-confidence).[72,73,74]

Patient engagement vs. participation vs. involvement: Patient engagement, patient participation, and patient involvement are defined as involving some type of action or behavior on the part of the patient. One distinction among these terms characterizes patient participation and patient involvement as strictly focused on behaviors.[75] In contrast, patient engagement can be seen as a state (involving cognitive components) that manifests as behaviors (participation/involvement). Patient engagement can thus be viewed as the broader concept of action, with patient participation and patient involvement considered as the behavioral components. Patient involvement has been described as representing a range of activities, from patient information seeking to self-care.[76] In contrast, patient participation is distinguished by mutuality, involving interaction between patients and providers, including two-way communication and shared decision-making.

For the purposes of this environmental scan, we will use the term patient empowerment to refer to a patient’s ability and motivation to have an active role in their health and health care. We will use the term patient engagement to refer to the actions that patients take with respect to their health and health care.

IV.B. Approaches to Empowering Patients

A well-designed health care system fosters patient empowerment, provides patients with practical skills and knowledge to better manage their health and treatment, and engages patients in their care processes. Different patient, organizational, and societal level factors can influence the extent to which patients are empowered and engaged to make decisions about their health and treatment. This section summarizes these factors as well as different strategies that can be used to promote patient empowerment.

Empowering Patients to Make Informed Decisions about their Providers and Health Insurance Plans

One area in which patients can be empowered is regarding choices about their health care providers and health insurance plans. Patients desire the power to choose and change the clinician, care team, and health care organization from which they receive their care. Patients emphasize the importance of having the ability to choose from whom and where they receive their health care as they perceive this decision to directly influence their health care experiences.[77] Allowing patients to actively choose their providers—where they obtain information and make decisions based on that information—can encourage competition between providers and ultimately improve care quality while decreasing costs.[78]

There is an increasing amount of information, such as quality indicators, available to patients to allow them to compare and select their health care providers. For example, CMS offers an online tool that allows patients to search for and compare health care providers based on their health care needs.[79,80] As an additional source of information, patients may access Consumer Assessment of Healthcare Providers and Systems (CAHPS) measures to evaluate information on patient experience with their providers and health plans. However, many patients do not use this type of information when selecting a provider for different reasons, including but not limited to having only a short amount of time to select a provider, having difficulty finding the information they seek, distrust of the information, not being able to understand the information, and/or feeling overwhelmed by the extensive amount of information available.[81] As a result, patients may choose to go to their nearest provider or rely on their general practitioner to choose a specialist for them.[82] Research evidence shows that the most influential source of information patients use to select a health care provider is having a previous positive experience with the provider. Patients with greater levels of education and higher incomes, younger patients, and patients that do not have an existing relationship with a provider are more likely to seek information and make an active choice to select a provider.[83]

Patient choice is also reflected in patients’ ability to select a health insurance plan that meets their health needs. Selecting a plan is an important decision given that this choice will impact out-of-pocket costs and which providers a patient can see. Currently, there are many insurance plans to choose from and patients must consider variability in both the cost and quality of plans while also predicting their health care use and needs. Most commonly, patients focus on cost when selecting a health insurance plan, such as cost of plan premiums, deductibles, and out-of-pocket spending caps.[84]

The primary source available to patients to compare Medicare coverage options is the Medicare Plan Finder. The Medicare Plan Finder is an online decision support tool to support beneficiaries with comparing pricing, coverage options, and benefits between Original Medicare, Medicare prescription drug plans, Medicare Advantage (MA) plans, and Medigap policies.[85] Evidence suggests that beneficiaries experience challenges with navigating the website and understanding the information provided.[86] In addition, the tool may provide incomplete information needed to make comparisons between options, such as incomplete estimates of beneficiaries' costs under certain coverage options.[87]

Although information on health insurance plan quality is available to patients to support them with selecting a plan, some patients may not understand information on quality, potentially due to a general lack of understanding of the current health care context, and subsequently dismiss the information as unimportant.[88]

Many older adults use insurance companies and insurance brokers to guide their selection of an MA plan. Older adults often do not question the reliability of the information or the potential bias of the information received from insurance brokers.[89] A survey of people who enrolled in an individual market health plan either on or off the Health Insurance Marketplace showed that despite receiving more assistance from brokers, individuals who enrolled off Marketplace had more difficulty identifying the best or most affordable health plan compared with people who enrolled through the Marketplace.[90] Compared with on Marketplace enrollees, off Marketplace enrollees may face more plan choices and do not have access to online decision support tools (e.g., provider finder, prescription drug finder) that on Marketplace enrollees use to compare plans.[91] Further, many older adults are either unaware or not interested in using the CMS Plan Compare website, which assists individuals with selecting a Medicare plan by allowing them to compare different plans, and instead prefer to receive information about plan costs and benefits in-person (e.g., through seminars) or over the telephone.[92]

Additional research is needed to understand how patients make decisions about their clinicians and health insurance plans. This is a particularly important topic as evidence shows that the quality of patients' health care decisions decreases as complexity and the number of options available increase.[93]

Empowering Patients to Make Informed Decisions about their Health Conditions and Treatment

A second area of patient empowerment is patients' abilities to make decisions about their health and treatment. Patients commonly report that having information about their health condition and treatment options gives them a sense of responsibility and control over their lives, which can improve their level of engagement in their care and strengthen the patient-provider relationship.[94] Engaging a patient in clinical practice often involves promoting shared decision-making, where a patient and their clinician work together to make informed decisions about the patient's health and health care.[95]

The shared decision-making process includes several steps. First, patients are made aware that there is a decision to make and that choices are available to them.[96] Next, patients work with their clinicians to discuss detailed information about their options, including treatment risks and benefits, and to ensure their care is aligned with their preferences. Finally, patients are supported by their clinicians to make an informed decision about their care. Shared decision-making helps to ensure medical decisions align with patients' personal health goals and fulfills patients' wishes to feel that they are on the same team as their health care providers.[97,98]

Policy initiatives can help implement effective shared decision-making in clinical practice. Such initiatives should consider the nuances inherent in shared decision-making. For example, many measures that aim to quantify shared decision-making have an underlying assumption that medical decisions occur once in a single encounter. However, some medical decisions can evolve over time and occur with different clinicians, including decisions for patients with chronic conditions. In addition, measures that assess shared decision-making often do not account for the important role family members can play in the shared decision-making process.[99] Blumenthal-Barby et al. (2019) cited several recommendations policy makers can consider to implement shared decision-making in clinical practice. These recommendations included prioritizing the use of specific instruments to measure shared decision-making and identifying definitions of desired outcomes for shared decision-making.[100]

The following two sections discuss factors that influence patient empowerment and strategies to empower patients with respect to patients' making informed decisions about their health and treatment.

Factors Influencing Patient Empowerment in Making Decisions about their Health and Treatment

Patient, organizational, and societal level factors influence a patient's ability, motivation, and willingness to engage in their health and health care and to form partnerships with clinicians and other stakeholders. Patient factors that impact engagement include beliefs regarding the patient's role in their care, level of education, and health literacy.[101] For example, patients with minimal education and limited health and digital literacy (e.g., lack of computer skills, lack of experience using search bars) tend to have low uptake of their own personal health record—electronically stored health information accessed and managed directly by patients—and are less likely to understand their health data.[102,103,104] Studies have also shown that patients from rural or economically distressed communities, for example, are less likely to use their health data.[105] A patient's past experiences with the medical system can also influence their level of engagement, as those who have had negative medical experiences tend to have less trust in their providers and therefore may wish to be more involved in making decisions about their care.[106,107]

Organizational design and characteristics can influence the extent to which patients engage and partner with organizations, such as hospitals, physician practices, clinics, nursing homes, and accountable care organizations (ACOs). Organizational culture and existing policies and practices can impact how easy it is for patients to serve as active partners in their care.[108,109] To promote patient engagement and foster partnerships with patients, organizations can consider instituting open family presence policies (e.g., policies that allow families to visit 24 hours a day), conducting physician rounds at patients' bedsides, having nurses exchange their change of shift reports at patients' bedsides, adopting patient-centered discharge planning, and providing patients with access and the ability to edit their EMRs.[110,111] Despite the benefits, organizational leaders may be resistant to making such changes to policy and practice due to the potential costs and disruptions of doing so.[112]

Patients and organizations operate within a broader social context. Local, state, and national policies and programs can influence the extent to which patients engage in their health and health care and partner with health care organizations. For example, some states have mandates for hospitals to establish patient advisory councils to encourage patient participation in health care.[113] Policy makers can create avenues for patients to provide their input to inform public policy, such as through town hall meetings, public hearings, and public deliberation. Purchasers' regulations, benefit designs, and reimbursement mechanisms can also influence patient engagement in their health and health care.[114] For example, no or low copayments for office visits could impact the extent to which a patient seeks care.[115] Social and community norms, such as norms about patient and caregiver roles in health and health care, can also influence engagement.[116] For example, norms can impact a patient's perspective on their own ability to influence their health and contribute to policy making.

Strategies to Empower Patients to Make Decisions about their Health and Treatment

Different strategies can be used to empower patients and encourage them to actively participate in making decisions about their care. One strategy includes educating patients. Knowledge is a key element of patient empowerment as it allows patients to make informed decisions about their health and health care. Educating patients and providing them with resources about their health conditions and treatment options promotes patient empowerment and increases patient engagement.[117] In addition, giving patients access to their medical information, via patient portals, personal health records (PHRs), and/or mobile applications (apps), can provide patients with the information they need to make decisions, as they will be able to view their appointments, tests and treatments ordered, laboratory test results, immunizations, allergies, medications, and providers' notes, and communicate with their providers.

As mentioned previously, collaborative patient-clinician partnerships that leverage open communication and shared decision-making can promote a patient-centered approach that ensures the patient's health care needs, preferences, and goals are met. Shared decision-making can be facilitated through the use of patient-centered clinical decision support, which are digital tools that support the collaboration between patients and clinicians while they make informed decisions about the patient's health and treatment.[118] Such tools can provide patients with evidence-based findings and their health data to help them understand that a medical decision needs to be made. These tools can also help collect and integrate relevant information from collaborative discussions between clinicians and patients.[119] Given the impact that past medical experiences can have on patients' engagement in the health system, clinicians should work to build trust with patients to foster open communication and a collaborative environment.

Digital tools and health data are critical to empowering patients by supporting them in managing their care, facilitating communication with their clinician, and helping them to better comprehend their health conditions and treatment choices. The next section of this environmental scan focuses specifically on the use of digital tools and health data to empower patients.

V. The Use of Digital Tools to Empower Patients and Support Providers

Digital tools can help increase patient empowerment by providing patients with access to their health data, facilitating shared decision-making, and personalizing care. This section introduces the history of digital technology as it relates to patient empowerment and discusses the importance of data interoperability. This section also provides an overview of current digital health tools used by patients and providers across the care journey that can increase patient empowerment and support shared decision-making.

V.A. Background on Patient Empowerment and Digital Technology

Digital technology has been used in numerous ways over the past 40 years to help patients feel empowered to make decisions about their own health care.

Evolution of Health Information Technology

Digitizing Patient Health Information. The way in which patients' medical records have been created, accessed, and edited has evolved over time. The use of paper medical records became widespread between 1900 and 1920.[120] Paper records contained information about a patient's medical history and clinical data. These records were managed by a single clinician in a hospital, office, or clinic and were used to diagnose and treat patients. Although these records allowed for the organization and storage of patients' medical information, they came with challenges. Paper records lack standardization across different physicians and health care settings and have poor searchability.[121] In addition, paper records are accessible to only the clinicians within a single practice setting, challenging the coordination of care across providers in different settings.[122]

In the 1960s and 1970s, advancements in technology facilitated a shift from paper records to EMRs, or digital versions of paper medical records.[123] EMRs were used in academic medical centers as early as the 1980s.[124] EMRs were often considered incomplete, as few contained all of the same information as the paper chart.[125]

Use of EHRs began in the 1980s and 1990s as technology became more affordable and portable and the use of the internet became more widespread.[126] Similar to EMRs, EHRs contain a patient's health information (e.g., diagnosis, medications, immunizations) and the information is managed by providers. However, EHRs allow for the sharing of medical information between health care settings and are used, edited, and viewed by different entities involved in the patient's health care, such as primary care providers (PCPs), specialists, hospitals, insurance companies, and patients.[127] EHRs enable providers and other staff to enter, manage, and track patient information across multiple systems and communicate with other providers.[128] As of 2021, 88 percent of physician offices used an EHR.[129] Despite increased adoption of sending and obtaining health data electronically, many hospitals continue to face challenges with exchanging health data with organizations outside of their hospital system.[130]

Digital Health Tools. There has been an increased demand from patients to have access to their medical information.[131] Over the past 20 years, digital health tools have emerged to expand the resources and information that clinicians and patients can use to make informed decisions about a patient's health and treatment.[132]

Patient-facing digital health tools can include patient portals, mobile apps, and wearable health technology. These tools can use patient data (e.g., health history) to individualize the benefits and risks of a patient's treatment options and facilitate the collection of a patient's health goals and preferences. Portals provide patients with web-based access to their EHRs so that they can view their appointments, tests and treatments ordered, laboratory test results, immunizations, allergies, medications, and providers' notes. Patient portals also typically provide patients with a platform to communicate with their providers. Accessing the information in EHRs allows patients to be more informed and engaged in managing their own health care.

Another type of digital health tool includes clinical decision support, which are digital tools that support health care decision-making. Clinical decision support can facilitate the shared decision-making process by serving several functions, including notifying patients that there is a medical decision to be made, helping the patient understand the benefits and risks of their treatment options, and ensuring the decisions made align with the patient's health goals and preferences. These tools can be informed by other patient-facing tools, including apps and patient portals. Early clinical decision supports were primarily clinician-facing and designed to support the delivery of diagnostic and treatment guidance.[133] More recently, however, these tools have been developed to be clinician-facing, patient-facing, or both.

Starting in the 1990s and early 2000s, increased demand from patients to access their medical information has also led to the integration of health and lifestyle information into patients' PHRs.[134,135] PHRs can be linked to patients' EMRs and EHRs and include information from different sources, including information entered by patients and clinicians or information collected by digital health tools (discussed in more detail in the subsequent paragraph).[136] Promoting patient-centered care, patients can add medical and non-medical information to their personal record to allow their clinician to better understand their health goals and care preferences.[137] Because PHRs comprise the same kinds of information as EHRs but are managed by patients, PHRs allow patients to have a more active role in managing their health information.[138]

Mobile apps and wearable health technology allow patients to actively participate in their own health and health care. These tools provide patients with access to real-time data, such as blood glucose, heart rate, blood pressure, physical activity, and sleep, which can help to empower patients to actively monitor and manage their health conditions. For example, some tools allow patients to monitor their symptoms and determine whether they should seek medical care. Additional information about digital health tools is provided in Section V.B.

Artificial Intelligence (AI) and Emerging Technologies. AI is currently used to support different digital tools. For example, AI-based text outreach allows health care organizations to automatically contact and engage dormant patients to increase use of routine care.[139] There is an increasing role of AI to enhance and maximize the use of digital health tools. To support patients, personalized apps may be able to help patients better monitor their medical conditions by predicting symptoms and suggesting real-time interventions.[140] Patients may also be able to use chatbots or virtual assistants to receive answers to their medical questions.[141] To support providers, AI is expected to use patient data, such as information from monitoring devices, lifestyle factors, and genetics, to personalize medical treatment plans. In addition, smart implants and wearables may allow clinicians to remotely monitor patients in real time to provide better chronic disease management for patients. AI algorithms are also anticipated to support an earlier diagnosis of medical conditions and to minimize diagnostic errors. Although the use of AI in health care is an emerging field, caution has been raised around privacy, ethical considerations, and capacity to conduct clinical validation testing on results.[142,143]

Data Interoperability

Despite the wide adoption of electronic health information, exchanging this information outside of an organization's hospital system or between different EHR vendors has been difficult. Health care data typically have multiple sources and use different formats and many health care organizations use different software and systems that do not communicate with each other. As a result, different health care organizations face challenges with exchanging health data with each other while maintaining its usability.[144] Data interoperability refers to the capability of different information systems from different organizations to access, exchange, integrate, and use data in a harmonized way.[145]

Data interoperability can support clinicians in delivering high quality care by allowing them to view patients' complete medical histories, including results from tests performed at different provider organizations.[146] Interoperability allows patients and their caregivers to access the patient's electronic medical data.[147]

Different strategies have been implemented to improve data infrastructure and interoperability. Regulatory and policy initiatives were established to improve patients' access to their health data, promote data interoperability, and incentivize efforts to enhance interoperability. **Exhibit 2** outlines key initiatives.

Exhibit 2. Regulations and Initiatives Related to Data Interoperability

Regulation/Initiative	Description
Medicare and Medicaid EHR Incentive Programs (2011)	• Provided eligible clinicians, hospitals, and critical access hospitals (CAHs) with financial incentives for meeting program requirements for adopting, implementing, and upgrading EHR technology.[148] • Eligible providers could receive up to $44,000 across five years. • Additional incentives were given to organizations providing services in Health Professional Shortage Areas (HPSAs).[149]
Office of the National Coordinator for Health Information Technology (ONC) 21st Century Cures Act (2016)	• Requires health care providers to give patients timely, free, and full electronic access to their test results, medication lists, referrals, and clinical notes. • Provides guidelines for when it is permitted for physicians to block the immediate release of medical results, such as when physicians deem the release could harm the patient or others.[150] • Requires the use of Application Programming Interfaces (APIs), which are a set of rules that enable medical data exchange between different systems.
Medicare and Medicaid Promoting Interoperability Programs (2018)	• Replaced the Medicare and Medicaid EHR Incentive Programs. • Placed greater emphasis on promoting interoperability and improving patients' access to their health information.[151]
CMS Interoperability and Patient Access Final Rule (2020)	• Aims to advance interoperability and require payers to build APIs that allow secure data exchange among payers, providers, and patients.[152] • Applies to MA providers, CHIP providers, and Qualified Health Plan (QHPs) participating in federally-facilitated exchanges.
Medicare Promoting Interoperability Program for eligible hospitals and CAHs (2022)	• Establishes policy requirements for acute care and long-term care hospitals to receive a designation of a certified EHR technology user (CEHRT) and avoid downward Medicare payment adjustments.[153]

Challenges and Opportunities. Health care organizations, payers, patients, federal partners, EHR developers, and other organizations face challenges with data interoperability. These challenges are related to the lack of standardization for data formats and sharing, the resources and costs required to implement new systems, potential issues regarding patients obtaining immediate access to some types of medical data, and patient privacy and confidentiality concerns.[154,155,156]

Lack of Standardization. One challenge with interoperability is the lack of standardization in health care data. Health care data typically involve multiple sources and different formats. EHR vendors use different proprietary software that do not communicate with each other, which can create data silos. In addition, nearly half of hospitals (48 percent) experience one-sided data sharing practices whereby they share patient data with other providers but do not receive patient data in return.[157] Despite the majority of hospitals adopting electronic methods to send health information outside of their hospital system, in 2021, over two-thirds (69 percent) of hospitals continued to also use non-electronic methods, including mail and fax, to send records outside of the hospital system.[158] To help address this challenge and allow seamless data sharing across different organizations, the U.S. has adopted a national standard for how health care data are exchanged between systems, called Health Level 7 (HL7) Fast Healthcare Interoperability Resources (FHIR). This standard provides a uniform method for organizations to exchange health information across multiple diverse software systems. However, adoption of this standard continues to vary across health care organizations.

Because EHR vendors use their own proprietary software that often do not communicate with software from other EHR vendors, patients who receive care from different health systems can be challenged with having to access and navigate multiple different patient portals to view their medical information. An online 29-state survey polling older adults who had at least one chronic disease revealed that a total of 38 different types of patient portals were accessed across all respondents. Half of the older adults (51 percent) had two or more patient portal accounts, and some older adults reported having up to six different patient portal accounts.[159] To address this issue, some software companies pull patients' health records from multiple different organizations into one place so that patients can view their health records in a single patient portal.[160] However, this service is only available to patients who receive care from participating health care organizations.

CMS launched Blue Button 2.0 to simplify health data access and sharing for Medicare beneficiaries. The program empowers patients by providing them with a secure, universal, electronic way to access and share their health information, prescriptions, treatments, and procedures with providers.[161,162] There are many Medicare-approved apps available that allow beneficiaries to view their health information (e.g., medications, lab results) in one place and share the information with their providers.[163]

Resources and Cost Demands. Substantial resource and cost demands present another challenge to enhancing interoperability. Many health care organizations and hospitals have difficulty taking on the costs and resources required to adopt modern interoperable systems.[164] Some incentive programs aim to support organizations that adopt and implement modern systems. For example, as described in Exhibit 2, CMS launched programs to provide financial incentives to eligible clinicians and hospitals for meeting program requirements for adopting, implementing, and upgrading EHR technology.[165]

Issues with Real Time Access to Data. Some providers cite concerns with allowing patients to have instant access to some types of health information. Test results, including pathology reports and imaging results, are often shared with patients as soon as the results are available. Consequently, it is possible for patients to learn about their results directly from their patient portal rather than during an interaction with their clinician.[166] Because many patients do not have the clinical knowledge to interpret medical test results on their own, physicians have expressed concerns that real-time access to test results might lead patients to misunderstand the information and experience anxiety and fear.[167] One single-site study assessed the change in unsolicited patient complaints received before and after the 21st Century Cures Act that required automatic release of diagnostic and testing results available for patient access through patient portals. While there was no statistically significant difference identified in the number of complaints filed, the topics of the complaints were more often related to misunderstanding results provided to the patient before the physician could review them with the patient[168] Although timely access to health information has generally been met with positive feedback from patients,[169] additional research is needed to understand patients' perceptions and experiences with having real-time access to certain types of health information.

Patient Privacy and Confidentiality Concerns. Another challenge is related to documenting and electronically sharing confidential and sensitive information with providers and caregivers, since sharing health information can raise privacy and legal concerns.[170] For example, some clinicians are hesitant to provide caregivers with access to patients' health records because doing so could negatively impact patients' privacy (for example, a caregiver learning of conditions that are often stigmatized or having access to medical bill information).[171, 172] Further, patients report concerns about unauthorized access to their health records and concerns about the use of health data for profit and exploitation.[173] Patients also report concerns about the misuse of health information by government agencies, third parties, and/or insurance companies that could deny health coverage.[174,175] Some exceptions exist for sharing sensitive information electronically; clinicians can hide certain notes from nonessential providers if hiding the note will reduce the risk of harm to the patient. For example, internal medicine providers may be blocked from viewing a patient's mental health records.[176] To help protect patient confidentiality and address privacy concerns, different tools have been developed that give patients more control over sharing their health data, including control over which specific types of health data they share, with whom they share the data (e.g., health care organizations, individuals), and for what purpose they share the data (e.g., treatment, payment, research).[177]

V.B. Digital Tools to Empower Patients and Support Providers

As outlined in Section V.A, digital tools, including mobile apps, patient portals, and wearable technology, have evolved with advancements in technology. These tools can facilitate shared decision-making and promote patient-centered care. This section outlines the current landscape of digital tools, summarizes how digital tools support shared decision-making, and presents limited but promising evidence on the effectiveness of digital tools to increase patient empowerment.

The number of digital health tools on the market has rapidly grown to 337,000.[178] These tools serve different purposes, such as to diagnose or treat health conditions, remotely monitor patients, and promote wellness, and are designed to be patient-facing or provider-facing.[179] To support a shared understanding of the different types of digital tools, the Digital Therapeutics Alliance and Health Advances developed a digital health technology categorization that classifies digital tools into eight categories.[180] This classification serves as a framework in this section for presenting the types of digital health tools that exist and where in the patient health care journey each type of digital health tool applies (see Exhibit 3).[iv]

[iv] The authors also included industry and hospital administration-facing classifications that are focused on non-health system software and operational software, such as data aggregation and analytics for payers and population health technology for employers. The scope presented in this environmental scan is limited to classifications of digital health tools related to the patient health care journey.

Exhibit 3. Classification of Digital Health Tools Used Throughout the Patient Care Journey

Digital Health Tool Category	Category Definition	Patient Care Journey	Types of Digital Health Tools
Health & Wellness	Disease-agnostic solutions that capture, store, and sometimes transmit health data and promote general wellbeing and healthy living	Preventive Health/ Self-Care	• Non-clinical, wellness-based apps (breathwork, meditation) • Wearables (smartwatches, accelerometers, odometers) • Virtual reality fitness games
Health System Clinical Software (A)	Enterprise health IT and digital health solutions intended to provide clinicians with support managing their patient populations	Diagnosis	• Clinical documentation and imaging (PHRs, EMRs, EHRs, patient portals) • Physician clinical decision support (CDS) tools (care plans, software that proactively alerts for clinical decisions based on new data points) • Communication supports (workflow supports, communication alerts) • Telehealth platforms
Digital Diagnostics	Validated digital tools for detecting and characterizing disease, measuring disease status, response, progress, or recurrence	Diagnosis	• Algorithmic analysis of data (test results, biometric data) • Predictive modeling (diagnostic to predict rate of disability advancement)
Care Support	Solutions intended to support patient self-management of a specific diagnosed medical condition through education, recommendations, and reminders	Treatment (self-care)	• Disease-specific apps for patient self-management (medication trackers) • Patient CDS tools (educational resource mobile apps) • Patient decision aids (PDAs) embedded in care tools • Digital care (virtual reality-based physical rehab, pain management, and behavioral therapy apps)
Digital Therapeutics	Health software intended to treat or alleviate a disease by generating and delivering a medical intervention that has a demonstrable positive therapeutic impact	Treatment (clinical care)	• Immediate feedback on biometrics using a connected device (breathing pattern recognition connected devices) • Sensory stimuli to target neural activity using a connected device • Clinically validated digital behavioral therapy
Patient Monitoring	Solutions intended to monitor specific patient health data that may be used to inform management of a specific disease, condition, or health outcome	Monitoring	• Physiologic monitoring (glucose monitoring devices, blood pressure cuffs, other wearable devices) • Patient-reported outcomes monitoring (cancer symptom tracker mobile app) • Remote patient monitoring (RPM) and other data monitoring that report use/results to the provider (inhalers with built-in sensors that track use)

Digital Health Tool Category	Category Definition	Patient Care Journey	Types of Digital Health Tools
Health System Clinical Software (B)	Enterprise health IT and digital health solutions intended to provide clinicians with support managing their patient populations	Monitoring	• Clinical documentation and imaging (PHR, EMR, EHRs, patient portals) • Physician clinical decision support (CDS) tools (care plans, software that proactively alerts for clinical decisions based on new data points) • Communication supports (workflow supports, communication alerts) • Telehealth platforms

Notes: Category definitions presented in this table are verbatim from the cited source. The framework presented in this table is adapted from the Digital Therapeutic Alliance (DTA)'s and Health Advances Classification of Digital Health Technologies report, 2023: https://dtxalliance.org/wp-content/uploads/2023/06/Guidance-to-Industry-Classification-of-Digital-Health-Technologies-2023Jun05.pdf.

Patient vs. Provider-Facing Digital Health Tools. As depicted in Exhibit 3, various digital tools are available for patients and providers to use across the patient care journey. These tools can be provider-facing or patient-facing, and some patient-facing tools can include features that are usable by providers. Health system clinical software tools are provider-facing and are typically used by health care providers, health systems, hospital administrations, and other non-patient stakeholders to aid in the delivery of clinical care, including during the diagnostic and monitoring phases of the patient care journey. However, these tools can also include telehealth platforms, where providers can virtually communicate and deliver health services to patients. These platforms can be particularly useful to reach patients who have historically faced challenges accessing health care facilities, such as patients who live in rural areas.[181,182,183] In contrast, health and wellness, patient monitoring, care support, digital diagnostics, and digital therapeutics are primarily patient-facing digital tools; however, these tools also may incorporate features that are provider-facing and promote shared decision-making (e.g., patients monitor their blood glucose levels through a device where the data is being reported to the provider).

Regulation of Digital Health Tools. Patient-facing tools differ in the extent to which they impact clinical outcomes. Tools that impact clinical outcomes are typically regulated, and tools that do not impact clinical outcomes are not typically regulated. Digital therapeutics have the greatest impact on clinical management whereas health and wellness tools have the least impact on clinical management. The different patient-facing tools make different marketing claims regarding their intended use and benefits, such as their impact on outcomes or other measures. These claims impact the extent to which the tools are regulated to ensure they are safe and effective. Digital diagnostics tools diagnose diseases and medical conditions, and digital therapeutics tools treat diseases and medical conditions. As a result, these tools make clinical claims, such as to diagnose, assess, treat, and/or improve a specific disease or health condition, and are therefore regulated. These tools are intended to provide patient care and are typically reimbursed by payers or health systems.[184]

Patient monitoring and care support tools may not make any clinical claims or may make non-clinical claims, such as to assess patient data or improve health-adjacent measures (e.g., monitor blood pressure, improve medication adherence). These tools are often used to provide patient care, can be reimbursed by payers or health systems, and may require regulatory approval and labeling (if non-clinical claims are made).

Health and wellness tools seek to promote patient wellness or enhance patient experience by providing patients with information that can support their decision to seek medical advice. However, these tools do not deliver medical diagnoses or interventions and do not make any claims about diagnosing, treating, or improving health conditions. As a result, health and wellness tools do not have any regulatory oversight, which has allowed these tools to develop rapidly and offer free or low-cost services.[185] The majority of health and wellness apps track and encourage healthy eating, exercise, and weight loss.[186] In 2024, 26 percent of apps were focused on exercise and fitness.[187]

The number of digital health apps declined by 4 percent between 2021 and 2024. In 2024, 337,000 apps were available. This decline was due in part to app stores being more proactive about removing low-quality health apps and those that are not updated by their developers.[188] Despite an overall decline in the number of apps available, the development of disease-specific apps continues to grow, including those that support mental health and people with diabetes and cardiovascular diseases.[189] In 2024, 26 percent of apps were focused on disease management.[190]

Digital Tools Promote Shared Decision-Making

As described in Section IV.B., shared decision-making is a model of care that fosters collaboration between a patient and their clinician to make an informed decision about the patient’s care that considers the patient’s health goals, preferences, and values.[191, 192] Digital health tools, particularly care support and patient monitoring tools, can facilitate shared decision-making across the patient care journey by empowering patients with health knowledge to enable them to make informed decisions about their health and treatment and by fostering patient-provider partnerships.[193] Although patient-facing digital tools are designed to be used by patients and include patient-facing features (e.g., medication or appointment reminders, wearables), many of these tools also include features that are provider-facing.[194] For example, a tool that collects a patient’s health data could share the data with the patient’s clinician so the clinician can use the data to identify and present potential treatment options to the patient. This exchange of health information between patients and providers can facilitate patient-provider partnerships and engage patients in making informed decisions with their providers that align with the patient’s health goals.[195]

Care support tools. Care support tools help patients with self-managing their diseases or health conditions through clinical education, recommendations, and reminders. One way these tools support shared decision-making is by facilitating patient-provider connections. For example, some care support apps analyze patient data, such as physiologic data, patient-reported outcomes, and medication utilization data, to aid in disease management and may also trigger virtual connections between patients and health care professionals in real-time.[196]

Care support tools also provide patients with educational content that can support shared decision-making. For example, decision aids promote patient education throughout the care journey. These tools can identify possible treatment and/or disease management recommendations, explain patient options, describe the advantages and potential harms associated with each option, and help the patient determine what is most important to them.[197] Educational material can be provided using short videos, tutorials, and animations that walk patients through steps to explore potential recommendations regarding treatment and disease management.[198] A review of existing patient decision aids identified 71 different care decisions (e.g., decisions about cardiovascular treatment or cancer treatment) with developed decision aids.[199] These decision aids increased patients' knowledge of their health conditions, improved their understanding of the risks involved in their treatment options, and decreased decisional conflict patients could experience if they did not feel informed.[200] Key to shared decision-making, decision aids help patients feel more informed about their care, have a better understanding of what matters most to them, and can more actively participate in conversations with their providers.[201] Despite their benefits, decision aids to support patients with shared decision-making are not consistently available across U.S. physician practices.[202] One challenge with using decision aids is ensuring that the information stays current with new treatment alternatives and guidelines.[203]

Patient monitoring. Patient monitoring tools also support shared decision-making. These tools collect and monitor health data, such as patient-reported outcomes or biometrics related to specific disease states, which can be used by patients and clinicians to inform decisions related to the clinical management of diseases or health conditions.

One type of patient monitoring tool is remote patient monitoring (RPM), which allows providers to receive information from patient digital tools to track patient progress.[204] There are a variety of tools that can monitor patient data, including smartwatches, pacemakers, inhaler sensors, and blood pressure monitors. Data from these tools can be reported directly by the patient, such as through a connected wearable device or manually entered by the patient via a patient portal. Information collected via RPM can be used by both patients and clinicians to make informed decisions about a patient's health and treatment. A systematic review that assessed health care practitioners' perspectives on the use of RPM tools showed that physicians perceive RPM as an effective method to improve patient education, confidence, and communication.[205]

Effectiveness of Digital Tools on Improving Clinical Outcomes and Patient Empowerment

There is limited but promising evidence showing the effectiveness of digital health tools on improving clinical outcomes and increasing patient empowerment. For example, one study focused on the impact that digital tools have on improving hypertension control.[206] Patients enrolled in a home-based digital medicine blood pressure program completed online questionnaires, submitted blood pressure readings, and received medication management and lifestyle recommendations from a clinical pharmacist and health coach, respectively. A larger proportion of patients in the program obtained the target blood pressure control compared with the patients who received usual care. In addition, the digital health monitoring program increased patient activation scores.[207] Different types of digital interventions, such as short message services, telephone support, mobile apps, videoconferencing systems, telemonitoring, and wearables, have been found to support the management of cardiovascular diseases, such as heart failure and stroke.[208] Evidence has been mixed regarding the effectiveness of mobile health and wellness apps on increasing individuals' adoption of healthy behaviors, such as physical activity. For example, meta-analytic evidence indicates that exercise apps have either no impact or only a moderate impact on increasing users' physical activity.[209,210]

Digital tools can also promote patient empowerment. One type of digital tool, decision aids, can help empower patients by giving them the knowledge they need to make informed medical decisions. One systematic review assessed decision aids that promote shared decision-making and found that nearly all decision tools improved patients' knowledge and awareness of their treatment options.[211] Some decision aids also were found to improve documentation, clinical decisions, and treatments.[212]

Digital tools can also encourage patient-centered care and patient empowerment in the treatment of chronic health and mental health conditions. Some pharmacological treatments for chronic conditions can incorporate self-care practices through the use of digital tools.[213] For example, patients can use digital tools designed to promote self-care and self-management of their symptoms. Apps that guide patients through breathing exercises or mindfulness and meditation can help to reduce depressive symptoms. Combining the use of digital tools with pharmacotherapies for chronic illnesses can help to tailor patients' care by incorporating personalized self-care practices.[214]

Although these limited positive findings are encouraging, more research is needed to understand the association between using digital health tools, clinical outcomes, and patient empowerment.

VI. Patient Empowerment and Value-Based Care

A pillar of value-based care is to actively empower patients in care decisions and improve patients' overall health care experience.[215] This section highlights value-based care arrangements used in CMS Innovation Center models to increase patient engagement and empowerment. It also provides an example of a Veterans Health Administration program that used the medical home model to promote patient empowerment.

The Accountable Health Communities (AHC**)** Model (2017-2023) created an opportunity for community-based organizations, hospitals, and health care practices to provide beneficiaries with screening, referral services, and community navigation services to identify and address HRSNs. Beneficiaries were able to provide feedback to the community-based organizations on the screening, referral services, and community navigation services to facilitate improvements and give patients the opportunity to be heard and contribute to the design and delivery of model services.

The Innovation in Behavioral Health (IBH) Model (2025-present) provides Medicare and Medicaid beneficiaries who have moderate to severe mental health conditions and substance use disorders with coordinated care that focuses on their physical and behavioral health care needs and HRSNs. The model uses a person-centered approach to actively engage patients in both their behavioral and physical health care. It also provides patient self-management support and allows for use of upfront funds for patient engagement IT solutions (e.g., adoption of patient portals).[216]

The Medicare Diabetes Prevention Program (MDPP) Expanded Model (2018 – present) participants (e.g., health organizations, hospitals, community organizations) aim to prevent type 2 diabetes in patients with signs of pre-diabetes. Beneficiaries attend a year-long Centers for Disease Control and Prevention (CDC)-approved training program focused on promoting dietary changes, physical activity, and healthy lifestyle habits. The program aims to empower patients to manage their own health. [217] Participants also can offer engagement incentives that are preventive-care related or aimed at progressing beneficiaries' clinical goals by involving beneficiaries in managing their health.[218]

The Transforming Maternal Health (TMaH) Model (2025 – present) provides female Medicaid and CHIP enrollees with pregnancy, childbirth, and postpartum care that encompasses their physical, mental health, and social care needs. The model promotes a person-centered approach and actively listening to patients so they can better control their birth experience.[219]

Medical home models that leverage interdisciplinary primary care teams also promote patient empowerment. For example, the Veterans Health Administration began the Patient-Aligned Care Team (PACT) in 2010. PACT used the medical home model to provide veterans with coordinated, comprehensive, patient-driven, team-based health care. The model considered the patient a member of the primary care team and emphasized the importance of considering patients' treatment goals. One research study identified different organizational and contextual factors that were related to the use of patient engagement practices within the PACT model.[220] Findings showed that primary care teams that were fully staffed, had clear roles and responsibilities, participated in recurring team meetings to facilitate performance improvement, and had effective leadership that supported PACT were more likely to adopt patient engagement care practices, such as planning and goal setting with the patient; providing motivational interviewing (e.g., motivating patients to commit to healthy behaviors); and promoting patient self-management.[221]

Patient engagement and empowerment strategies included in the design of CMS Innovation Center models will increase as the Innovation Center is currently expanding existing models and designing new models that focus on empowering patients to achieve their health goals.[222]

VII. Relevant Features in Previously Submitted Proposals

This section summarizes findings from an analysis of components in previously submitted PTAC proposals that are relevant to patient choice and health IT. Among the 35 proposals that were submitted to PTAC between 2016 and 2020, including 28 proposals that PTAC has deliberated and voted on during public meetings, nearly all of the proposals address patient choice and health IT. The goal of the criterion on "Patient Choice" is to "encourage greater attention to the health of the population served while also supporting the unique needs and preferences of individual patients," and the goal of the criterion on "Health Information Technology" is to "encourage use of health information technology to inform care." Committee members found that, of the 28 proposals deliberated on, 25 of these proposals met Criterion 8 (Patient Choice) and 22 proposals met Criterion 10 (Health IT). Seven proposals were selected for this environmental scan: four proposals describe specific strategies to support patient choice (**Exhibit 4**), and three proposals describe innovative approaches to health IT that promote data standardization, interoperability, and transparency (**Exhibit 5**).

Exhibit 4. PTAC Proposals That Describe Specific Strategies to Support Patient Choice

Proposal	Clinical Focus	Value-Based Care Components
American Academy of Hospice and Palliative Medicine (AAHPM) *(Provider association/specialty society)* Patient and Caregiver Support for Serious Illness (PACSSI) Recommended for limited-scale testing, 3/26/2018	**Clinical Focus:** Serious illness and palliative care	**Overall Model Design Features:** PACSSI proposes palliative care medical home services for high-need patients not yet eligible or not wanting hospice care. **Specific Strategies to Support Patient Choice:** Palliative care teams (PCTs) would conduct several patient assessments (e.g., physical, social, cultural), identify patient goals, and develop coordinated care plans that include patient preferences in accordance with their identified goals. Further, PCTs would provide care to patients in their preferred settings (e.g., home).

Proposal	Clinical Focus	Value-Based Care Components
Johns Hopkins School of Nursing and the Stanford Clinical Excellence Research Center (Hopkins/Stanford) *(Academic institution)* CAPABLE Provider Focused Model Recommended for testing as specified in PTAC comments, 9/6/19	**Clinical Focus:** Chronic conditions and functional limitations	**Overall Model Design Features:** A time-limited intervention performed by an interdisciplinary team to target specific functional goals, perform limited home repairs and modifications, and address common geriatric concerns. **Specific Strategies to Support Patient Choice:** Hopkins/Stanford proposes to identify patient goals, specifically goals for patients to reside at home in a safe capacity and with choice (e.g., patient sleeping on the second floor in their bed versus on the first floor on a couch).
Icahn School of Medicine at Mount Sinai (Mount Sinai) (*Academic institution*) "HaH-Plus" (Hospital at Home-Plus): Provider-Focused Payment Model Recommended for implementation, 9/17/2017	**Clinical Focus**: Inpatient services in the home setting	**Overall Model Design Features:** Multidisciplinary care around an acute care event to reduce complications and readmissions. **Specific Strategies to Support Patient Choice:** The proposal specifies that it would accommodate patient preferences, needs, and conditions.
Personalized Recovery Care (PRC) (*Regional/local single specialty practice*) Home Hospitalization: An Alternative Payment Model for Delivering Acute Care in the Home Recommended for implementation, 3/26/2018	**Clinical Focus**: Inpatient services in the home setting or skilled nursing facility	**Overall Model Design Features:** This is a home hospitalization care model that proposes to provide inpatient hospitalization-level care and personalized recovery care (PRC) at home or a skilled nursing facility for patients with certain conditions through an episodic payment arrangement. **Specific Strategies to Support Patient Choice:** It would provide a choice for the ill patient to receive care at home as opposed to receiving care in the hospital, and would accommodate different patient characteristics and conditions.

Exhibit 5. PTAC Proposals That Describe Innovative Health Information Technology (IT) Approaches

Proposal	Clinical Focus	Value-Based Care Components
Hackensack Meridian Health and Cota, Inc. (HMH/Cota) *(Regional/local multispecialty practice or health system; Device/ technology company)* Oncology Bundled Payment Program Using CNA-Guided Care Recommended for limited-scale testing, 9/8/2017	**Clinical Focus:** Oncology	**Overall Model Design Features:** This is an oncology bundled payment model in which care choices are modulated by the prior outcomes of similar patients from real-world data. This process is called Cota Nodal Address (CNA) guided care. **Innovative Health IT Approaches:** HMH/Cota will ensure interoperability and standardization of EHRs by using one data system (Epic) across all providers. Further, HMH/Cota created a database to provide monthly cost of care and quality measure reports and also has developed an innovative telemedicine program to improve communication between the patient and provider.

Proposal	Clinical Focus	Value-Based Care Components
Innovative Oncology Business Solutions, Inc. **(IOBS)** *(For-profit corporation)* Making Accountable Sustainable Oncology Networks (MASON) Referred for further development and Implementation, 12/10/2018	**Clinical Focus**: Oncology	**Overall Model Design Features**: Builds off the Community Oncology Medical Home (COME HOME) Innovation Center project. **Innovative Health IT Approaches:** All participants need to have advanced knowledge and use of EHRs as this would be necessary to create and update the oncology payment categories (OPCs); IOBS will also create dashboards to facilitate trusted decision support. The proposal also expresses the importance of data transparency and being able to access all data for a given patient.
The University of New Mexico Health Sciences Center (UNMHSC) (*Academic institution*) ACCESS Telemedicine: An Alternative Healthcare Delivery Model for Rural Emergencies Recommended for implementation, 9/16/2019	**Clinical Focus**: Cerebral emergency care; telemedicine	**Overall Model Design Features**: Rural EDs can consult neurologists via teleconsultation and assess patients' condition when they present at the hospital ED. The model aims to reduce costs in hospital transfers and ambulatory medicine. **Innovative Health IT Approaches:** UNMHSC uses telemedicine delivery technology by Net Medical Express (NMXS), and all participants/sites use the same technology ensuring consistency. UNMHSC will remain flexible to expansion in technology, such as phones or tablets. The proposal mentions that interoperability between the patient EHR and the remote neurologist could improve this model, but it is not a requirement.

Appendix B includes additional information about the relevant components of the seven selected proposals.

VIII. Areas Where Additional Information is Needed

This section includes a summary of some areas for consideration to guide future research on using data and health IT to transparently empower consumers and support providers. **Appendix D** further describes areas for future exploration and research.

Patient Empowerment and Health Outcomes

There has been limited research focused on the associations between patient empowerment, health outcomes, and patient experience. Additional research is needed to better understand the relationship between patient empowerment and improved clinical outcomes.

Empowering Patients to Make Informed Decisions about their Providers and Health Insurance Plans

Additional research is needed to understand how patients make decisions about their health care. This is a particularly important topic as evidence shows that the quality of patients' health care decisions decreases as complexity and the number of options available increase.[223]

Effectiveness of Digital Tools on Clinical Outcomes and Patient Empowerment

There has been limited research showing that the use of digital tools is associated, or leads to, positive clinical outcomes and increased patient empowerment. More research is needed to understand the association between using digital health tools, clinical outcomes, and patient empowerment.

Appendix A. Research Questions by Environmental Scan Section

Section	Research Questions
Section IV. Background on Patient Enablement, Empowerment, and Engagement	• What information do patients need to support their involvement in decisions affecting their health (e.g., providers, treatment options, care management, insurance navigation)? • What are approaches to enable patients to make independent care decisions? • What is the evidence on the relationship between health outcomes and patient engagement and empowerment? • What approaches to patient empowerment address the needs of a broad range of patients and how do these differ from approaches most effective for patients with chronic conditions?
Section V. Data Infrastructure Challenges and Opportunities	• What is the current state of IT and EHR support for patient empowerment? • What are solutions to improving patient data standardization, transparency, and access? • How can electronic health record vendors work together to improve data interoperability? • How can data infrastructure be improved to ensure the availability of patient data? • What funding mechanisms can be used to promote improvements in patient data?
Section VI. The Scope and Impact of Patient Empowerment and Provider Support Tools	• How can digital technology be used to provide information to and empower patients? • How can patients be empowered to: ○ better understand the health care data they can access through tools such as patient portals? ○ make decisions regarding their health? • What is the impact of the use of patient digital tools on patient quality, outcomes, and TCOC? • What are effective approaches for using patient navigators to support patients in managing their health care? • What are best practices for encouraging shared decision-making between clinicians and patients? • What is or can be the role of AI in patient digital tools? • How can providers help to engage patients and promote patient empowerment? • What are innovative patient empowerment techniques (e.g., shared decision-making, open communication, patient education, patient activation) used by care delivery teams?
Section VII. Overview of the Integration of Patient Engagement Strategies Within Value-Based Care Models	• What are current patient engagement strategies within value-based care?

Appendix B. Summary of Relevant Components for Selected Proposals Reviewed by PTAC that Focus on Patient Choice or Health Information Technology

Overview of Methodology Used to Review the Proposals

The following information was reviewed for each submitter's proposal, where available: proposal and related documents, PRT report, and report to the Secretary (RTS). Information found in these materials was used to summarize the proposals' main design features, including financial methodology, how payment is adjusted for performance, specific strategies to support patient choice (Exhibit B1), and innovative health IT approaches (Exhibit B2).

Among the 35 proposals that were submitted to PTAC between 2016 and 2020, including 28 proposals that PTAC has deliberated and voted on during public meetings, nearly all of the proposals address patient choice and health IT. The goal of the criterion on "Patient Choice" is to "encourage greater attention to the health of the population served while also supporting the unique needs and preferences of individual patients," and the goal of the criterion on "Health Information Technology" is to "encourage use of health information technology to inform care." Committee members found that, of the 28 proposals deliberated on, 25 of these proposals met Criterion 8 (Patient Choice) and 22 proposals met Criterion 10 (Health IT). Seven proposals were selected for analysis: four proposals describe specific strategies to support patient choice, and three proposals describe innovative approaches to health IT that promote data standardization, interoperability, and transparency.

Findings from the review of these seven proposals are summarized in the following tables.

Exhibit B1. Key Value-Based Care Components of Selected PTAC PFPM Proposals That Describe Specific Strategies to Support Patient Choice

Proposal	Clinical Focus, Providers, Setting, Patient Population	Value-Based Care Components
American Academy of Hospice and Palliative Medicine (AAHPM) *(Provider association/specialty society)* Patient and Caregiver Support for Serious Illness (PACSSI) Recommended for limited-scale testing, 3/26/2018	**Clinical Focus:** Serious illness and palliative care **Providers:** Palliative care teams (PCT) **Setting:** Inpatient; outpatient; other palliative care settings **Patient Population:** Patients with serious illness	**Overall Model Design Features:** PACSSI proposes palliative care medical home services for high-need patients not yet eligible or not wanting hospice care. **Financial Methodology:** Monthly care management payments adjusted based on geographic location and site of care. There are two tracks: Track 1 – payment incentives and Track 2 – shared savings and shared risk. **How Payment is Adjusted for Performance:** Payments would be adjusted based on performance on quality and spending. **Specific Strategies to Support Patient Choice:** PCTs would conduct several patient assessments (e.g., physical, social, cultural), identify patient goals, and develop coordinated care plans that include patient preferences in accordance with their identified goals. Further, PCTs would provide care to patients in their preferred settings (e.g., home).
Johns Hopkins School of Nursing and the Stanford Clinical Excellence Research Center (Hopkins/Stanford) *(Academic institution)* CAPABLE Provider Focused Model Recommended for testing as specified in PTAC comments, 9/6/19	**Clinical Focus:** Chronic conditions and functional limitations **Providers:** Interdisciplinary team of an occupational therapist, registered nurses, and a handy worker **Setting:** Home and community-based settings **Patient Population:** Medicare FFS beneficiaries with at least two chronic conditions and difficulty with at least one activity of daily living	**Overall Model Design Features:** A time-limited intervention performed by an interdisciplinary team to target specific functional goals, perform limited home repairs and modifications, and address common geriatric concerns. **Financial Methodology:** Partial bundled payment with partial upside, moving toward a fully capitated model of care. **How Payment is Adjusted for Performance:** A bonus for meeting quality metrics would be awarded. **Specific Strategies to Support Patient Choice:** Hopkins/Stanford proposes to identify patient goals, specifically goals for patients to reside at home in a safe capacity and with choice (e.g., patient sleeping on the second floor in their bed versus on the first floor on a couch).

Proposal	Clinical Focus, Providers, Setting, Patient Population	Value-Based Care Components
Icahn School of Medicine at Mount Sinai (Mount Sinai) (*Academic institution*) "HaH-Plus" (Hospital at Home-Plus): Provider-Focused Payment Model Recommended for implementation, 9/17/2017	**Clinical Focus**: Inpatient services in the home setting **Providers**: Physicians and HaH-Plus providers, including nurse practitioners, registered nurses, social workers, physical, occupational, and speech therapists **Setting**: Patient homes **Patient Population**: Medicare FFS beneficiaries who have one of the 44 acute conditions	**Overall Model Design Features:** Multidisciplinary care around an acute care event to reduce complications and readmissions. **Financial Methodology**: Bundle payment covering the acute episode and an additional 30 days of transition services. Two components are in the payment model: 1) a new diagnosis-related group (DRG)-like HaH-Plus payment to substitute for the acute inpatient payment to the hospital and attending physician, and 2) the potential for a performance-based payment linked to the total Medicare spend for the entire HaH-Plus episode and the APM performance on quality metrics. **How Payment is Adjusted for Performance**: The APM entity's performance on quality metrics influences payment. **Specific Strategies to Support Patient Choice:** The proposal specifies that it would accommodate patient preferences, needs, and conditions.
Personalized Recovery Care (PRC) (*Regional/local single specialty practice*) Home Hospitalization: An Alternative Payment Model for Delivering Acute Care in the Home Recommended for implementation, 3/26/2018	**Clinical Focus**: Inpatient services in the home setting or skilled nursing facility **Providers**: Admitting physicians at facilities receiving PRC payments; on-call physicians; recovery care coordinators **Setting**: Patient home or skilled nursing facility **Patient Population**: Commercial and Medicare Advantage patients with one of 150 acute conditions	**Overall Model Design Features:** This is a home hospitalization care model that proposes to provide inpatient hospitalization-level care and personalized recovery care (PRC) at home or a skilled nursing facility for patients with certain conditions through an episodic payment arrangement. **Financial Methodology**: Bundled episode-based payment not tied to an anchor admission, replacing FFS with shared risk. Bundled payment has two components: 1) risk payment for delivering care compared to the targeted cost of care, and 2) a per-episode payment made for care provided instead of an acute care hospitalization. **How Payment is Adjusted for Performance**: A portion of physician compensation is tied to quality metrics and outcomes. **Specific Strategies to Support Patient Choice:** It would provide a choice for the ill patient to receive care at home, as opposed to receiving care in the hospital, and would accommodate different patient characteristics and conditions.

Exhibit B2. Key Value-Based Care Components of Selected PTAC PFPM Proposals That Describe Innovative Health Information Technology (IT) Approaches

Proposal	Clinical Focus, Providers, Setting, Patient Population	Value-Based Care Components
Hackensack Meridian Health and Cota, Inc. (HMH/Cota) *(Regional/local multispecialty practice or health system; Device/technology company)* Oncology Bundled Payment Program Using CNA-Guided Care Recommended for limited-scale testing, 9/8/2017	**Clinical Focus:** Oncology **Providers:** Clinicians with admitting privileges in the Hackensack Meridian Health (HMH) health system **Setting:** HMH health system that includes hospitals, home health, rehabilitation clinics, skilled nursing facilities, and mental health facilities **Patient Population:** Medicare patients with breast, colon, rectal, or lung cancer attributed to clinicians in the HMH health system	**Overall Model Design Features:** This is an oncology bundled payment model in which care choices are modulated by the prior outcomes of similar patients from real-world data. This process is called Cota Nodal Address (CNA) guided care. **Financial Methodology:** Prospective payment is provided to HMH for patients participating in the model. HMH bears the risk of bundled payments and distributes payments to physicians. **How Payment is Adjusted for Performance:** Compensation is, in part, incentive-based and determined by the achievement of clinical quality and patient satisfaction outcomes. **Innovative Health IT Approaches:** HMH/Cota will ensure interoperability and standardization of EHRs by using one data system (Epic) across all providers. Further, HMH/Cota created a database to provide monthly cost of care and quality measure reports, and also has developed an innovative telemedicine program to improve communication between the patient and provider.
Innovative Oncology Business Solutions, Inc. (IOBS) *(For-profit corporation)* Making Accountable Sustainable Oncology Networks (MASON) Referred for further development and Implementation, 12/10/2018	**Clinical Focus**: Oncology **Providers**: Oncologists, surgeons, PCPs, pathologists, radiologists **Setting**: Oncology practices **Patient Population**: Medicare FFS beneficiaries	**Overall Model Design Features**: Builds off the Community Oncology Medical Home (COME HOME) Innovation Center project. **Financial Methodology**: Determined by the oncology payment category (OPC), consisting of FFS payments for physician visits, imaging, lab, radiation therapy, surgery; infusion with a facility fee; ambulatory payment classifications (APC) for hospital outpatient care; DRGs for inpatient care; and the patient-centered oncology payment (PCOP) for medical home infrastructure. **How Payment is Adjusted for Performance**: Two percent of the OPC, which includes all expenses related to cancer care except drugs, is reserved for a quality pool. If quality measures are not met, the 2% is not rewarded. **Innovative Health IT Approaches:** All participants need to have advanced knowledge and use of EHRs as this would be necessary in order to create and update the OPCs; IOBS will also create dashboards to facilitate trusted decision support. The proposal also expresses the importance of data transparency and being able to access all data for a given patient.

Proposal	Clinical Focus, Providers, Setting, Patient Population	Value-Based Care Components
The University of New Mexico Health Sciences Center (UNMHSC) (*Academic institution*) ACCESS Telemedicine: An Alternative Healthcare Delivery Model for Rural Emergencies Recommended for implementation, 9/16/2019	**Clinical Focus**: Cerebral emergency care; telemedicine **Providers**: Neurologists, neurosurgeons, and providers in rural and community systems **Setting**: Inpatient, outpatient, or emergency department **Patient Population**: Patients with neurological emergencies	**Overall Model Design Features**: Rural EDs can consult neurologists via teleconsultation and assess patients' condition when they present at the hospital ED. The model aims to reduce costs in hospital transfers and ambulatory medicine. **Financial Methodology**: Additional one-time payment without shared risk. **How Payment is Adjusted for Performance**: Performance is monitored but does not impact payment. **Innovative Health IT Approaches:** UNMHSC uses telemedicine delivery technology by NMXS, and all participants/sites use the same technology, ensuring consistency. UNMHSC will remain flexible to expansion in technology, such as phones or tablets. The proposal mentions that interoperability between the patient EHR and the remote neurologist could improve this model, but it is not a requirement.

Appendix C. Summary of Key Components for Selected Innovation Center Models that Focus on Patient Engagement or Health Information Technology

Overview of Methodology Used to Review the Selected Innovation Center Models

The available information on selected Innovation Center models' summary pages on the Innovation Center website was reviewed. This included model overviews, informational webinars, evaluation reports and findings (as applicable), summaries, fact sheets, and press releases. Information found in these materials was used to summarize the models' main design features, including financial methodology, how payment is adjusted for performance, specific strategies to engage patients in their health care, and innovative heath IT approaches.

Four Innovation Center models were selected because the models describe patient engagement services and/or innovative health IT approaches. Findings from the review of these four models are summarized in the following table.

Exhibit C1. Key Value-Based Care Components of Selected Innovation Center Models That Describe Specific Strategies to Engage Patients in Their Health Care and/or Innovative Health Information Technology (IT) Approaches

Model Name	Clinical Focus, Providers, Setting, Patient Population	Value-Based Care Components
Accountable Health Communities (AHC) Model *Not Active* Years Active: 2017-2023	**Clinical Focus:** Unmet HRSNs **Providers:** Community-based organizations, hospitals, health care practices **Setting:** Broad **Patient Population:** Medicare and Medicaid beneficiaries	**Overall Model Design Features:** The model provided screening, referral services, and community navigation services to Medicare and Medicaid beneficiaries to identify and address HRSNs and assess the impact on health care costs and utilization. **Financial Methodology:** Upfront funds, as well as payments for beneficiary screening and referrals and payments for high-risk beneficiaries who choose to receive community navigation services. **How Payment is Adjusted for Performance:** N/A **Specific Strategies to Engage Patients in Their Health Care:** Some participants had community members provide feedback on HRSN screening, referral, and community navigation services to facilitate improvements. **Innovative Health IT Approaches:** Some participants built HRSN screening tools into EHR systems, developed closed-loop referral platforms, and integrated HIEs with referral platforms.
Innovation in Behavioral Health (IBH) Model *Ongoing* Years active: 2025-present	**Clinical Focus:** Behavioral health **Providers:** Specialty behavioral health practices (e.g., community mental health centers, opioid treatment programs) **Setting:** Outpatient **Patient Population:** Medicare and Medicaid beneficiaries with moderate to severe mental health conditions and substance use disorders	**Overall Model Design Features:** The model provides Medicare and Medicaid beneficiaries who have moderate to severe mental health conditions and substance use disorders with coordinated care that focuses on their physical and behavioral health care needs and HRSNs. **Financial Methodology:** Upfront funds to upgrade HIT and EHR, to hire needed staff, and to provide practice transformation activities. By model year 4, practices will participate in the Medicaid payment approach (and those who serve Medicare patients may also participate in the Medicare payment approach) where participants most likely will receive a per-person per-month payment; however, states have flexibility in their Medicaid payment approach (e.g., payment type, financial risk level). **How Payment is Adjusted for Performance:** Additional performance-based payments will be made to participants for meeting certain performance requirements. Again, states have flexibility in how they make performance-based payments (e.g., upside only, downside risk). **Specific Strategies to Engage Patients in Their Health Care:** Person-centered approach that actively tries to engage patients in both their behavioral and physical health care; provides patient self-management support; allows for use of upfront funds for patient engagement IT solutions. **Innovative Health IT Approaches:** The model offers targeted investments in EHR and other tools to facilitate interoperability and data sharing.

Model Name	Clinical Focus, Providers, Setting, Patient Population	Value-Based Care Components
Medicare Diabetes Prevention Program (MDPP) Expanded Model *Ongoing* Years active: 2018-present	**Clinical Focus:** Diabetes (Type 2) **Providers:** MDPP supplier organizations (e.g., health organizations, hospitals, community organizations) **Setting:** Broad **Patient Population:** Pre-diabetic patients at risk of type 2 diabetes	**Overall Model Design Features:** MDPP provides interventions to try to prevent type 2 diabetes in patients with signs of pre-diabetes. Patients receive 16 "core" sessions of a Centers for Disease Control and Prevention (CDC)-approved curriculum over six months focused on dietary changes, physical activity, and healthy lifestyle habits. Core sessions are followed by six follow-up sessions over six months. **Financial Methodology:** Participants submit claims using g-codes and receive up to 22 FFS payments per beneficiary (for attending the 22 sessions) and potential performance-based payments for any decreases in beneficiaries' risk of diabetes (e.g., weight loss). **How Payment is Adjusted for Performance:** Participants receive a performance-based payment if beneficiaries show documented decreases in risk of diabetes (e.g., weight loss). **Specific Strategies to Engage Patients in Their Health Care:** Participants may offer beneficiary engagement incentives (at their own expense; CMS will not fund incentives) that are preventive care-related or aimed at progressing beneficiaries' clinical goals by involving beneficiaries in managing their health. **Innovative Health IT Approaches:** The model allows for sessions to be conducted virtually, as well as the use of digital technology to obtain performance goals (e.g., scales that record and communicate weights electronically).
Transforming Maternal Health (TMaH) Model *Ongoing* Years active: 2025-present	**Clinical Focus:** Pregnant and postpartum mothers **Providers:** Obstetricians, maternity care providers, midwives **Setting:** Hospitals, birth centers, health centers, Rural Health Clinics **Patient Population:** Female Medicaid and CHIP beneficiaries	**Overall Model Design Features:** The model provides female Medicaid and CHIP beneficiaries with pregnancy, childbirth, and postpartum care, including physical, mental health, and social needs. **Financial Methodology:** Provider infrastructure payments to support care delivery transformation, including patient safety bundles, maternal care assessments, quality measure reporting, data integration, team-based care, enhanced access to care, and identification of community-based organizations to address HRSNs. Starting in model year 4, participants may receive upside-only performance payments. **How Payment is Adjusted for Performance:** Participants may earn a performance-incentive payment where 80% of the payment is based on quality performance score and 20% of the payment is based on cost performance score. **Specific Strategies to Engage Patients in Their Health Care:** The model aims to provide person-specific care and to actively listen to patients so they can better control their birth experience. **Innovative Health IT Approaches:** The model aims to improve data integration and HIEs. This includes integration with community-based organizations to share screening and referral information.

Appendix D. Areas for Future Exploration and Research

Please note that the items listed below may be better addressed through the Request for Input (RFI), subject matter expert (SME) discussions or listening sessions, roundtable panel discussions, or another research approach. They are captured here for further exploration.

- Data infrastructure requisites to improve patient access to their health data
- Efforts by providers and payers to improve data infrastructure and address gaps
- Potential of wearable technologies
- Integrating mobile apps with EHRs
- Use of remote patient monitoring tools
- Tools to improve health literacy and patient choice
- Shared decision-making strategies between providers and patients
- Perspectives on data-driven approaches for enabling/empowering patients with chronic conditions
- Potential model benefit design improvements to enhance patient empowerment
- Role of payment models to incentivize the use of digital tools

Appendix E. Annotated Bibliography

Alexander JA, Hearld LR, Mittler JN, Harvey J. Patient-physician role relationships and patient activation among individuals with chronic illness. *Health Serv Res*. 2012; 47(3 Pt 1):1201-23. doi:10.1111/j.1475-6773.2011.01354.x

Subtopic: Background on Patient Empowerment

Type of Source: Journal Article

Objective: To determine whether patient activation is influenced by chronically ill patients' perceptions of their role relationship with their health care providers.

Main Findings: Patient activation scores were higher among patients who reported better quality interpersonal exchanges, more fairness and respect throughout treatment, and more frequent communications with their physicians outside of office visits. Patients who reported English as their second language, were unemployed, and had an income less than $25,000 tended to have lower patient activation scores. Treatment goal setting was not significantly associated with patient activation.

Strengths/Limitations: The study's cross-sectional design limits causal inference for the primary research objective.

Generalizability to the Medicare Population: Moderate; although Medicare was not explicitly mentioned in the article, some findings could apply to the Medicare population. For example, patient activation scores increased with age until approximately age 53 when they declined. Patient activation scores were also higher among patients with multiple chronic illnesses.

Methods: A cross-sectional analysis was conducted. Random sampling was used to administer a survey to chronically ill individuals.

Anumula N, Sanelli PC. Meaningful use. *American Journal of Neuroradiology*. 2012;33(8):1455-7. https://doi.org/10.3174/ajnr.A3247

Subtopic: The Use of Digital Tools to Empower Patients and Support Providers

Type of Source: Journal Article

Objective: To review the Meaningful Use incentive program for electronic health record (EHR) implementation, including an overview of clinical measures relevant to radiology and barriers to implementation.

Main Findings: Radiologists experience barriers to participating in Meaningful Use, including dual requirements for meeting the technologic criteria and clinical measures, the lack of Radiology Information System products to meet the requirements of the Meaningful Use program, difficulty with influencing institutions to buy expensive EHR systems, and the increasingly complex stages to implement Meaningful Use.

Strengths/Limitations: The review adequately summarizes the impact that the Meaningful Use incentive program could have on radiologists and provides resources on the requirements of the program.

Generalizability to the Medicare Population: Moderate; although this review provides information on administrative efforts to improve Clinical Quality Measure reporting, it is not specific to the Medicare population.

Methods: Brief review of the policy, legislative history, criteria for enrollment, and barriers to participation.

Austin CA, Mohottige D, Sudore RL, Smith AK, Hanson LC. Tools to promote shared decision making in serious illness: a systematic review. *JAMA Intern Med*. 2015;175(7):1213-1221. doi:10.1001/jamainternmed.2015.1679

Subtopic: The Use of Digital Tools to Empower Patients and Support Providers
Type of Source: Journal Article
Objective: To review the clinical tools available to improve communication and decision making for patients with serious illnesses and their providers.
Main Findings: The systematic review found that decision tools improve patient knowledge and preparation for treatment choices. The authors identified 17 moderate or high quality randomized clinical trials that assess the effectiveness of these tools. There is a promising evidence base to support future research, which could focus on decision making about patient preferences and satisfaction with care.
Strengths/Limitations: Many study populations included in the review were small, limiting power to detect meaningful results and potentially limiting the generalizability of findings.
Generalizability to the Medicare Population: Moderate; the studies included in the review were focused on populations facing serious illnesses, including Medicare eligible adults.
Methods: A systematic review of the literature was conducted. A total of 38 studies were included in the review.

Bailo L, Guiddi P, Vergani L, Marton G, Pravettoni G. The patient perspective: investigating patient empowerment enablers and barriers within the oncological care process. *Ecancermedicalscience*. 2019;13:912. doi:10.3332/ecancer.2019.912

Subtopic: Background on Patient Empowerment
Type of Source: Journal Article
Objective: To investigate elements of the care process that enable patients to feel and be empowered throughout their oncological care journey.
Main Findings: Patient empowerment is broader than solely including patients in shared medical decision making. Patients with cancer value the relational component of the care process the most because they want to have a space to be able to voice their questions and concerns to their care team. Patients also value communication, effective information exchange, and the ability to choose the care team that they trust.
Strengths/Limitations: Convenience sampling from one institution was used. The institution was comprised of mostly women undergoing treatment for breast cancer, limiting the generalizability of results.
Generalizability to the Medicare Population: Moderate; although some diagnoses considered in the article were common among the Medicare population, the research was performed in Italy with patients aged 30-80 years old.
Methods: Focus groups were conducted with a convenience sample of patients at the European Institute of Oncology. Qualitative methods were used to extract themes from the transcripts and recordings.

Bates DW, Samal L. Interoperability: what is it, how can we make it work for clinicians, and how should we measure it in the future? *Health Serv Re*s. 2018;53(5):3270-3277. doi:10.1111/1475-6773.12852

Subtopic: Key Highlights; The Use of Digital Tools to Empower Patients and Support Providers
Type of Source: Journal Article
Objective: To assess the current status of the health information technology landscape and to propose improvements to health information exchange and interoperability.
Main Findings: Current methods for exchanging health information between organizations and providers are subject to weaknesses, such as using inconsistent coding, not sharing enough

information depending on the format of the report to be shared, and a lack of care records being shared or received. The authors emphasized the importance of improving interoperability rather than sharing health information through vendor certification and conformance testing. Future research on interoperability could identify best practices for evaluating a health information exchange, assess whether providers receive the data they need, understand how to reconcile data, and determine how to use analytics to identify important new information in the data sets.

Strengths/Limitations: This article is a commentary with opinions of two authors based on observed trends and current research.

Generalizability to the Medicare Population: Moderate; the editorial does not focus on any one population but addresses systemic flaws in the exchange of health information and proposes how to improve it.

Methods: N/A

Blumenthal-Barby J, Opel DJ, Dickert NW, Kramer DB, Tucker Edmonds B, Ladin K, et al. Potential unintended consequences of recent shared decision making policy initiatives. *Health Aff*. 2019;38(11):1876-81. https://doi.org/10.1377/hlthaff.2019.00243

Subtopic: Background on Patient Empowerment

Type of Source: Journal Article

Objective: To provide context on current implementation guidelines for shared decision making in clinical settings and to provide recommendations for how to improve the guidelines.

Main Findings: As shared decision making is recommended for implementation through policy initiatives, clinicians need an understanding of the nuances of shared decision making, including the evaluation of how well they are implemented in clinical encounters. Clinicians could consider how the family or caregivers of a patient are involved in making medical decisions, how much information to provide to a patient, whether to act neutral when providing options to patients, and how to allow patients to delegate a decision to the medical professional among many other considerations.

Strengths/Limitations: N/A

Generalizability to the Medicare Population: Moderate; although this commentary is not specific to the Medicare population, shared decision making is used broadly and can be instructive for clinicians working with the Medicare population.

Methods: N/A

Bravo P, Edwards A, Barr PJ, Scholl I, Elwyn G, McAllister M, et al. Conceptualising patient empowerment: a mixed methods study. *BMC Health Services Research*. 2015;15:252.

Subtopic: Background on Patient Empowerment

Type of Source: Journal Article

Objective: To define patient empowerment, identify the elements of which it is comprised, and assess the effectiveness of interventions designed to promote patient empowerment.

Main Findings: Five key components of patient empowerment were identified, including (1) an underpinning ethos at the patient, health care provider, and health care system level; (2) interventions including motivational interviewing or training programs for clinicians or patients; (3) moderators that can influence how effectively interventions impact empowerment; (4) indicators of the patient state or patient behaviors; and (5) outcomes of patient empowerment.

Strengths/Limitations: The study included research conducted globally. However, the interviews were limited to stakeholders in the UK.

Generalizability to the Medicare Population: Moderate; although this study focused on patient empowerment generally and not specifically in the Medicare population, findings can be applied in Medicare encounters.
Methods: A scoping literature review with thematic analysis was performed to identify the components of patient empowerment and develop a conceptual map. Semi-structured interviews were then conducted to further develop the conceptual map. Finally, the researchers consulted with the Cochrane Healthcare Quality Research Group in an iterative process to develop the final map, which was proposed for use in future research.

Boston Consulting Group. *How Digital and AI Will Reshape Health Care in 2025*. January 2025. https://web-assets.bcg.com/8c/f8/ae51ffb44ca59cb8abd751940441/bcg-how-digital-and-ai-solutions-will-reshape-health-care-in-2025.pdf
Subtopic: The Use of Digital Tools to Empower Patients and Support Providers
Type of Source: Report
Objective: To showcase the ways the evolution of digital and artificial intelligence (AI) tools will affect health care services and technologies in the coming years.
Main Findings: AI has the ability to organize and structure vast amounts of administrative data from providers and individual data collected from wearable devices and implants. The data can then be used to create personalized medical treatment plans. These newly organized data can help patients learn more about their body and their conditions to take control of their health and their care journey.
Strengths/Limitations: N/A
Generalizability to the Medicare Population: Moderate; the advancements described in this report may be useful for Medicare patients who would benefit from a more streamlined data system, such as patients with chronic or complex medical conditions.
Methods: A collection of short paragraphs from Boston Consulting Group directors and partners provide insight into the future of health care technologies.

Bulaj G, Clark J, Ebrahimi M, Bald E. From precision metapharmacology to patient empowerment: delivery of self-care practices for epilepsy, pain, depression and cancer using digital health technologies. *Front Pharmacol*. 2021;12:612602.
Subtopic: The Use of Digital Tools to Empower Patients and Support Providers
Type of Source: Journal Article
Objective: To provide an overview of the ways precision metapharmacology (non-pharmacological interventions) can lessen the burden of chronic disease and increase patient empowerment.
Main Findings: Non-pharmacological interventions can include breathing exercises, mindfulness, physical activity, music, sleep, forgiveness, and gratitude. These interventions have shown clinical benefits for populations who participated in studies examining the effects of precision metapharmacology. Digital health technologies provide a mechanism to integrate these interventions, such as self-care and lifestyle interventions, which aim to improve patient empowerment and mitigate the limitations of pharmacotherapies.
Strengths/Limitations: The article provided a comprehensive overview of the opportunities and limitations of non-pharmacological interventions.
Generalizability to the Medicare Population: Moderate; digital health technologies can improve patient empowerment for all patient populations, including Medicare eligible populations.
Methods: A review of the literature on precision metapharmacology was conducted.

Burton LC, Anderson GF, Kues IW. Using electronic health records to help coordinate care. *Milbank Q*. 2004;82(3):457-81, doi:10.1111/j.0887-378X.2004.00318.x

Subtopic: The Use of Digital Tools to Empower Patients and Support Providers
Type of Source: Journal Article
Objective: To provide recommendations for the development of the electronic health record (EHR) as a way to improve care coordination among providers, payers, and governance structures.
Main Findings: The development of a common health record is important for patients who may move or seek care outside of their primary care region. Patients with chronic diseases may benefit from having an EHR by being able to manage their medications and care plans on their own. Regional governments could encourage digital exchange of clinical data and insurers. Managed care plans could provide payments to physicians to complete EHRs to encourage adoption.
Strengths/Limitations: N/A
Generalizability to the Medicare Population: Moderate; the arguments for a comprehensive EHR system is important for all patient populations, including those eligible for Medicare.
Methods: A review of the literature on EHR adoption was conducted.

Carman KL, Dardess P, Maurer M, Sofaer S, Adams K, Bechtel C, et al. Patient and family engagement: a framework for understanding the elements and developing interventions and policies. *Health Aff*. 2013;32(2):223-231. doi:10.1377/hlthaff.2012.1133

Subtopic: Key Highlights; Background on Patient Empowerment
Type of Source: Journal Article
Objective: To provide a framework for patient and family engagement in health care decisions and to summarize a research agenda to develop a robust evidence base to support this framework.
Main Findings: Patient and family engagement is multidimensional. There is a continuum of engagement—from consultation to partnership and shared leadership. There are also different levels to patient and family engagement, starting at the direct care setting to incorporating engagement into organizational design, governance, and policy making. Several factors influence engagement, including the patient and their beliefs about their role; the patient's level of health literacy or education; organizational culture; policies and practices; societal norms; and regulations and policy.
Strengths/Limitations: Although the framework characterizes the patient-provider relationship, more evidence is needed to fully outline the contours of that relationship. For example, more evidence is needed on what works and what does not work for productive patient engagement.
Generalizability to the Medicare Population: Moderate; the framework is important for all patient populations including those eligible for Medicare.
Methods: The patient and family engagement framework is presented with a discussion of each element supported by the literature.

Carman KL, Workman TA. Engaging patients and consumers in research evidence: applying the conceptual model of patient and family engagement. *Patient Education and Counseling*. 2017;100(1):25-9. https://doi.org/10.1016/j.pec.2016.07.009

Subtopic: Key Highlights; Background on Patient Empowerment
Type of Source: Journal Article
Objective: To discuss the application of the Patient and Family Engagement framework.
Main Findings: Research is often siloed off from patients who, while invited to participate as participants or key informants, are not typically invited to provide feedback into the methods or

development of a research topic. As a result, patients may not be engaged in research aimed at improving their care experiences. The authors suggest four strategies to encourage more robust engagement with patients and consumers, including (1) preparing the patient and family with plain language trainings; (2) training and mentoring health professionals on how to interact with patients in a research setting; (3) examining organizational barriers to partnership and considering how partnerships can be redesigned; and (4) being transparent and accountable about research methods and goals to bridge the divide between experts and laypersons.
Strengths/Limitations: This study was informed by large studies conducted with patients, clinicians, researchers, funders, payers, administrators, and policymakers.
Generalizability to the Medicare Population: Moderate; the framework and recommendations provided in this article are useful for encouraging engagement for all patient populations, including those eligible for Medicare.
Methods: This article presents each element of the framework with supporting evidence from the literature.

Castro EM, Van Regenmortel T, Vanhaecht K, Sermeus W, Van Hecke A. Patient empowerment, patient participation and patient-centeredness in hospital care: a concept analysis based on a literature review. *Patient Education and Counseling*. 2016;99(12):1923-39. https://doi.org/10.1016/j.pec.2016.07.026

Subtopic: Background on Patient Empowerment
Type of Source: Journal Article
Objective: To clarify the definitions of patient empowerment, patient participation, and patient-centeredness and to create a process model for these concepts.
Main Findings: Patient empowerment is a broad concept. Patient-centeredness is a precondition of empowerment. Patient participation can be considered a strategy to help health care become more patient-centered and achieve patient empowerment.
Strengths/Limitations: The goal of the study was to be inclusive of all definitions of patient empowerment to perform a concept analysis. A systematic quality evaluation was not performed on the included research articles.
Generalizability to the Medicare Population: Low; the article did not focus on the Medicare population and the concepts may be widely applicable.
Methods: A literature review was conducted using databases and a snowballing method. The Walker & Avant method with simultaneous concept analysis was used to create clarity regarding the three terms of interest.

Commonwealth Fund. *Helping Patients Make Better Treatment Choices with Decision Aids*. Commonwealth Fund. https://www.commonwealthfund.org/publications/newsletter-article/helping-patients-make-better-treatment-choices-decision-aids

Subtopic: The Use of Digital Tools to Empower Patients and Support Providers
Type of Source: Web Page
Objective: To discuss the implementation of decision aids and barriers to shared decision making.
Main Findings: There are a variety of ways that decision aids are provided to patients, such as through DVDs, pamphlets, and informative documents that encourage conversation with their providers. Although providers are interested in using decision aids in their practice, use of these aids can be time consuming and requires support from leadership to implement broadly. Additionally, not all patients wish to engage in shared decision-making. Whereas some patients prefer their providers make the decision for them, other patients may want the absolute minimum input from their provider.

Strengths/Limitations: The article provides insights from a variety of stakeholders, including providers, practice groups, and patients.
Generalizability to the Medicare Population: Moderate; although this article is not focused specifically on use of decision aids among the Medicare population, decision aids are used by the Medicare population.
Methods: Interviews were conducted with providers and practice groups.

Dambrino RJ IV, Domenico HJ, Graves JA, et al. Unsolicited patient complaints following the 21st Century Cures Act information-blocking rule. *JAMA Health Forum*. 2023;4(9):e233244. doi:10.1001/jamahealthforum.2023.3244

Subtopic: The Use of Digital Tools to Empower Patients and Support Providers
Type of Source: Journal Article
Objective: To understand the impact the information-blocking rule (IBR) implemented with the 21st Century Cures Act had on unsolicited patient complaints (UPC).
Main Findings: No significant difference in UPC was found before versus after implementation of the IBR. UPCs included patient concerns about receiving medical results before having a conversation with their physician to fully understand the results.
Strengths/Limitations: This study focused on a single institution, limiting the generalizability of findings.
Generalizability to the Medicare Population: Moderate; although this study did not focused on the Medicare population, the implementation of IBR applies to the patient population broadly.
Methods: That was a retrospective cohort study with interrupted time series analysis focused on the frequency of UPCs pre- and post-implementation of the IBR. Qualitative thematic analysis was conducted on UPCs to determine patient concerns related to the IBR.

Delbanco T, Wachenheim D. Open notes: new federal rules promoting open and transparent communication. *Jt Comm J Qual Patient Saf*. 2021;47(4):207-9. doi:10.1016/j.jcjq.2021.02.004

Subtopic: The Use of Digital Tools to Empower Patients and Support Providers
Type of Source: Journal Article
Objective: To discuss the advantages, limitations, opportunities, and concerns associated with the implementation of open notes in patient portals.
Main Findings: Open notes have increased patients' trust in the health care system, making them feel more in control and better able to manage their care. Over the course of a year, 25 percent of doctor notes had a patient-identified mistake that doctors judged as serious. Open notes have improved how doctors communicate with their patients, including using plain language and being more sensitive about how their notes may be received.
Strengths/Limitations: This article is an editorial and contains the opinion of the authors with supporting literature.
Generalizability to the Medicare Population: Moderate; although this article does not focus on the Medicare population, the review of open notes applies to the patient population broadly.
Methods: N/A

Desai PJ, Nanji K, Dullabh PM, Cope E, Catlett M, Adler J, et al. and the CDSiC Outcomes and Objectives Workgroup. *Integration of Patient-Centered Clinical Decision Support Into Shared Decision Making*. Prepared under Contract No. 75Q80120D00018. AHRQ Publication No. 23-0084. Rockville, MD: Agency for Healthcare Research and Quality; September 2023. https://cdsic.ahrq.gov/sites/default/files/2023-09/FINAL%20OO%20PC%20CDS%20SDM%20Report.pdf

Subtopic: Key Highlights; Background on Patient Empowerment; The Use of Digital Tools to Empower Patients and Support Providers

Type of Source: Journal Article
Objective: To explore how patient-centered clinical decision support (PC CDS) tools are integrated into the Agency for Healthcare Research and Quality's Shared Decision Making (SDM) process.
Main Findings: The PC CDS-SDM framework is a crosswalk between the Three Talk model and three elements of PC CDS. The three primary phases in SDM include (1) Team Talk where there is a recognition that a decision needs to be made through evidence based findings (knowledge), patient information (data), and an alert for the patient and care team (delivery); (2) Option Talk which is supported by providing recommendations (knowledge) through collecting and integrating patient information (data and delivery) to understand the options available; and (3) Decision Talk where there is discussion on the options available to the patient that consider their values, preferences, and circumstances (data and delivery).
Strengths/Limitations: Barriers to the framework include limited access to the tools that support the PC CDS-SDM framework and a dependence on the patient having average health literacy.
Generalizability to the Medicare Population: Moderate; although the tool is not specifically designed for the Medicare population, it could be useful for empowering Medicare patients.
Methods: A literature review was conducted to identify articles relevant to SDM and PC CDS processes. The identification of an SDM conceptual model was then used to develop the PC CDS-SDM framework. To validate the framework, key informant interviews were conducted with experts.

Dinh-Le C, Chuang R, Chokshi S, Mann D. Wearable health technology and electronic health record integration: scoping review and future directions. *JMIR Mhealth Uhealth*. 2019;7(9):e12861. doi:10.2196/12861

Subtopic: The Use of Digital Tools to Empower Patients and Support Providers
Type of Source: Journal Article
Objective: To assess the landscape of wearable health technology and understand how health systems and organizations are integrating data to track and improve patient outcomes.
Main Findings: The authors found several challenges in wearable device integration, including the protection of confidentiality and patient privacy, a lack of interoperability and connectivity, and an overload of patient information and data. However, health systems and organizations are innovating new ways to deal with these challenges, including collaboration with third-party applications and using user-centered design approaches. Health insurance companies have also introduced rewards programs for patients to improve their uptake of wearable devices.
Strengths/Limitations: The number of wearable devices available on the market is expected to grow in future years. There is a limited amount of published research available, potentially indicating there is a lack of broad consensus on the terminology to be able to search all databases thoroughly.
Generalizability to the Medicare Population: Moderate; although the Medicare population is not the focus of this article, they are consumers who may use wearable devices.
Methods: A systematic review of the literature was conducted to understand wearable health technology and data integration into electronic health record (EHR) systems.

Elwyn G, Frosch D, Thomson R, Joseph-Williams N, Lloyd A, Kinnersley P, et al. Shared decision making: a model for clinical practice. *J Gen Intern Med*. 2012;27(10):1361-7. doi:10.1007/s11606-012-2077-6

Subtopic: Key Highlights; Background on Patient Empowerment
Type of Source: Journal Article

Objective: To propose a model for effective clinician-patient dialogue to accomplish shared decision making.
Main Findings: The model is composed of three steps: (1) Choice Talk, where the patient is informed of the choices for treatment; (2) Option Talk, where the patient receives detailed information about each choice available to them; and (3) Decision Talk, where the clinician supports the patient's decision by making sure the patient's preferences are taken into account.
Strengths/Limitations: The model is informed by the authors' implementation studies of shared decision making, which itself has a robust evidence base and supports the ethical foundations of the original work.
Generalizability to the Medicare Population: Moderate; although the Medicare population was not the focus of this article, new tools to support shared decision making will be useful in providing treatment to people enrolled in Medicare.
Methods: The model was developed through a review of the research that supports shared decision making as well as from the authors' experience implementing shared decision making.

Emanuel EJ, Emanuel LL. Four models of the physician-patient relationship. *JAMA*. 1992;267(16):2221-6. doi:10.1001/jama.1992.03480160079038

Subtopic: Background on Patient Empowerment
Type of Source: Journal Article
Objective: To describe, compare, contrast, and provide a recommendation based on four models of physician-patient interactions: the paternalistic model, the informative model, the interpretive model, and the deliberative model.
Main Findings: The broad debate in physician-patient interactions is along the continuum between patient autonomy and physician paternalism. The authors recommended the deliberative model. In this model, the physician engages the patient in a conversation about what treatment would be best for their situation. The conversation is based on information the physician provides to the patient, the patient's health-related values, and how the treatment would impact their outcomes.
Strengths/Limitations: The article is a commentary on physician-patient interactions and provides a recommendation based on the literature and the authors' expertise.
Generalizability to the Medicare Population: Moderate; although this article does not focus specifically on Medicare patients, the patient-physician interaction is relevant to the Medicare population.
Methods: The authors reviewed the four models of physician-patient interaction, summarized the criticisms and debate over these models, and provided a recommendation.

Evans RS. Electronic health records: then, now, and in the future. *Yearb Med Inform*. 2016;(Suppl 1):S48-S61. doi:10.15265/IYS-2016-s006.

Subtopic: The Use of Digital Tools to Empower Patients and Support Providers
Type of Source: Journal Article
Objective: To summarize the history of electronic health records (EHRs), their use, how they have evolved, and where innovation is needed for the future.
Main Findings: The evolution and mass adoption of the EHR in health care organizations occurred due to increased access and affordability of personal computers and network connections. Large vendors have taken over management of EHRs, allowing them to become web/client-server-based and increase sharing between facilities. With the increased amount of patient data in these systems, challenges include data privacy and data bloat. In the coming years, EHRs may become more integrated and have more navigable interfaces with better search functions to comb through the sizable amount of data stored in EHRs.

Strengths/Limitations: This article provides a thorough review of EHR development as it stands today. The authors acknowledge that it is difficult to predict how the technology will develop, but list opportunities and observed trends showing the direction it is expected to go.
Generalizability to the Medicare Population: Moderate; although this article is not focused on the Medicare population, the use and development of EHRs is important for the support and clinical management of Medicare patients.
Methods: A literature search was conducted using search terms such as "electronic health record," "medical record," and "medical chart." Snowball methods were used to find additional relevant books and articles.

Fritz Z, Schlindwein A, Slowther AM. Patient engagement or information overload: patient and physician views on sharing the medical record in the acute setting. *Clin Med (Lond)*. 2019;19(5):386-391. doi:10.7861/clinmed.2019-0079

Subtopic: The Use of Digital Tools to Empower Patients and Support Providers
Type of Source: Journal Article
Objective: To assess the interest and impact of sharing a patient's full medical record in an acute hospital setting.
Main Findings: Approximately 81 percent of patients surveyed agreed with the idea that they should have access to their full medical record. Doctors were hesitant to provide the full record to patients due to concerns related to increasing patients' anxiety. Patients and doctors supported the use of a summary record as an alternative approach to providing the full medical record.
Strengths/Limitations: The study was conducted in the UK and some findings may not be generalizable to the US population. Conducting this study in the acute care setting may provide unique results given a patient's diagnosis is not confirmed at the time of review by the patient.
Generalizability to the Medicare Population: Moderate; although the study was conducted in the UK and was not specific to the Medicare population, lessons learned are applicable to a broad patient population.
Methods: Questionnaire with closed Likert-scale and open-ended questions were provided to acute medicine physicians and recent acute care patients. Descriptive statistics and thematic analysis were used to analyze responses.

Fumagalli LP, Radaelli G, Lettieri E, Bertele P, Masella C. Patient empowerment and its neighbours: clarifying the boundaries and their mutual relationships. *Health Policy*. 2015;119:384-394.

Subtopic: Background on Patient Empowerment
Type of Source: Journal Article
Objective: To examine the literature defining patient empowerment, involvement, participation, enablement, engagement, and activation in order to delineate clear boundaries between these terms.
Main Findings: The authors developed a comprehensive definition of patient empowerment as follows: "the acquisition of motivation (self-awareness and attitude through engagement) and ability (skills and knowledge through enablement) that patients might use to be involved or participate in decision-making, thus creating an opportunity for higher levels of power in their relationship with professionals." Patient activation may be a subset of patient empowerment. There are four areas for future research, including (1) understanding the link between engagement/enablement and empowerment; (2) exploring how empowerment moves into involvement and participation; (3) examining the connection between empowerment and activation; and (4) assessing the translation of patient empowerment programs and ideas.

Strengths/Limitations: While the authors acknowledge that this article does not settle the debate about the concepts in question, it is a significant attempt to create clarity within the terms that have a substantial research base.
Generalizability to the Medicare Population: Moderate; although the article is not focused on the Medicare population, clarifying the definition of patient empowerment is important for policymakers and providers trying to improve patient empowerment among Medicare patients.
Methods: A literature review was conducted to identify relevant articles and studies. Data analysis was conducted in multiple steps using clusters of studies with similar concepts (within-cluster and between-cluster). A concept map was developed to map out boundaries for each concept.

Gal R, May AM, van Overmeeren EJ, et al. The effect of physical activity interventions comprising wearables and smartphone applications on physical activity: a systematic review and meta-analysis. *Sports Med Open*. 2018;4:42. doi:10.1186/s40798-018-0157-9
Subtopic: The Use of Digital Tools to Empower Patients and Support Providers
Type of Source: Journal Article
Objective: To review the literature on the effect of wearable technology and smartphone applications on physical activity levels.
Main Findings: The use of wearable technology and smartphone applications increased physical activity levels (in minutes per day and steps per day) to a small to moderate degree. Eighteen randomized controlled trials were included in the study.
Strengths/Limitations: Given the design of the studies included in the systematic review and meta-analysis, the authors could not report insights on the sustainability of increased physical activity levels from wearables and smartphone applications.
Generalizability to the Medicare Population: Moderate; although the Medicare population was not the focus of the article, many Medicare beneficiaries use wearable technology and smartphone applications to support their health and wellness.
Methods: A systematic review and meta-analysis were conducted.

Government Accountability Office. Medicare Plan Finder: Usability Problems and Incomplete Information Create Challenges for Beneficiaries Comparing Coverage Options. July 2019. GAO-19-627. https://www.gao.gov/assets/gao-19-627.pdf
Subtopic: Key Highlights; Background on Patient Empowerment
Type of Source: Report
Objective: To review the usability and completeness of the Medicare Plan Finder.
Main Findings: Beneficiaries experienced challenges with finding information in the Medicare Plan Finder. The tool provides incomplete estimates of costs under original Medicare, making it difficult for beneficiaries to compare original Medicare to Medicare Advantage.
Strengths/Limitations: The survey of State Health Insurance Assistance Program (SHIP) directors had a response rate of 78 percent. SHIP directors did not respond to some of the interview questions.
Generalizability to the Medicare Population: Strong; the report focused on assessing the Medicare Plan Finder, a tool administered by the Centers for Medicare & Medicaid Services (CMS) to help Medicare beneficiaries make informed decisions about their health care and prescription drug coverage.
Methods: To review the Medicare Plan Finder, the Government Accountability Office reviewed CMS-sponsored research and CMS documentation on the Medicare Plan Finder, surveyed SHIP directors, and interviewed CMS officials and stakeholders with knowledge about Medicare beneficiaries' health insurance needs.

Greene J, Hibbard JH. Why does patient activation matter? An examination of the relationships between patient activation and health-related outcomes. *J Gen Intern Med*. 2011;27(5):520-6. doi:10.1007/s11606-011-1931-2

Subtopic: Key Highlights; Background on Patient Empowerment
Type of Source: Journal Article
Objective: To assess how different levels of patient activation are associated with outcomes for four areas of health, including prevention, unhealthy behaviors, clinical indicators, and utilization.
Main Findings: Patients with higher activation levels were more likely to have received preventative care, less likely to smoke or have a high body mass index (BMI), and had better clinical indicators. The findings indicate that improving patient activation can improve quality and health outcomes. In particular, the authors suggested that low socioeconomic status patients may be the appropriate population to focus future interventions because there are more opportunities for improving activation and health-related outcomes in this group.
Strengths/Limitations: A longitudinal analysis would help to build upon the results to better understand the impact of the findings.
Generalizability to the Medicare Population: Low; the study did not focus on the Medicare population.
Methods: A cross-sectional study of patients in a large not-for-profit health care system was conducted. The study looked at how the Patient Activation Measure (PAM), which was routinely collected during office visits, was correlated with health outcomes derived from electronic health records. Analyses included descriptive methods and multivariate regression models.

Harrington RL, Hanna ML, Oehrlein EM, Camp R, Wheeler R, Cooblall C, et al. Defining patient engagement in research: results of a systematic review and analysis: report of the ISPOR patient-centered special interest group. *Value in Health*. 2020;23(6):677-88. https://doi.org/10.1016/j.jval.2020.01.019

Subtopic: Background on Patient Empowerment
Type of Source: Journal Article
Objective: To identify a definition for patient engagement in research.
Main Findings: After synthesizing definitions of patient engagement and related concepts in the literature, the authors proposed the following definition for patient engagement in research: "The active, meaningful, and collaborative interaction between patients and researchers across all stages of the research process, where research decision making is guided by patients' contributions as partners, recognizing their specific experiences, values, and expertise."
Strengths/Limitations: The literature review did not include recent publications. Only articles published in English were included in the review.
Generalizability to the Medicare Population: Moderate; although this article was not focused specifically on the Medicare population, findings on patient engagement are applicable to the Medicare population.
Methods: A systematic review of published literature was conducted to identify definitions of patient engagement and related concepts, such as patient-centeredness.

Hero JO, Sinaiko AD, Kingsdale J, Gruver RS, Galbraith AA. Decision-making experiences of consumers choosing individual-market health insurance plans. *Health Aff*. 2019;38(3):464-72. https://doi.org/10.1377/hlthaff.2018.05036

Subtopic: Background on Patient Empowerment
Type of Source: Journal Article

Objective: To assess the challenges and decision supports available to individuals enrolling in on- and off-Marketplace plans.
Main Findings: On-Marketplace enrollees had less difficulty finding the best or most affordable coverage option than off-Marketplace enrollees. On-Marketplace enrollees with chronic conditions and low-health insurance literacy had higher rates of negative experiences choosing a health plan compared with enrollees without chronic conditions and higher health insurance literacy. Enrollees with chronic conditions who purchased a plan through the Marketplace were less likely to report negative shopping experiences than those who purchased a plan off-Marketplace. Enrollees with low health insurance literacy were more likely to have challenges finding a plan both on and off Marketplace.
Strengths/Limitations: The study collected experiences from respondents coming from one insurance carrier, potentially limiting the generalizability of results.
Generalizability to the Medicare Population: Low; this study was conducted on consumers purchasing health insurance through Marketplace.
Methods: Surveys were mailed to enrollees in a large non-profit health insurance carrier. A random sample of people who had individual or family coverage was selected for analysis. Descriptive statistics and multivariable logistic regression models were conducted to generate results.

Hibbard JH, Greene J. What the evidence shows about patient activation: better health outcomes and care experiences; fewer data on costs. *Health Aff*. 2013;32(2):207-14. https://doi.org/10.1377/hlthaff.2012.1061
Subtopic: Key Highlights; Background on Patient Empowerment
Type of Source: Journal Article
Objective: To summarize existing research evidence on the relationships between patient activation and health outcomes and patient health care experiences.
Main Findings: Research evidence suggests that more activated patients tend to have better health outcomes and better experiences with care compared with patients who are less activated. Interventions can help to increase patient activation.
Strengths/Limitations: N/A
Generalizability to the Medicare Population: Moderate; this article was not focused specifically on the Medicare population. However, the authors summarized findings on patient activation from health care delivery systems that have participated in Centers for Medicare & Medicaid Services (CMS) models or received innovation grants from CMS.
Methods: A review was conducted on existing literature focused on patient activation.

Hibbard JH, Jewett JJ. Will quality report cards help consumers? *Health Affairs*. 1997;16(3):218-28. https://doi.org/10.1377/hlthaff.16.3.218
Subtopic: Key Highlights; Background on Patient Empowerment
Type of Source: Journal Article
Objective: To assess the extent to which consumers understand quality information.
Main Findings: Consumers that did not understand quality information tended to consider it unimportant. Findings suggest that consumers may not understand quality information, potentially due to a lack of understanding the general health care context.
Strengths/Limitations: Findings were based on a small sample and therefore may be limited in generalizability.
Generalizability to the Medicare Population: Moderate; study participants included a combination of those who were publicly insured, privately insured, and uninsured. However, findings may still be applicable to the Medicare population.

Methods: Content analysis was performed on data from surveys and focus groups with consumers.

Hibbard JH. Patient activation and the use of information to support informed health decisions. *Patient Education and Counseling*. 2017;100(1):5-7. https://doi.org/10.1016/j.pec.2016.07.006

Subtopic: Background on Patient Empowerment
Type of Source: Journal Article
Objective: To summarize the current research landscape of patient activation and provide recommendations for how to advance the implications of this research for clinical practices.
Main Findings: Patient activation should be tailored to the patient and their level of knowledge, skill, and confidence about their health. Studies focused on Patient Activation Measure (PAM) scores indicate that less activated patients are less likely to engage with support resources that are offered and are more likely to feel overwhelmed managing their health relative to more activated patients. Future interventions to improve informed consumer choice could be evaluated by addressing two questions: Who is the intervention reaching? And who is the intervention helping?
Strengths/Limitations: The article provided an overview of the state of patient activation research and can be used to consider future directions of research in the field.
Generalizability to the Medicare Population: Moderate; although the article did not focus on the Medicare population, lessons learned can be applied to encounters with Medicare patients.
Methods: A brief literature review was conducted focused on patient activation.

Hickmann E, Richter P, Chlieter H. All together now – patient engagement, patient empowerment, and associated terms in personal healthcare. *BMC Health Services Research*. 2022;22:1116. https://doi.org/10.1186/s12913-022-08501-5

Subtopic: Background on Patient Empowerment
Type of Source: Journal Article
Objective: To develop a concept map showing similarities and differences between terms used to describe the active role patients can take in their health care, such as patient enablement, patient engagement, patient activation, patient empowerment, patient involvement, patient participation, and related terms.
Main Findings: The terms were categorized into one of three groups: competencies (skills and knowledge about their health); attitudes (feelings of power making patients capable of doing something about their health); and behaviors (actively engaging in their health). Enabling patients to be more empowered can help to increase patients' involvement and engagement in their health care.
Strengths/Limitations: One strength of the article was the wide range of concepts included in the concept map. One limitation of the article was the inconsistent use of terms included in existing literature. Inconsistent usage of terms could make it difficult to know if different terms are being used synonymously.
Generalizability to the Medicare Population: Moderate; although the article was not focused specifically on the Medicare population, patient empowerment, engagement, and related terms are applicable to the Medicare population.
Methods: A systematic review of the literature was conducted.

Higgins T, Larson E, Schnall R. Unraveling the meaning of patient engagement: a concept analysis. *Patient Education and Counseling.* 2017;100:30-36.

Subtopic: Background on Patient Empowerment
Type of Source: Journal Article

Objective: To define patient engagement by developing a concept map for the term.
Main Findings: Patient engagement is a process and a behavior. The authors defined patient engagement as, "the desire and capability to actively choose to participate in care in a way uniquely appropriate to the individual, in cooperation with a healthcare provider or institution, for the purposes of maximizing outcomes or improving experiences of care."
Strengths/Limitations: The concept analysis only included articles that used the term patient engagement. There could be other related terms that reflect the same meaning but were not considered in the concept analysis.
Generalizability to the Medicare Population: Moderate; although the article was not focused specifically on the Medicare population, patient engagement is applicable to the Medicare population.
Methods: A concept analysis of the literature was conducted using Roger's Evolutionary Method.

Holmstrom SE, Stukus K, Goyal MK. Raising confidentiality concerns with a law mandating access to electronic notes. *JAMA Health Forum*. 2021;2(3):e210269. doi:10.1001/jamahealthforum.2021.0269

Subtopic: The Use of Digital Tools to Empower Patients and Support Providers
Type of Source: Online Article
Objective: To describe confidentiality concerns related to mandating open access to clinician notes and to provide recommendations to mitigate possible harms.
Main Findings: Open notes are an important step for patient-centered care; however, confidentiality measures must be taken. A balance between harms can be achieved by considering exceptions to open access laws, including identifying sensitive health information (e.g., mental health, substance use, intimate partner violence, abuse and sexual and reproductive health) and creating split records to designate a difference between guardian access and patient access. Additionally, adolescents should be informed of their health care rights and confidentiality protections under state law.
Strengths/Limitations: N/A
Generalizability to the Medicare Population: Low; the primary concerns described in this article were for minors. However, confidentiality concerns regarding open notes are important to consider for the Medicare population.
Methods: N/A

Honavar SG. Electronic medical records - the good, the bad and the ugly. *Indian J Ophthalmol*. 2020;68(3):417-418. doi:10.4103/ijo.IJO_278_20

Subtopic: The Use of Digital Tools to Empower Patients and Support Providers
Type of Source: Journal Article
Objective: To describe the evolution of electronic medical records (EMRs) as well as their advantages and disadvantages.
Main Findings: EMRs have transformed health care. EMRs can support clinical decision making, improve the accuracy of patient information, and increase access to information. However, EMRs have not been designed to foster patient care and may increase burden on clinicians.
Strengths/Limitations: N/A
Generalizability to the Medicare Population: Moderate; although the article was not focused specifically on the Medicare population, the advantages and disadvantages of EMRs are applicable to the Medicare population.
Methods: A review of the literature was conducted.

IQVIA Institute for Human Data Science. Digital Health Trends 2024: Implications for Research and Patient Care. December 2024. https://www.iqvia.com/insights/the-iqvia-institute/reports-and-publications/reports/digital-health-trends-2024

Subtopic: The Use of Digital Tools to Empower Patients and Support Providers
Type of Source: Report
Objective: To provide an overview of the landscape of digital health and trends across the digital health market.
Main Findings: As of October 2024, there were over 337,000 health applications available. Digital health technologies can diagnose, treat, and remotely monitor patients. The applications can be both patient- and provider-facing. Examples of these technologies include consumer applications, digital diagnostic tools, digital therapeutics, clinical decision support tools, sensors and wearables, and remote patient monitoring tools. Digital platforms informed by artificial intelligence are also used to help improve outcomes for patients with chronic conditions.
Strengths/Limitations: N/A
Generalizability to the Medicare Population: Moderate; although the report did not focus specifically on the use of digital health technology by the Medicare population, many Medicare beneficiaries use digital health technologies.
Methods: A database of consumer mobile health application data was developed and analyzed.

Jiang X, Ming WK, You JH. The cost-effectiveness of digital health interventions on the management of cardiovascular diseases: systematic review. *Journal of Medical Internet Research*. 2019;21(6):e13166. doi:10.2196/13166

Subtopic: The Use of Digital Tools to Empower Patients and Support Providers
Type of Source: Journal Article
Objective: To assess the cost effectiveness of digital health interventions designed to support the management of cardiovascular diseases.
Main Findings: Among cardiovascular diseases, digital health interventions most frequently managed heart failure and stroke. The following devices and technologies were used to deliver the interventions: short message services; telephone support; mobile apps; video conferencing systems; telemonitoring; and wearable devices. The digital health interventions were cost effective.
Strengths/Limitations: The review only included studies written in English. The search used a limited number of databases and keywords. Thus, the study may not have included all relevant literature.
Generalizability to the Medicare Population: Moderate; although the article was not focused specifically on the Medicare population, findings related to the use of digital health interventions are applicable to the Medicare population.
Methods: A systematic review of the literature was conducted.

Karway G, Ivanova J, Kaing T, Todd M, Chern D, Murcko A. My data choices: pilot evaluation of patient-controlled medical record sharing technology. *Health Informatics Journal*. 2022;28(4). doi:10.1177/14604582221143893

Subtopic: The Use of Digital Tools to Empower Patients and Support Providers
Type of Source: Journal Article
Objective: To test the Consent2Share (C2S) tool with behavioral health conditions (BHC) and to understand how it supports granular data sharing (GDS) that aligns with patient preferences and data privacy regulations.
Main Findings: Patients with BHC preferred granular control over sharing their health data. None of the patients chose to “share all” or “share none” of their data. When patients accessed

the educational material on C2S, they were less likely to share all their records and were more likely to restrict access to some data.

Strengths/Limitations: The study was hypothetical; actual choices may vary when patients are presented with their own data.

Generalizability to the Medicare Population: Moderate; although this article did not focus on the Medicare population, consent to share health data is applicable to Medicare patients.

Methods: Study participants used the C2S tool to make GDS choices and provided feedback on their experiences. Descriptive statistics were used to assess the choices provided through the C2S tool. Thematic analysis was used to understand themes in patients' experiences with using the tool.

Katz DA, Wu C, Jaske E, Stewart GL, Mohr DC. Care practices to promote patient engagement in VA primary care: factors associated with high performance. *Ann Fam Med*. 2020;18(5):397-405. https://doi.org/10.1370/afm.2569

Subtopic: Key Highlights; Patient Empowerment and Value-Based Care

Type of Source: Journal Article

Objective: To understand the organizational and contextual factors associated with patient engagement in Veterans Health Administration primary care clinics.

Main Findings: Having a fully staffed team with clear roles, holding daily huddles, and having responsible leadership were positively associated with better patient engagement. Strengthening the medical home can have significant benefits for patient engagement.

Strengths/Limitations: Patient engagement practices were based on self-report and are subject to response bias.

Generalizability to the Medicare Population: Low; the article was focused on the Veterans health care system. However, lessons learned about medical homes can be useful to the engaging with the Medicare population.

Methods: A cross-sectional analysis was conducted on a national survey that assessed the progress toward goals of the patient-centered medical home.

Kim J, Jung H, Bates DW. History and trends of "personal health record" research in PubMed. *Healthc Inform Res*. 2011;17(1):3-17. doi:10.4258/hir.2011.17.1.3

Subtopic: The Use of Digital Tools to Empower Patients and Support Providers

Type of Source: Journal Article

Objective: To provide a history and overview of personal health records (PHRs).

Main Findings: The first time the term PHR appeared in an academic journal was in 1969. There have been changes in the use of and focus on the term over time. For example, the number of studies published on PHRs increased in the 2000s as there was a greater focus on patient-centeredness.

Strengths/Limitations: One limitation is that the study searched for relevant literature using only one database (PubMed).

Generalizability to the Medicare Population: Moderate; although the article was not focused specifically on the Medicare population, findings on PHRs are applicable to the Medicare population.

Methods: A search was conducted using PubMed to identify articles focused on PHRs. A total of 229 articles were included in the study.

Komaromy M, Duhigg D, Metcalf A, et al. Project Echo (Extension for Community Healthcare Outcomes): A new model for educating primary care providers about treatment of substance use disorders. *Substance Abuse*. 2016;37(1):20-24. doi:10.1080/08897077.2015.1129388

Subtopic(s): The Use of Digital Tools to Empower Patients and Support Providers
Type of Source: Journal Article
Objective: To evaluate the success of the Extension for Community Healthcare Outcomes model focused on training physicians on substance use disorders (SUDs) and behavioral health disorders.
Main Findings: There has been significant growth in the teleECHO Clinic over its duration. An average of 147 participants joined the clinic each year. The model allowed for rapid dissemination of new research findings to the teleECHO network.
Strengths/Limitations: N/A
Generalizability to Medicare Population: Weak; this article did not discuss the Medicare population.
Methods: Calculated descriptive statistics using Substance Abuse and Mental Health Services Administration data and teleECHO clinic attendance data.

Latulipe C, Quandt SA, Melius KA, et al. Insights into older adult patient concerns around the caregiver proxy portal use: qualitative interview study. *J Med Internet Res*. 2018;20(11):e10524. doi:10.2196/10524v
Subtopic: The Use of Digital Tools to Empower Patients and Support Providers
Type of Source: Journal Article
Objective: To understand older adult patients' perceived benefits and risks of giving their caregivers access to their patient portals.
Main Findings: Instead of establishing official proxy patient portal accounts, many patients gave their caregivers their patient portal log-in credentials to access the patient portal. Patients generally perceived benefits of allowing their caregivers to access information in their patient portals. However, some patients expressed concerns about caregivers accessing potentially stigmatized information and financial billing information in the portal.
Strengths/Limitations: The study had a small sample size and primarily collected data from older adults with low income, potentially limiting the generalizability of the results.
Generalizability to the Medicare Population: Moderate; although the article was not focused specifically on the Medicare population, findings on patients' perceptions of giving caregivers access to their patient portals are applicable to the Medicare population.
Methods: Semi-structured interviews were conducted with 10 older adult patients with chronic illnesses.

Madanian S, Nakarada-Kordic I, Reay S, Chetty T. Patients' perspectives on digital health tools. *PEC Innov*. 2023;2:100171. doi:10.1016/j.pecinn.2023.100171
Subtopic: Key Highlights; Background on Patient Empowerment; The Use of Digital Tools to Empower Patients and Support Providers
Type of Source: Journal Article
Objective: To review and synthesize the available literature on patient perspectives on digital health tools and applications.
Main Findings: Primary facilitators for patient uptake of digital health tools included patient empowerment, self-management, and personalization through communication and patient-driven solutions. Barriers to patient uptake of digital health tools included digital literacy, health literacy, and privacy concerns. Patients and clinicians have opposing needs for what they prefer in a digital health tool. One way to overcome this difference is to use participatory design, which collects input from patients and clinicians to create a product that is useful for both parties.
Strengths/Limitations: Participatory research was not the focus of this paper.

Generalizability to the Medicare Population: Moderate; although the article did not focus on the Medicare population, findings are applicable to the Medicare population as beneficiaries use digital health tools.
Methods: A critical literature review incorporated 71 articles for thematic and qualitative content analysis.

Milani RV, Lavie CJ, Bober RM, Milani AR, Ventura HO. Improving hypertension control and patient engagement using digital tools. *Am J Med*. 2017;130(1):14-20. http://dx.doi.org/10.1016/j.amjmed.2016.07.029

Subtopic: The Use of Digital Tools to Empower Patients and Support Providers
Type of Source: Journal Article
Objective: To assess the impact of a home-based digital-medicine blood pressure program on improving hypertension control among patients with uncontrolled hypertension.
Main Findings: After 90 days, a greater proportion of patients in the digital-medicine group achieved target blood pressure control relative to patients in the usual-care group. The digital-medicine group also had a greater reduction in systolic/diastolic blood pressure compared with the usual-care group. Patients in the digital-medicine group showed increases in patient activation from baseline to 90 days.
Strengths/Limitations: The study was conducted at a single center in a health care system, reducing the generalizability of findings to other types of health care settings. Patients were not randomly assigned to the intervention group (digital-medicine group) versus the control group (usual-care group).
Generalizability to the Medicare Population: Moderate; although the article was not focused specifically on the Medicare population, findings on the use of digital tools are applicable to the Medicare population.
Methods: The study evaluated a home-based digital-medicine blood pressure program, which included digital health monitoring and an intervention to promote hypertension management.

Miller-Rosales C, Lewis VA, Shortell SM, Rodriguez HP. Adoption of patient engagement strategies by physician practices in the United States. *Med Care*. 2022;60(9):691-699. doi:10.1097/MLR.0000000000001748

Subtopic: The Use of Digital Tools to Empower Patients and Support Providers
Type of Source: Journal Article
Objective: To understand physicians' adoption of patient engagement strategies.
Main Findings: In the US, physician practices have shown modest adoption of patient engagement strategies, including shared decision-making.
Strengths/Limitations: Adoption of patient engagement strategies was assessed using self-reported data. Respondents may have overreported their adoption of these strategies due to social desirability response bias.
Generalizability to the Medicare Population: Moderate; although the article was not focused specifically on the Medicare population, findings are applicable to Medicare's policy initiatives to improve patient engagement.
Methods: Data from the National Survey of Healthcare Organizations and Systems were analyzed to assess the adoption of patient engagement strategies among physician practices in the US. The data were collected from primary care practice sites between 2017 and 2018.

Mishra R, Kaur I, Sahu S, Saxena S, Malsa N, Narwaria M. Establishing three layer architecture to improve interoperability in Medicare using smart and strategic API led integration. *SoftwareX*. 2023;22:101376. https://doi.org/10.1016/j.softx.2023.101376

Subtopic: Key Highlights; The Use of Digital Tools to Empower Patients and Support Providers
Type of Source: Journal Article
Objective: To summarize a framework for improving the interoperability of patient health information between health care organizations.
Main Findings: Application Programming Interfaces (APIs) are helping to facilitate the exchange of data between health care organizations. The authors suggested that medical advancements will depend on interoperability.
Strengths/Limitations: N/A
Generalizability to the Medicare Population: Strong; the framework for interoperability outlined in this article was for the Medicare population.
Methods: N/A

Mora MA, Sparud-Lundin C, Moons P, Bratt EL. Definitions, instruments and correlates of patient empowerment: a descriptive review. *Patient Education and Counseling*. 2022;105(2):346-55. https://doi.org/10.1016/j.pec.2021.06.014

Subtopic: Key Highlights; Background on Patient Empowerment
Type of Source: Journal Article
Objective: To review existing measures of patient empowerment and to understand the correlates of patient empowerment in individuals with chronic conditions.
Main Findings: There are many different definitions and measures used to assess patient empowerment. Thirty-five definitions of patient empowerment with 38 measures were identified in the literature. Correlates of patient empowerment included sociodemographic characteristics, clinical outcomes, patient-reported outcomes, and patient-reported experiences. The authors emphasized the need for consensus on a single definition of patient empowerment and an approach to measure patient empowerment.
Strengths/Limitations: One strength of the study was the inclusion of a pilot test for the data collection form. The pilot was conducted to ensure quality and consistency of the data extraction process. One limitation of the study was that the literature search did not include grey literature; thus, relevant literature may not have been included in the study.
Generalizability to the Medicare Population: Moderate; although the article was not focused specifically on the Medicare population, findings on patient empowerment are applicable to the Medicare population.
Methods: A literature review was conducted to identify articles that discussed definitions and measures of patient empowerment among individuals with chronic conditions.

Mueller KJ, Potter AJ, MacKinney AC, Ward MM. Lessons from tele-emergency: improving care quality and health outcomes by expanding support for rural care systems. Health Aff. 2014;33(2):228-234. https://doi.org/10.1377/hlthaff.2013.1016

Subtopic: The Use of Digital Tools to Empower Patients and Support Providers
Type of Source: Journal Article
Objective: To understand tele-emergency models and outcomes in rural emergency departments (EDs).
Main Findings: The majority of survey respondents reported that tele-emergency improves clinical quality in rural EDs. Reasons for improved quality included improved access to specialized clinicians, improved recruitment and retention of family physicians, increased clinical resources during critical events, reduced time to care, and improved care coordination and

patient-centered care. Tele-emergency can also help to stabilize patient bases. Barriers to tele-emergency implementation included inconsistent reimbursement policies and cross-state licensing-related barriers. Value-based purchasing can encourage the use of tele-emergency.
Strengths/Limitations: The study relied on staff perceptions of quality, which could differ from other measures of quality. The methods used to administer the survey and schedule the interviews may have made this study vulnerable to non-response bias.
Generalizability to the Medicare Population: Strong; Medicare policies related to payment and conditions of participation were considered as policy implications in this article.
Methods: A systematic review was conducted to identify tele-emergency models and outcomes. Then, a survey was administered to hospitals that used tele-emergency services in the upper Midwest. Interviews and site visits were conducted with clinicians and administrators at the hospitals.

Nahm ES, Zhu S, Bellantoni M, Keldsen L, Charters K, Russomanno V, et al. Patient portal use among older adults: what is really happening nationwide? *J Appl Gerontol*. 2020;39(4):442-50. doi:10.1177/0733464818776125

Subtopic: The Use of Digital Tools to Empower Patients and Support Providers
Type of Source: Journal Article
Objective: To assess patient portal use among older adults in the US.
Main Findings: More than half of the older adult participants had two or more patient portal accounts. The usability of patient portals was found to be low relative to the usability of other online programs designed for older people. Generally, older adults reported positive feedback about having the ability to review their own medical records in their patient portals. They most commonly used their patient portals to access lab results and to communicate with their health care providers.
Strengths/Limitations: Older adults that participated in the study were educated online users; thus, results may not be generalizable to the general population of older adults.
Generalizability to the Medicare Population: Moderate; although the article was not focused specifically on the Medicare population, findings on older adults' patient portal use are applicable to the Medicare population as many Medicare beneficiaries use patient portals.
Methods: The analysis focused on quantitative and qualitative data on patient portal use and related outcomes. Data were collected from 272 older adults with at least one chronic condition.

Niazkhani Z, Toni E, Cheshmekaboodi M, Georgiou A, Pirnejad H. Barriers to patient, provider, and caregiver adoption and use of electronic personal health records in chronic care: a systematic review. *BMC Med Inform Decis Mak*. 2020;20:1-36. https://doi.org/10.1186/s12911-020-01159-1
Subtopic: Key Highlights; Background on Patient Empowerment; The Use of Digital Tools to Empower Patients and Support Providers
Type of Source: Journal Article
Objective: To understand barriers that patients with chronic conditions and their providers experience when using electronic personal health records (ePHRs).
Main Findings: Barriers to ePHR use have been more commonly studied in patients relative to providers and health care organizations. Among patients, barriers to ePHR use were associated with demographic characteristics (e.g., age, race and ethnicity, education), perceived usefulness of ePHRs, perceived complexity of navigating ePHRs, and privacy concerns. For example, some patients were concerned about their caregivers having access to their health information. Among providers, barriers to ePHR use were associated with providers' lack of interest or

resistance to adopting ePHRs. For example, some providers were concerned about the impact ePHRs would have on their workload. Providers were also concerned about potential professional or legal liabilities associated with using ePHRs. The authors indicated that ePHRs should be implemented as a component of comprehensive care models for patients with chronic conditions.
Strengths/Limitations: This was the first study to examine barriers to using ePHRs in chronic care. One limitation of the study includes its exclusion of articles that were not published in English.
Generalizability to the Medicare Population: Moderate; although the article was not focused specifically on the Medicare population, findings on barriers to use of ePHRs are applicable to the Medicare population.
Methods: A systematic review of the literature was conducted to identify original research studies on barriers to using ePHRs.

Pekonen A, Eloranta S, Stolt M, Virolainen P, Leino-Kilpi H. Measuring patient empowerment–a systematic review. *Patient Education and Counseling*. 2020;103(4):777-87. https://doi.org/10.1016/j.pec.2019.10.019
Subtopic: Key Highlights; Background on Patient Empowerment
Type of Source: Journal Article
Objective: To identify and assess the psychometric properties of measures of patient empowerment and associated terms, including patient enablement, activation, engagement, and perceived control.
Main Findings: The psychometric properties of measures of patient empowerment are heterogeneous. Of the 13 measures identified in the literature, five measures covered all four components used to define patient empowerment, including patient capacity, patient knowledge, patient behavior, and support from others. Examples of patient empowerment measures identified in the review included the Patient Perceptions of Empowerment Scale (PPES), Health Education Impact Questionnaire (HeiQ), Health Care Empowerment (HCE), Health Empowerment Scale (HES), and China Client Empowerment Scale (CCES). The authors suggested that patient empowerment is more multidimensional compared with related terms.
Strengths/Limitations: As one limitation, the authors noted that some of the measures included in the study are new and may still be under development.
Generalizability to the Medicare Population: Moderate; although the article was not focused specifically on the Medicare population, findings on instruments used to measure patient empowerment are applicable to the Medicare population.
Methods: A systematic review was conducted to identify measures for patient empowerment and related terms.

Pylypchuk Y, Everson J. Interoperability and Methods of Exchange among Hospitals in 2021. Office of the National Coordinator for Health Information Technology. ONC Data Brief No 64. January 2023. https://www.healthit.gov/sites/default/files/2023-01/DB64_Interop_and_Methods_of_Exchange_Among_Hosp.pdf
Subtopic: The Use of Digital Tools to Empower Patients and Support Providers
Type of Source: Report
Objective: To summarize advances made by hospitals to improve information sharing.
Main Findings: Hospitals have increased their engagement in sharing electronic health records. The most common methods for exchanging information were Health Information Service Providers and Health Information Exchanges. The percentage of rural and small hospitals that

have their information available at the point of care increased by 25 percent but lagged their counterparts in engagement in four domains of interoperability.

Strengths/Limitations: This report provided a useful snapshot of the state of interoperability in hospitals from 2017 to 2020.

Generalizability to the Medicare Population: Moderate; although this report was not focused on the Medicare population, information in the report may be useful for the Medicare population.

Methods: Data were gathered from the American Hospital Association (AHA) Information Technology Supplement to the AHA Annual Survey from 2017 to 2020. A logistic regression model was used to predict the propensity of survey response as a function of hospital characteristics.

Reid RO, Deb P, Howell BL, Conway PH, Shrank WH. The roles of cost and quality information in Medicare Advantage plan enrollment decisions: an observational study. *J Gen Intern Med*. 2016;31:234-41. https://doi.org/10.1007/s11606-015-3467-3

Subtopic: Background on Patient Empowerment

Type of Source: Journal Article

Objective: To understand the roles that cost, quality, and benefit information have on beneficiaries' Medicare Advantage enrollment decisions.

Main Findings: Beneficiaries' enrollment decisions were informed by costs, quality, and brand market share. Willingness to pay—including the total annual combined premiums and out-of-pocket costs—ranged from $4,155 for 2.5-star plans to $5,699 for 5-star plans. However, increases in willingness to pay diminished at higher star ratings. Beneficiaries' decisions were strongly related to the plans' brand market share.

Strengths/Limitations: The study used a cross-sectional design and therefore cannot establish causal relationships.

Generalizability to the Medicare Population: Strong; this article focused on beneficiaries' considerations when making Medicare Advantage enrollment decisions.

Methods: A cross-sectional analysis was conducted on Medicare Advantage and Prescription Drug (MAPD) plan choices. The analysis included 847,069 beneficiaries enrolled in Medicare Advantage for the first time in 2011.

Rivera-Hernandez M, Blackwood KL, Mercedes M, Moody KA. Seniors don't use Medicare. Gov: how do eligible beneficiaries obtain information about Medicare Advantage Plans in the United States? *BMC Health Serv Res*. 2021;21:146. https://doi.org/10.1186/s12913-021-06135-7

Subtopic: Background on Patient Empowerment

Type of Source: Journal Article

Objective: To understand how older adults obtain information about Medicare Advantage to make informed decisions about their health coverage.

Main Findings: Many older adults preferred to obtain plan information (e.g., benefits, costs) in person or over the telephone. They relied on insurance brokers and family and friends to gather plan information. Few older adults used resources available online, including the www.medicare.gov website, to make decisions about their health insurance. Older adults that used the internet did not discuss using the CMS Plan Compare tool.

Strengths/Limitations: This study had a relatively small sample size and included only older adults from one state; thus, findings may not be generalizable to the general older adult population or to Medicare Advantage markets with lower or higher penetration.

Generalizability to the Medicare Population: Strong; this article focused on the types of resources beneficiaries used to inform their decisions regarding their health coverage.

Methods: Semi-structured interviews were conducted with 26 Medicare Advantage beneficiaries from Rhode Island.

Romeo A, Edney S, Plotnikoff R, Curtis R, Ryan J, Sanders I, et al. Can smartphone apps increase physical activity? systematic review and meta-analysis. *J Med Internet Res*. 2019;21(3):e12053. doi:10.2196/12053

Subtopic: The Use of Digital Tools to Empower Patients and Support Providers
Type of Source: Journal Article
Objective: To identify randomized controlled trials that assess the efficacy of interventions delivered via smartphone applications designed to increase physical activity in adults.
Main Findings: Interventions delivered via smartphone applications had a positive but non-significant impact on the average number of steps per day, relative to control conditions. Physical activity interventions that lasted less than three months were more effective at increasing physical activity compared with interventions that lasted more than three months. Applications that specifically targeted physical activity in isolation, as opposed to physical activity in combination with diet, were more effective at increasing physical activity.
Strengths/Limitations: A small number of randomized controlled trials met the inclusion criteria, and the studies had relatively small sample sizes. In addition, some of the studies included elements beyond a smartphone application, such as activity trackers, which may have an impact on physical activity.
Generalizability to the Medicare Population: Moderate; although this article was not focused specifically on the Medicare population, results are applicable to the Medicare population as many Medicare beneficiaries use smartphone applications designed to improve health and wellness.
Methods: A systematic review and meta-analysis were conducted to assess randomized controlled trials focused on smartphone applications designed to increase physical activity in adults.

Salmi L, Blease C, Hägglund M, Walker J, DesRoches CM. US policy requires immediate release of records to patients. *BMJ*. 2021;372:n426. https://doi.org/10.1136/bmj.n426

Subtopic: The Use of Digital Tools to Empower Patients and Support Providers
Type of Source: Journal Article
Objective: To summarize the benefits and concerns of a rule that requires US health care providers to give patients access to their health information in an electronic format.
Main Findings: Health care providers are required to give patients access to their health information in the electronic medical record at no charge, as part of the 21st Century Cures Act of 2016. Benefits of the information sharing rule for patients include feeling more involved in and knowledgeable about their health and care. The rule was expected to strengthen patient-clinician communication, encourage self-management, increase health literacy, and foster trust.
Strengths/Limitations: N/A
Generalizability to the Medicare Population: Strong; this article focused on a new information sharing rule that impacted all patients in the US, including Medicare beneficiaries.
Methods: N/A

Schlesinger M, Kanouse DE, Martino SC, Shaller D, Rybowski L. Complexity, public reporting, and choice of doctors: a look inside the blackest box of consumer behavior. *Med Care Res Rev*. 2014;71(5 Suppl):38S-64S. doi:10.1177/1077558713496321

Subtopic: Background on Patient Empowerment; Areas Where Additional Information is Needed
Type of Source: Journal Article

Objective: To understand the association between the complexity of different choices and consumers' decision quality.
Main Findings: When selecting a primary care physician, consumers' decision quality decreased as the complexity of the presented choice sets increased. Although consumers' skills and decision-making styles had a role in the quality of decisions, the relationship between complexity and decision quality remained even after accounting for such factors. The influence of the complexity of choices on decision quality may extend beyond the factors considered in the study, including consumers' skills and decision-making styles. Additional research is needed to identify these factors.
Strengths/Limitations: The study used an experimental design to understand the association between decision quality and choice complexity. Additional work is needed to examine the relationship between the complexity of choices and decision quality in real-world contexts.
Generalizability to the Medicare Population: Moderate; although the article was not focused specifically on the Medicare population, findings may be applicable to the process Medicare beneficiaries experience when selecting a health care provider.
Methods: In an experiment, participants were presented with a hypothetical scenario where they were to select a primary care physician using a protype website that functioned similarly to report card websites. Participants were provided information on the physicians, including performance metrics such as Consumer Assessment of Healthcare Providers and Systems (CAHPS) and Healthcare Effectiveness Data and Information Set (HEDIS) scores. To manipulate the complexity of choice sets, experimenters increased the amount of quality information provided to participants (e.g., measures of clinical performance, patient anecdotes about their experiences) and increased the number of options of primary care physicians from which participants could select.

Serrano LP, Maita KC, Avila FR, et al. Benefits and challenges of remote patient monitoring as perceived by health care practitioners: a systematic review. *Perm J*. 27(4):100-111. doi:10.7812/TPP/23.022

Subtopic: Key Highlights; The Use of Digital Tools to Empower Patients and Support Providers
Type of Source: Journal Article
Objective: To understand health care practitioners' experiences and concerns with using remote patient monitoring technologies.
Main Findings: Health care practitioners reported benefits and challenges with using remote patient monitoring technologies. Perceived benefits included the ability to provide prompt care to patients and visualize health trends. Benefits also included improvements in patient communication, confidence, education, and self-care at home. Perceived challenges included increases in practitioner workloads, increases in patient anxiety if patients believed their providers were not constantly monitoring patient data, potential issues regarding data accuracy (e.g., invalid patient measures, concerns of false positives), confusion about how to use the technology, financial concerns, particularly for patients from low-income populations, and concerns about patient privacy.
Strengths/Limitations: The authors noted a limited amount of information available on health care practitioners' experiences with using remote patient monitoring technologies. The studies included in the systematic review differed on the types of technologies used, the practitioners' specialties, and the vitals that were monitored.
Generalizability to the Medicare Population: Moderate; although this article was not focused specifically on the Medicare population, findings are applicable to the Medicare population because some beneficiaries use remote patient monitoring.

Methods: A systematic review was conducted to understand the experiences of health care practitioners from different specialties who used remote patient monitoring technologies. The review included 13 articles.

Stacey D, Lewis KB, Smith M, Carley M, Volk R, Douglas EE, et al. Decision aids for people facing health treatment or screening decisions. *Cochrane Database Syst Rev*. 2024;(1):CD001431. doi:10.1002/14651858.CD001431.pub6

Subtopic: The Use of Digital Tools to Empower Patients and Support Providers
Type of Source: Journal Article
Objective: To evaluate the impact of patient decision aids on treatment and screening decisions.
Main Findings: Patient decision aids focused on 71 different medical decisions, such as decisions regarding cardiovascular treatments, cancer screening, cancer treatments, mental health treatments, and joint replacement surgery. Relative to usual care, the use of patient decision aids was associated with improved patient knowledge and accuracy of risk perceptions. Patient decision aids were also associated with decreased decisional conflict from feeling uninformed, indecision about personal values, and the number of patients who were passive in their decision making. No difference was found in the length of consultation times when patient decision aids were versus were not used in preparation for the consultation.
Strengths/Limitations: One limitation of this study included a lack of power to assess differences related to the type of comparator used in the studies. The measures used for some outcomes differed across studies, which may have introduced bias in the findings.
Generalizability to the Medicare Population: Moderate; although this study was not focused specifically on the Medicare population, findings on patient decision aids are applicable to the Medicare population as the Centers for Medicare & Medicaid Services encourage the use of decision aids for reimbursement of some health care services.
Methods: A Cochrane systematic review focused on randomized controlled trials published between 2015 to March 2022 was conducted. Patient decision aids were compared with usual care. The review included 209 studies.

Tapuria A, Porat T, Kalra D, Dsouza G, Xiaohui S, Curcin V. Impact of patient access to their electronic health record: systematic review. *Inform Health Soc Care*. 2021;46(2):192-204. doi:10.1080/17538157.2021.1879810

Subtopic: The Use of Digital Tools to Empower Patients and Support Providers
Type of Source: Journal Article
Objective: To review benefits and concerns associated with sharing electronic health records (EHRs) with patients.
Main Findings: Benefits of sharing EHRs with patients included improved self-reported levels of engagement, enhanced knowledge, reduced anxiety, stronger patient-clinician relationships, and increased patient adherence to medications. Sharing EHRs with patients was also associated with positive health outcomes, such as improved blood pressure and glycemic control. Concerns with sharing EHRs with patients were related to security, privacy, and confidentiality of patient health information.
Strengths/Limitations: The review included papers published in English and did not include grey literature; therefore, the study may not have included all relevant papers and other resources on the topic.
Generalizability to the Medicare Population: Moderate; although this article was not focused specifically on the impact of sharing EHRs with Medicare beneficiaries, findings are applicable to the Medicare population.

Methods: A systematic review of articles focused on impacts and outcomes of sharing EHRs with patients. The review included 74 articles.

Thompson AG. The meaning of patient involvement and participation in health care consultations: a taxonomy. *Soc Sci Med*. 2007;64(6):1297-310. doi:10.1016/j.socscimed.2006.11.002

Subtopic: Key Highlights; Background on Patient Empowerment
Type of Source: Journal Article
Objective: To develop a taxonomy for patient involvement and participation in their health care.
Main Findings: The taxonomy for patient involvement included five discrete levels of involvement ranging from non-involved to autonomous decision-making. The extent to which patients wish to be involved in their health care can depend on different factors such as the illness to be treated, patient characteristics, and the relationship between the patient and their health care provider.
Strengths/Limitations: It remains unclear how different ethnic groups perceive patient involvement in health care and how personality characteristics impact patient involvement.
Generalizability to the Medicare Population: Moderate; although the study participants were not Medicare beneficiaries, the taxonomy of patient involvement is applicable to the Medicare population.
Methods: A series of semi-structured interviews, focus groups, and workshops were conducted with patients to collect their experiences and perspectives on the extent to which they wish to be involved in health care decisions. Qualitative data informed the development of a taxonomy for patient involvement.

US Preventive Services Task Force; Davidson KW, Mangione CM, Barry MJ, Nicholson WK, Cabana MD, Caughey AB, et al. Collaboration and shared decision-making between patients and clinicians in preventive health care decisions and US Preventive Services Task Force recommendations. *JAMA*. 2022 Mar 22;327(12):1171-1176. doi:10.1001/jama.2022.3267

Subtopic: Key Highlights; The Use of Digital Tools to Empower Patients and Support Providers
Type of Source: Journal Article
Objective: To review the role of shared decision-making in making patient-centered decisions about prevention across different US Preventive Services Task Force (USPSTF) recommendations.
Main Findings: Patients have the right to work with their clinicians to make informed decisions about their health. Patient decision aids can facilitate shared decision-making by providing patients with the information they need to make decisions that align with their goals and values. Shared decision-making has different roles across USPSTF recommendations. Clinical judgement should be used to decide whether and how to use shared decision-making for preventive services with A and B recommendations. Under these recommendations, preventive services should be presented as a recommendation to the patient. Not all C recommendations require shared decision-making, and there is no need to discuss preventive services with a D or I recommendation unless asked by the patient.
Strengths/Limitations: N/A
Generalizability to the Medicare Population: Moderate; although the article did not focus specifically on shared decision-making in the Medicare population, using shared decision-making to make choices about preventive services is relevant to Medicare beneficiaries.
Methods: A review of the literature on shared decision-making and the role of the USPSTF.

van Kessel R, Ranganathan S, Anderson M, McMillan B, Mossialos E. Exploring potential drivers of patient engagement with their health data through digital platforms: a scoping review. *Int J Med Inform*. 2024;189:105513. https://doi.org/10.1016/j.ijmedinf.2024.105513

Subtopic: Key Highlights; Background on Patient Empowerment

Type of Source: Journal Article

Objective: To identify different factors that influence patient engagement in their health data.

Main Findings: The review identified 44 different factors that can impact patient engagement in their health data. Relevant factors identified in the literature included social and demographic factors (e.g., age, income level, race and ethnicity), patient ability factors (e.g., awareness of electronic health record [EHR] access, health literacy), patient motivation factors (e.g., perceptions towards technology, perceived control over health data), factors associated with health care professionals' attitudes and skills (e.g., changes in workflows, workload, likelihood of burnout), health care system factors (e.g., collection and storage of patient data, integration of EHRs into workflows), technological factors (e.g., mobile device compatibility, privacy and security), and policy factors (e.g., protection of patient privacy and security, regulation of patient access to data).

Strengths/Limitations: The study did not assess the quality of the sources identified in the literature. The authors noted that their conclusions regarding factors related to patient engagement in health data may not be applicable to all health care settings.

Generalizability to the Medicare Population: Moderate; although the scoping review did not focus specifically on identifying literature on the Medicare population, findings on engagement in health data are applicable to Medicare beneficiaries.

Methods: A scoping review with qualitative synthesis was conducted to identify factors that influence patient engagement with health data. The review included 292 academic and grey literature records.

Victoor A, Delnoij DM, Friele RD, Rademakers JJ. Determinants of patient choice of healthcare providers: a scoping review. *BMC Health Services Research*. 2012;12:1-6. https://doi.org/10.1186/1472-6963-12-272

Subtopic(s): Key Highlights; Background on Patient Empowerment

Type of Source: Journal Article

Objective: To understand the factors patients consider when selecting a health care provider.

Main Findings: When selecting a health care provider, patient choice is determined by both patient and provider characteristics. Patients' previous health care experiences and provider recommendations may have a greater influence on patient choice in a health care provider than comparative information. Instead of relying solely on outcome indicators when selecting a provider, patients consider different structural characteristics (e.g., availability of providers, accessibility of providers, type of provider), process characteristics (e.g., interpersonal factors, continuity of treatment, waiting time, quality of treatment), and outcome characteristics (e.g., mortality) of providers.

Strengths/Limitations: The scoping review included only scientific papers written in English and excluded studies from non-Western countries, potentially limiting the generalizability of results.

Generalizability to Medicare Population: Moderate; although the scoping review did not focus specifically on identifying literature on the Medicare population, findings on patient choice are applicable to Medicare beneficiaries.

Methods: A scoping review was conducted to understand the determinants of patient choice when selecting a health care provider. The review included 118 studies.

Wade B, Abraham J, Coder M. Guidance to Industry: Classification of Digital Health Technologies. Digital Therapeutic Alliance; Health Advances. 2023. https://dtxalliance.org/wp-content/uploads/2023/06/Guidance-to-Industry-Classification-of-Digital-Health-Technologies-2023Jun05.pdf

> **Subtopic**: Key Highlights; The Use of Digital Tools to Empower Patients and Support Providers
> **Type of Source**: Report
> **Objective**: To provide an overview of digital health technologies.
> **Main Findings**: Digital health technologies include a broad range of tools, such as computing platforms, software, and sensors. These technologies aim to support health and wellness, patient monitoring, care support, digital diagnostics, digital therapeutics, health system clinical and operational software, and non-health system software. The tools can be provider-facing, patient-facing, or provider- and patient-facing. Whereas some tools provide patients with information about their health, other tools can deliver medical interventions.
> **Strengths/Limitations**: N/A
> **Generalizability to the Medicare Population**: Moderate; although the report did not focus specifically on the use of digital health technology by the Medicare population, digital health technologies are used by Medicare beneficiaries and providers.
> **Methods**: N/A

Ward MM, Jaana M, Natafgi N. Systematic review of telemedicine applications in emergency rooms. *International Journal of Medical Informatics*. 2015;84(9):601-616. doi:10.1016/j.ijmedinf.2015.05.009

> **Subtopic(s)**: The Use of Digital Tools to Empower Patients and Support Providers
> **Type of Source:** Journal Article
> **Objective**: To review telemedicine applications for hospital-based care and understand its impact on patients, providers, organizations, and health systems.
> **Main Findings**: Telemedicine applications have the potential to make important impacts on the needs of small and rural hospitals, particularly in emergency situations that require specialist care. Technical quality and user satisfaction was found to be generally positive in tele-emergency studies. Technology is evolving quickly, and it is difficult to glean meaningful findings from studies of a particular application before a new application is developed.
> **Strengths/Limitations:** Telehealth is generally useful to improve access issues for rural settings; however, generalizability of findings is difficult due to the wide variability of clinical settings, scope, and technology.
> **Generalizability to Medicare Population:** Moderate; although this systematic review did not focus primarily on Medicare populations, many of the applications are applicable to their care.
> **Methods:** Systematic review utilizing PubMed, CINAHL, EMBASE, and the Cochrane Database. Keywords related to telemedicine and telehealth were used to identify relevant articles. Thirty-eight studies were included in the article.

Appendix F. References

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[1] Hibbard JH, Greene J. What the evidence shows about patient activation: better health outcomes and care experiences; fewer data on costs. *Health Affairs*. 2013;32(2):207-14. https://doi.org/10.1377/hlthaff.2012.1061

[2] Greene J, Hibbard JH. Why does patient activation matter? An examination of the relationships between patient activation and health-related outcomes. *J Gen Intern Med*. 2011;27(5):520-6. doi:10.1007/s11606-011-1931-2

[3] Mora MA, Sparud-Lundin C, Moons P, Bratt EL. Definitions, instruments and correlates of patient empowerment: a descriptive review. *Patient Education and Counseling*. 2022;105(2):346-55. https://doi.org/10.1016/j.pec.2021.06.014

[4] Victoor A, Delnoij DM, Friele RD, Rademakers JJ. Determinants of patient choice of healthcare providers: a scoping review. BMC Health Services Research. 2012;12:1-6. https://doi.org/10.1186/1472-6963-12-272

[5] Government Accountability Office. Medicare Plan Finder: Usability Problems and Incomplete Information Create Challenges for Beneficiaries Comparing Coverage Options. July 2019. GAO-19-627. https://www.gao.gov/assets/gao-19-627.pdf

[6] Hibbard JH, Jewett JJ. Will quality report cards help consumers? *Health Affairs*. 1997;16(3):218-28. https://doi.org/10.1377/hlthaff.16.3.218

[7] Elwyn G, Frosch D, Thomson R, Joseph-Williams N, Lloyd A, Kinnersley P, et al. Shared decision making: a model for clinical practice. *J Gen Intern Med*. 2012;27(10):1361-7. doi:10.1007/s11606-012-2077-6

[8] Elwyn G, Frosch D, Thomson R, Joseph-Williams N, Lloyd A, Kinnersley P, et al. Shared decision making: a model for clinical practice. *J Gen Intern Med*. 2012;27(10):1361-7. doi:10.1007/s11606-012-2077-6

[9] Thompson AG. The meaning of patient involvement and participation in health care consultations: a taxonomy. *Soc Sci Med*. 2007;64(6):1297-310. doi:10.1016/j.socscimed.2006.11.002

[10] Carman KL, Workman TA. Engaging patients and consumers in research evidence: applying the conceptual model of patient and family engagement. *Patient Education and Counseling*. 2017;100(1):25-9. https://doi.org/10.1016/j.pec.2016.07.009

[11] Carman KL, Dardess P, Maurer M, Sofaer S, Adams K, Bechtel C, et al. Patient and family engagement: a framework for understanding the elements and developing interventions and policies. *Health Affairs*. 2013;32(2):223-231. doi: 10.1377/hlthaff.2012.1133

[12] Madanian S, Nakarada-Kordic I, Reay S, Chetty T. Patients' perspectives on digital health tools. *PEC Innov*. 2023;2:100171. doi:10.1016/j.pecinn.2023.100171

[13] Niazkhani Z, Toni E, Cheshmekaboodi M, Georgiou A, Pirnejad H. Barriers to patient, provider, and caregiver adoption and use of electronic personal health records in chronic care: a systematic review. *BMC Medical Informatics and Decision Making*. 2020;20:1-36. https://doi.org/10.1186/s12911-020-01159-1

[14] Van Kessel R, Ranganathan S, Anderson M, McMillan B, Mossialos E. Exploring potential drivers of patient engagement with their health data through digital platforms: a scoping review. *International Journal of Medical Informatics*. 2024;189:105513. doi:10.1016/j.ijmedinf.2024.105513

[15] Carman KL, Dardess P, Maurer M, Sofaer S, Adams K, Bechtel C, et al. Patient and family engagement: a framework for understanding the elements and developing interventions and policies. *Health Affairs*. 2013;32(2):223-231. doi: 10.1377/hlthaff.2012.1133

[16] Carman KL, Dardess P, Maurer M, Sofaer S, Adams K, Bechtel C, et al. Patient and family engagement: a framework for understanding the elements and developing interventions and policies. *Health Affairs*. 2013;32(2):223-231. doi: 10.1377/hlthaff.2012.1133

[17] Pekonen A, Eloranta S, Stolt M, Virolainen P, Leino-Kilpi H. Measuring patient empowerment–a systematic review. *Patient Education and Counseling*. 2020;103(4):777-87. https://doi.org/10.1016/j.pec.2019.10.019

[18] Desai PJ, Nanji K, Dullabh PM, Cope E, Catlett M, Adler J, et al and the CDSiC Outcomes and Objectives Workgroup. Integration of Patient-Centered Clinical Decision Support Into Shared Decision Making. Prepared under Contract No. 75Q80120D00018. AHRQ Publication No. 23-0084. Rockville, MD: Agency for Healthcare Research and Quality; September 2023. https://cdsic.ahrq.gov/sites/default/files/2023-09/FINAL%20OO%20PC%20CDS%20SDM%20Report.pdf

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[19] Interoperability in Healthcare | HIMSS. August 4, 2020. Accessed May 18, 2025. https://legacy.himss.org/resources/interoperability-healthcare

[20] Bates DW, Samal L. Interoperability: what is it, how can we make it work for clinicians, and how should we measure it in the future? *Health Serv Res*. 2018;53(5):3270-3277. doi:10.1111/1475-6773.12852

[21] Mishra R, Kaur I, Sahu S, Saxena S, Malsa N, Narwaria M. Establishing three layer architecture to improve interoperability in Medicare using smart and strategic API led integration. *SoftwareX*. 2023;22:101376.

[22] Desai PJ, Nanji K, Dullabh PM, Cope E, Catlett M, Adler J, et al and the CDSiC Outcomes and Objectives Workgroup. Integration of Patient-Centered Clinical Decision Support Into Shared Decision Making. Prepared under Contract No. 75Q80120D00018. AHRQ Publication No. 23-0084. Rockville, MD: Agency for Healthcare Research and Quality; September 2023. https://cdsic.ahrq.gov/sites/default/files/2023-09/FINAL%20OO%20PC%20CDS%20SDM%20Report.pdf

[23] Wade B, Abraham J, Coder M. *Guidance to Industry: Classification of Digital Health Technologies*. Digital Therapeutic Alliance; Health Advances; 2023. Accessed May 15, 2025. https://dtxalliance.org/wp-content/uploads/2023/06/Guidance-to-Industry-Classification-of-Digital-Health-Technologies-2023Jun05.pdf

[24] US Preventive Services Task Force; Davidson KW, Mangione CM, Barry MJ, Nicholson WK, Cabana MD, Caughey AB, et al. Collaboration and shared decision-making between patients and clinicians in preventive health care decisions and US Preventive Services Task Force recommendations. *JAMA*. 2022 Mar 22;327(12):1171-1176. doi:10.1001/jama.2022.3267

[25] Agency for Healthcare Research and Quality. *The CAHPS Ambulatory Care Improvement Guide: Strategy 6I: Shared Decisionmaking*.; 2017. Accessed May 19, 2025. https://www.ahrq.gov/cahps/quality-improvement/improvement-guide/6-strategies-for-improving/communication/strategy6i-shared-decisionmaking.html

[26] Serrano LP, Maita KC, Avila FR, et al. Benefits and challenges of remote patient monitoring as perceived by health care practitioners: a systematic review. *Perm J*. 27(4):100-111. doi:10.7812/TPP/23.022

[27] What is Value-Based Care? America Medical Association. April 16, 2025. Accessed April 29, 2025. https://www.ama-assn.org/practice-management/payment-delivery-models/what-value-based-care

[28] Accountable Health Communities Model. Centers for Medicare & Medicaid Services. Accessed April 29, 2025. https://www.cms.gov/priorities/innovation/innovation-models/ahcm

[29] Innovation in Behavioral Health (IBH) Model. Centers for Medicare & Medicaid Services. Accessed April 29, 2025. https://www.cms.gov/priorities/innovation/innovation-models/innovation-behavioral-health-ibh-model

[30] Medicare Diabetes Prevention Program (MDPP) Expanded Model. Accessed April 29, 2025. https://www.cms.gov/priorities/innovation/innovation-models/medicare-diabetes-prevention-program

[31] Transforming Maternal Health (TMaH) Model. Centers for Medicare & Medicaid Services. Accessed April 29, 2025. https://www.cms.gov/priorities/innovation/innovation-models/transforming-maternal-health-tmah-model

[32] Katz DA, Wu C, Jaske E, Stewart GL, Mohr DC. Care practices to promote patient engagement in VA primary care: factors associated with high performance. *The Annals of Family Medicine*. 2020;18(5):397-405. https://doi.org/10.1370/afm.2569

[33] CMS Innovation Center Strategy to Make America Healthy Again. Accessed May 21, 2025. https://www.cms.gov/priorities/innovation/about/cms-innovation-center-strategy-make-america-healthy-again

[34] Emanuel EJ, Emanuel LL. Four models of the physician-patient relationship. *JAMA*. 1992;267(16):2221-6. doi:10.1001/jama.1992.03480160079038

[35] Emanuel EJ, Emanuel LL. Four models of the physician-patient relationship. *JAMA*. 1992;267(16):2221-6. doi:10.1001/jama.1992.03480160079038

[36] Castro EM, Van Regenmortel T, Vanhaecht K, Sermeus W, Van Hecke A. Patient empowerment, patient participation and patient-centeredness in hospital care: A concept analysis based on a literature review. *Patient Education and Counseling*. 2016;99(12):1923-39. https://doi.org/10.1016/j.pec.2016.07.026

[37] Harrington RL, Hanna ML, Oehrlein EM, Camp R, Wheeler R, Cooblall C, et al. Defining patient engagement in research: results of a systematic review and analysis: report of the ISPOR patient-centered special interest group. *Value in Health*. 2020;23(6):677-88. https://doi.org/10.1016/j.jval.2020.01.019

---

[38] Elwyn G, Frosch D, Thomson R, Joseph-Williams N, Lloyd A, Kinnersley P, et al. Shared decision making: a model for clinical practice. *J Gen Intern Med*. 2012;27(10):1361-7. doi:10.1007/s11606-012-2077-6

[39] Castro EM, Van Regenmortel T, Vanhaecht K, Sermeus W, Van Hecke A. Patient empowerment, patient participation and patient-centeredness in hospital care: A concept analysis based on a literature review. *Patient Education and Counseling*. 2016;99(12):1923-39. https://doi.org/10.1016/j.pec.2016.07.026

[40] Pekonen A, Eloranta S, Stolt M, Virolainen P, Leino-Kilpi H. Measuring patient empowerment–a systematic review. *Patient Education and Counseling*. 2020;103(4):777-87. https://doi.org/10.1016/j.pec.2019.10.019

[41] Castro EM, Van Regenmortel T, Vanhaecht K, Sermeus W, Van Hecke A. Patient empowerment, patient participation and patient-centeredness in hospital care: A concept analysis based on a literature review. *Patient Education and Counseling*. 2016;99(12):1923-39. https://doi.org/10.1016/j.pec.2016.07.026

[42] Hibbard JH, Greene J. What the evidence shows about patient activation: better health outcomes and care experiences; fewer data on costs. *Health Affairs*. 2013;32(2):207-14. https://doi.org/10.1377/hlthaff.2012.1061

[43] Hibbard JH. Patient activation and the use of information to support informed health decisions. *Patient Education and Counseling*. 2017;100(1):5-7. https://doi.org/10.1016/j.pec.2016.07.006

[44] Greene J, Hibbard JH. Why does patient activation matter? An examination of the relationships between patient activation and health-related outcomes. *J Gen Intern Med*. 2011;27(5):520-6. doi:10.1007/s11606-011-1931-2

[45] Hibbard JH, Greene J. What the evidence shows about patient activation: better health outcomes and care experiences; fewer data on costs. *Health Affairs*. 2013;32(2):207-14. https://doi.org/10.1377/hlthaff.2012.1061

[46] Greene J, Hibbard JH. Why does patient activation matter? An examination of the relationships between patient activation and health-related outcomes. *J Gen Intern Med*. 2011;27(5):520-6. doi:10.1007/s11606-011-1931-2

[47] Greene J, Hibbard JH. Why does patient activation matter? An examination of the relationships between patient activation and health-related outcomes. *J Gen Intern Med*. 2011;27(5):520-6. doi:10.1007/s11606-011-1931-2

[48] Hibbard JH, Greene J. What the evidence shows about patient activation: better health outcomes and care experiences; fewer data on costs. *Health Affairs*. 2013;32(2):207-14. https://doi.org/10.1377/hlthaff.2012.1061

[49] Alexander JA, Hearld LR, Mittler JN, Harvey J. Patient-physician role relationships and patient activation among individuals with chronic illness. *Health Serv Res*. 2012; 47(3 Pt 1):1201-23. doi:10.1111/j.1475-6773.2011.01354.x

[50] Mora MA, Sparud-Lundin C, Moons P, Bratt EL. Definitions, instruments and correlates of patient empowerment: a descriptive review. *Patient Education and Counseling*. 2022;105(2):346-55. https://doi.org/10.1016/j.pec.2021.06.014

[51] Mora MA, Sparud-Lundin C, Moons P, Bratt EL. Definitions, instruments and correlates of patient empowerment: a descriptive review. *Patient Education and Counseling*. 2022;105(2):346-55. https://doi.org/10.1016/j.pec.2021.06.014

[52] Carman KL, Dardess P, Maurer M, Sofaer S, Adams K, Bechtel C, et al. Patient and family engagement: a framework for understanding the elements and developing interventions and policies. *Health Affairs*. 2013;32(2):223-231. doi: 10.1377/hlthaff.2012.1133

[53] Hickmann E, Richter P, Chlieter H. All together now – patient engagement, patient empowerment, and associated terms in personal healthcare. *BMC Health Services Research*. 2022;22:1116. https://doi.org/10.1186/s12913-022-08501-5

[54] Harrington RL, Hana ML, Oehrlein EM, Camp R, Wheeler R, Cooblall C, et al. Definition patient engagement in research: results of a systematic review and analysis: report of the ISPOR Patient-Centered Special Interest Group. *Value in Health*. 2020;23(6)677-688.

[55] Bravo P, Edwards A, Barr PJ, Scholl I, Elwyn G, McAllister M, et al. Conceptualising patient empowerment: a mixed methods study. *BMC Health Services Research*. 2015;15:252.

[56] Fumagalli LP, Radaelli G, Lettieri E, Bertele P, Masella C. Patient empowerment and its neighbours: clarifying the boundaries and their mutual relationships. *Health Policy*. 2015;119:384-394.

[57] Castro EM, Regenmortel TV, Vanhaecht K, Serneus W, Hecke AV. Patient empowerment, patient participation and patient-centeredness in hospital care: a concept analysis based on a literature review. *Patient Education and Counseling*. 2016;99:1923-1939.

[58] Higgins T, Larson E, Schnall R. Unraveling the meaning of patient engagement: a concept analysis. *Patient Education and Counseling*. 2017;100:30-36.

---

[59] Pekonen A., Eloranta S, Stolt M, Virolainen P, Leino-Kilpi H. Measuring patient empowerment – a systematic review. *Patient Education and Counseling*. 2020;193:777-787.

[60] Hickmann E, Richter P, Chlieter H. All together now – patient engagement, patient empowerment, and associated terms in personal healthcare. *BMC Health Services Research*. 2022;22:1116. https://doi.org/10.1186/s12913-022-08501-5

[61] Mora MA, Sparud-Lundin C, Moons P, Bratt E-L. Definitions, instruments and correlates of patient empowerment: a descriptive review. *Patient Education and Counseling*. 2022;105:346-355.

[62] Office of Disease Prevention and Health Promotion. Health Literacy in Healthy People 2030. https://odphp.health.gov/healthypeople/priority-areas/health-literacy-healthy-people-2030. Accessed May 15, 2025.

[63] Fumagalli LP, Radaelli G, Lettieri E, Bertele P, Masella C. Patient empowerment and its neighbours: clarifying the boundaries and their mutual relationships. *Health Policy*. 2015;119:384-394.

[64] Higgins T, Larson E, Schnall R. Unraveling the meaning of patient engagement: a concept analysis. *Patient Education and Counseling*. 2017;100:30-36.

[65] Hickmann E, Richter P, Chlieter H. All together now – patient engagement, patient empowerment, and associated terms in personal healthcare. *BMC Health Services Research*. 2022;22:1116. https://doi.org/10.1186/s12913-022-08501-5

[66] Harrington RL, Hanna ML, Oehrlein EM, Camp R, Wheeler R, Cooblall C, et al. Defining patient engagement in research: results of a systematic review and analysis: report of the ISPOR patient-centered special interest group. *Value in Health*. 2020;23(6):677-688.

[67] Higgins T, Larson E, Schnall R. Unraveling the meaning of patient engagement: a concept analysis. *Patient Education and Counseling.* 2017;100:30-36.

[68] Higgins T, Larson E, Schnall R. Unraveling the meaning of patient engagement: a concept analysis. *Patient Education and Counseling.* 2017;100:30-36.

[69] Fumagalli LP, Radaelli G, Lettieri E, Bertele P, Masella C. Patient empowerment and its neighbours: clarifying the boundaries and their mutual relationships. *Health Policy*. 2015;119:384-394.

[70] Higgins T, Larson E, Schnall R. Unraveling the meaning of patient engagement: a concept analysis. Patient Education and Counseling; 2017;100:30-36.

[71] Fumagalli LP, Radaelli G, Lettieri E, Bertele P, Masella C. Patient empowerment and its neighbours: clarifying the boundaries and their mutual relationships. *Health Policy*. 2015;119:384-394.

[72] Fumagalli LP, Radaelli G, Lettieri E, Bertele P, Masella C. Patient empowerment and its neighbours: clarifying the boundaries and their mutual relationships. *Health Policy*. 2015;119:384-394.

[73] Higgins T, Larson E, Schnall R. Unraveling the meaning of patient engagement: a concept analysis. *Patient Education and Counseling.* 2017;100:30-36.

[74] Hickmann E, Richter P, Chlieter H. All together now – patient engagement, patient empowerment, and associated terms in personal healthcare. *BMC Health Services Research*. 2022;22:1116. https://doi.org/10.1186/s12913-022-08501-5

[75] Higgins T, Larson E, Schnall R. Unraveling the meaning of patient engagement: a concept analysis. *Patient Education and Counseling.* 2017;100:30-36.

[76] Fumagalli LP, Radaelli G, Lettieri E, Bertele P, Masella C. Patient empowerment and its neighbours: clarifying the boundaries and their mutual relationships. *Health Policy*. 2015;119:384-394.

[77] Bailo L, Guiddi P, Vergani L, Marton G, Pravettoni G. The patient perspective: investigating patient empowerment enablers and barriers within the oncological care process. *Ecancermedicalscience*. 2019;13:912. doi:10.3332/ecancer.2019.912

[78] Victoor A, Delnoij DM, Friele RD, Rademakers JJ. Determinants of patient choice of healthcare providers: a scoping review. *BMC Health Services Research*. 2012;12:1-6. https://doi.org/10.1186/1472-6963-12-272

[79] Centers for Medicare & Medicaid Services. Provider Data Catalogue. https://data.cms.gov/provider-data/

[80] Medicare.gov. Find & compare providers near you. https://www.medicare.gov/care-compare/

[81] Victoor A, Delnoij DM, Friele RD, Rademakers JJ. Determinants of patient choice of healthcare providers: a scoping review. *BMC Health Services Research*. 2012;12:1-6. https://doi.org/10.1186/1472-6963-12-272

---

[82] Victoor A, Delnoij DM, Friele RD, Rademakers JJ. Determinants of patient choice of healthcare providers: a scoping review. *BMC Health Services Research*. 2012;12:1-6. https://doi.org/10.1186/1472-6963-12-272

[83] Victoor A, Delnoij DM, Friele RD, Rademakers JJ. Determinants of patient choice of healthcare providers: a scoping review. *BMC Health Services Research*. 2012;12:1-6. https://doi.org/10.1186/1472-6963-12-272

[84] Reid RO, Deb P, Howell BL, Conway PH, Shrank WH. The roles of cost and quality information in Medicare Advantage plan enrollment decisions: an observational study. *Journal of General Internal Medicine*. 2016;31:234-41. https://doi.org/10.1007/s11606-015-3467-3

[85] Medicare.gov. Explore your Medicare coverage options. https://www.medicare.gov/plan-compare/#/?year=2025&lang=en

[86] Government Accountability Office. Medicare Plan Finder: Usability Problems and Incomplete Information Create Challenges for Beneficiaries Comparing Coverage Options. July 2019. GAO-19-627. https://www.gao.gov/assets/gao-19-627.pdf

[87] Government Accountability Office. Medicare Plan Finder: Usability Problems and Incomplete Information Create Challenges for Beneficiaries Comparing Coverage Options. July 2019. GAO-19-627. https://www.gao.gov/assets/gao-19-627.pdf

[88] Hibbard JH, Jewett JJ. Will quality report cards help consumers? *Health Affairs*. 1997;16(3):218-28. https://doi.org/10.1377/hlthaff.16.3.218

[89] Rivera-Hernandez M, Blackwood KL, Mercedes M, Moody KA. Seniors don’t use Medicare. Gov: how do eligible beneficiaries obtain information about Medicare Advantage plans in the United States? *BMC Health Services Research*. 2021;21:146. https://doi.org/10.1186/s12913-021-06135-7

[90] Hero JO, Sinaiko AD, Kingsdale J, Gruver RS, Galbraith AA. Decision-making experiences of consumers choosing individual-market health insurance plans. *Health Affairs*. 2019;38(3):464-72. https://doi.org/10.1377/hlthaff.2018.05036

[91] Hero JO, Sinaiko AD, Kingsdale J, Gruver RS, Galbraith AA. Decision-making experiences of consumers choosing individual-market health insurance plans. *Health Affairs*. 2019;38(3):464-72. https://doi.org/10.1377/hlthaff.2018.05036

[92] Rivera-Hernandez M, Blackwood KL, Mercedes M, Moody KA. Seniors don’t use Medicare. Gov: how do eligible beneficiaries obtain information about Medicare Advantage plans in the United States? *BMC Health Services Research*. 2021;21:146. https://doi.org/10.1186/s12913-021-06135-7

[93] Schlesinger M, Kanouse DE, Martino SC, Shaller D, Rybowski L. Complexity, public reporting, and choice of doctors: a look inside the blackest box of consumer behavior. *Medical Care Research and Review*. 2014;71(5 Suppl):38S-64S. doi:10.1177/1077558713496321

[94] Thompson AG. The meaning of patient involvement and participation in health care consultations: a taxonomy. *Soc Sci Med*. 2007;64(6):1297-310. doi:10.1016/j.socscimed.2006.11.002

[95] Elwyn G, Frosch D, Thomson R, Joseph-Williams N, Lloyd A, Kinnersley P, et al. Shared decision making: a model for clinical practice. *J Gen Intern Med*. 2012;27(10):1361-7. doi:10.1007/s11606-012-2077-6

[96] Elwyn G, Frosch D, Thomson R, Joseph-Williams N, Lloyd A, Kinnersley P, et al. Shared decision making: a model for clinical practice. *J Gen Intern Med*. 2012;27(10):1361-7. doi:10.1007/s11606-012-2077-6

[97] Thompson AG. The meaning of patient involvement and participation in health care consultations: a taxonomy. *Soc Sci Med*. 2007;64(6):1297-310. doi:10.1016/j.socscimed.2006.11.002

[98] Elwyn G, Frosch D, Thomson R, Joseph-Williams N, Lloyd A, Kinnersley P, et al. Shared decision making: a model for clinical practice. *J Gen Intern Med*. 2012;27(10):1361-7. doi:10.1007/s11606-012-2077-6

[99] Blumenthal-Barby J, Opel DJ, Dickert NW, Kramer DB, Tucker Edmonds B, Ladin K, et al. Potential unintended consequences of recent shared decision making policy initiatives. *Health Affairs*. 2019;38(11):1876-81. https://doi.org/10.1377/hlthaff.2019.00243

[100] Blumenthal-Barby J, Opel DJ, Dickert NW, Kramer DB, Tucker Edmonds B, Ladin K, et al. Potential unintended consequences of recent shared decision making policy initiatives. *Health Affairs*. 2019;38(11):1876-81. https://doi.org/10.1377/hlthaff.2019.00243

---

[101] Carman KL, Workman TA. Engaging patients and consumers in research evidence: applying the conceptual model of patient and family engagement. *Patient Education and Counseling*. 2017;100(1):25-9. https://doi.org/10.1016/j.pec.2016.07.009

[102] Madanian S, Nakarada-Kordic I, Reay S, Chetty T. Patients' perspectives on digital health tools. *PEC Innov*. 2023;2:100171. doi:10.1016/j.pecinn.2023.100171

[103] Niazkhani Z, Toni E, Cheshmekaboodi M, Georgiou A, Pirnejad H. Barriers to patient, provider, and caregiver adoption and use of electronic personal health records in chronic care: a systematic review. *BMC Medical Informatics and Decision Making*. 2020;20:1-36. https://doi.org/10.1186/s12911-020-01159-1

[104] Van Kessel R, Ranganathan S, Anderson M, McMillan B, Mossialos E. Exploring potential drivers of patient engagement with their health data through digital platforms: a scoping review. *International Journal of Medical Informatics*. 2024;189:105513. doi:10.1016/j.ijmedinf.2024.105513

[105] Van Kessel R, Ranganathan S, Anderson M, McMillan B, Mossialos E. Exploring potential drivers of patient engagement with their health data through digital platforms: a scoping review. *International Journal of Medical Informatics*. 2024;189:105513. doi:10.1016/j.ijmedinf.2024.105513

[106] Carman KL, Dardess P, Maurer M, Sofaer S, Adams K, Bechtel C, et al. Patient and family engagement: a framework for understanding the elements and developing interventions and policies. *Health Afffairs*. 2013;32(2):223-31. https://doi.org/10.1377/hlthaff.2012.1133

[107] Thompson AG. The meaning of patient involvement and participation in health care consultations: a taxonomy. *Soc Sci Med*. 2007;64(6):1297-310. doi:10.1016/j.socscimed.2006.11.002

[108] Carman KL, Dardess P, Maurer M, Sofaer S, Adams K, Bechtel C, et al. Patient and family engagement: a framework for understanding the elements and developing interventions and policies. *Health Afffairs*. 2013;32(2):223-31. https://doi.org/10.1377/hlthaff.2012.1133

[109] Carman KL, Workman TA. Engaging patients and consumers in research evidence: applying the conceptual model of patient and family engagement. *Patient Education and Counseling*. 2017;100(1):25-9. https://doi.org/10.1016/j.pec.2016.07.009

[110] Carman KL, Dardess P, Maurer M, Sofaer S, Adams K, Bechtel C, et al. Patient and family engagement: a framework for understanding the elements and developing interventions and policies. *Health Afffairs*. 2013;32(2):223-31. https://doi.org/10.1377/hlthaff.2012.1133

[111] Carman KL, Workman TA. Engaging patients and consumers in research evidence: applying the conceptual model of patient and family engagement. *Patient Education and Counseling*. 2017;100(1):25-9. https://doi.org/10.1016/j.pec.2016.07.009

[112] Carman KL, Workman TA. Engaging patients and consumers in research evidence: applying the conceptual model of patient and family engagement. *Patient Education and Counseling*. 2017;100(1):25-9. https://doi.org/10.1016/j.pec.2016.07.009

[113] Carman KL, Dardess P, Maurer M, Sofaer S, Adams K, Bechtel C, et al. Patient and family engagement: a framework for understanding the elements and developing interventions and policies. *Health Afffairs*. 2013;32(2):223-31. https://doi.org/10.1377/hlthaff.2012.1133

[114] Carman KL, Dardess P, Maurer M, Sofaer S, Adams K, Bechtel C, et al. Patient and family engagement: a framework for understanding the elements and developing interventions and policies. *Health Afffairs*. 2013;32(2):223-31. https://doi.org/10.1377/hlthaff.2012.1133

[115] Carman KL, Dardess P, Maurer M, Sofaer S, Adams K, Bechtel C, et al. Patient and family engagement: a framework for understanding the elements and developing interventions and policies. *Health Afffairs*. 2013;32(2):223-31. https://doi.org/10.1377/hlthaff.2012.1133

[116] Carman KL, Workman TA. Engaging patients and consumers in research evidence: applying the conceptual model of patient and family engagement. *Patient Education and Counseling*. 2017;100(1):25-9. https://doi.org/10.1016/j.pec.2016.07.009

[117] Pekonen A, Eloranta S, Stolt M, Virolainen P, Leino-Kilpi H. Measuring patient empowerment–a systematic review. *Patient Education and Counseling*. 2020;103(4):777-87. https://doi.org/10.1016/j.pec.2019.10.019

[118] Desai PJ, Nanji K, Dullabh PM, Cope E, Catlett M, Adler J, et al and the CDSiC Outcomes and Objectives Workgroup: Integration of Patient-Centered Clinical Decision Support Into Shared Decision Making. Prepared

---

under Contract No. 75Q80120D00018. AHRQ Publication No. 23-0084. Rockville, MD: Agency for Healthcare Research and Quality; September 2023. https://cdsic.ahrq.gov/sites/default/files/2023-09/FINAL%20OO%20PC%20CDS%20SDM%20Report.pdf

[119] Desai PJ, Nanji K, Dullabh PM, Cope E, Catlett M, Adler J, et al. and the CDSiC Outcomes and Objectives Workgroup. Integration of Patient-Centered Clinical Decision Support Into Shared Decision Making. Prepared under Contract No. 75Q80120D00018. AHRQ Publication No. 23-0084. Rockville, MD: Agency for Healthcare Research and Quality; September 2023. https://cdsic.ahrq.gov/sites/default/files/2023-09/FINAL%20OO%20PC%20CDS%20SDM%20Report.pdf

[120] Evans RS. Electronic health records: then, now, and in the future. *Yearb Med Inform*. 2016;(Suppl 1):S48-S61. doi:10.15265/IYS-2016-s006.

[121] Honavar SG. Electronic medical records - the good, the bad and the ugly. *Indian J Ophthalmol*. 2020;68(3):417-418. doi:10.4103/ijo.IJO_278_20

[122] Burton LC, Anderson GF, Kues IW. Using electronic health records to help coordinate care. *Milbank Q*. 2004;82(3):457-81, doi:10.1111/j.0887-378X.2004.00318.x

[123] Evans RS. Electronic health records: then, now, and in the future. *Yearb Med Inform*. 2016;(Suppl 1):S48-S61. doi:10.15265/IYS-2016-s006.

[124] Evans RS. Electronic Health Records: Then, Now, and in the Future. *Yearb Med Inform*. 2016;(Suppl 1):S48-S61. doi:10.15265/IYS-2016-s006

[125] Evans RS. Electronic health records: then, now, and in the future. *Yearb Med Inform*. 2016;(Suppl 1):S48-S61. doi:10.15265/IYS-2016-s006.

[126] Evans RS. Electronic health records: then, now, and in the future. Yearb Med Inform. 2016;(Suppl 1):S48-S61. doi:10.15265/IYS-2016-s006.

[127] Evans RS. Electronic health records: then, now, and in the future. *Yearb Med Inform*. 2016;(Suppl 1):S48-S61. doi:10.15265/IYS-2016-s006.

[128] Oracle. Interoperability in Healthcare Explained. Published on June 24, 2024. Accessed on April 8, 2025. https://www.oracle.com/health/interoperability-healthcare/

[129] Assistant Secretary for Technology Policy Office of the National Coordinator for Health IT. National Trends in Hospital and Physician Adoption of Electronic Health Records | Health IT Quick-Stat #61. Accessed April 28, 2025. https://www.healthit.gov/data/quickstats/national-trends-hospital-and-physician-adoption-electronic-health-records

[130] Pylypchuk Y, Everson J. Interoperability and Methods of Exchange among Hospitals in 2021. Office of the National Coordinator for Health Information Technology. ONC Data Brief No 64. January 2023. Accessed April 28, 2025. https://www.healthit.gov/sites/default/files/2023-01/DB64_Interop_and_Methods_of_Exchange_Among_Hosp.pdf

[131] Evans RS. Electronic health records: then, now, and in the future. *Yearb Med Inform*. 2016;(Suppl 1):S48-S61. doi:10.15265/IYS-2016-s006.

[132] Desai PJ, Nanji K, Dullabh PM, Cope E, Catlett M, Adler J, et al. and the CDSiC Outcomes and Objectives Workgroup. Integration of Patient-Centered Clinical Decision Support Into Shared Decision Making. Prepared under Contract No. 75Q80120D00018. AHRQ Publication No. 23-0084. Rockville, MD: Agency for Healthcare Research and Quality; September 2023. https://cdsic.ahrq.gov/sites/default/files/2023-09/FINAL%20OO%20PC%20CDS%20SDM%20Report.pdf

[133] Desai PJ, Nanji K, Dullabh PM, Cope E, Catlett M, Adler J, et al. and the CDSiC Outcomes and Objectives Workgroup. Integration of Patient-Centered Clinical Decision Support Into Shared Decision Making. Prepared under Contract No. 75Q80120D00018. AHRQ Publication No. 23-0084. Rockville, MD: Agency for Healthcare Research and Quality; September 2023. https://cdsic.ahrq.gov/sites/default/files/2023-09/FINAL%20OO%20PC%20CDS%20SDM%20Report.pdf

[134] Evans RS. Electronic health records: then, now, and in the future. *Yearb Med Inform*. 2016;(Suppl 1):S48-S61. doi:10.15265/IYS-2016-s006.

[135] Kim J, Jung H, Bates DW. History and trends of "personal health record" research in PubMed. *Healthc Inform Res*. 2011;17(1):3-17. doi:10.4258/hir.2011.17.1.3

---

[136] Kim J, Jung H, Bates DW. History and trends of "personal health record" research in PubMed. *Healthc Inform Res*. 2011;17(1):3-17. doi:10.4258/hir.2011.17.1.3

[137] Evans RS. Electronic health records: then, now, and in the future. *Yearb Med Inform*. 2016;(Suppl 1):S48-S61. doi:10.15265/IYS-2016-s006.

[138] Evans RS. Electronic health records: then, now, and in the future. *Yearb Med Inform*. 2016;(Suppl 1):S48-S61. doi:10.15265/IYS-2016-s006.

[139] Digital Patient Engagement Tools | Navigation Services | Get Well. 2025. Accessed April 29, 2025. https://www.getwellnetwork.com/virtual-care-navigation/

[140] Boston Consulting Group. How Digital and AI Will Reshape Health Care in 2025. January 2025. https://web-assets.bcg.com/8c/f8/ae51ffb44ca59cb8abd751940441/bcg-how-digital-and-ai-solutions-will-reshape-health-care-in-2025.pdf

[141] Boston Consulting Group. How Digital and AI Will Reshape Health Care in 2025. January 2025. https://web-assets.bcg.com/8c/f8/ae51ffb44ca59cb8abd751940441/bcg-how-digital-and-ai-solutions-will-reshape-health-care-in-2025.pdf

[142] Sambir A. What To Consider Before Implementing AI Into Healthcare Organizations. Forbes. 10 2023. Accessed April 28, 2025. https://www.forbes.com/councils/forbesbusinesscouncil/2023/11/10/what-to-consider-before-implementing-ai-into-your-healthcare-organization/

[143] Sambir A. Is AI A Magic Bullet For Transforming Business Operations? Forbes. October 13, 2023. Accessed April 28, 2025. https://www.forbes.com/councils/forbesbusinesscouncil/2023/10/13/is-ai-a-magic-bullet-for-transforming-business-operations/

[144] Bates DW, Samal L. Interoperability: what is it, how can we make it work for clinicians, and how should we measure it in the future? *Health Serv Res*. 2018;53(5):3270-3277. doi:10.1111/1475-6773.12852

[145] Interoperability in Healthcare | HIMSS. August 4, 2020. Accessed May 18, 2025. https://legacy.himss.org/resources/interoperability-healthcare

[146] Bates DW, Samal L. Interoperability: what is it, how can we make it work for clinicians, and how should we measure it in the future? *Health Serv Res*. 2018;53(5):3270-3277. doi:10.1111/1475-6773.12852

[147] U.S. Office of the National Coordinator for Health IT. Interoperability. Interoperability. February 18, 2025. Accessed May 18, 2025. https://www.healthit.gov/topic/interoperability

[148] Centers for Medicare & Medicaid Services. Promoting Interoperability Programs. December 12, 2024. Accessed March 26, 2025. https://www.cms.gov/medicare/regulations-guidance/promoting-interoperability-programs

[149] Anumula N, Sanelli PC. Meaningful use. *American Journal of Neuroradiology*. 2012;33(8):1455-7. https://doi.org/10.3174/ajnr.A3247

[150] Salmi L, Blease C, Hägglund M, Walker J, DesRoches CM. US policy requires immediate release of records to patients. *BMJ*. 2021;372:n426. https://doi.org/10.1136/bmj.n426

[151] Centers for Medicare & Medicaid Services. Promoting Interoperability Programs. December 12, 2024. Accessed March 26, 2025. https://www.cms.gov/medicare/regulations-guidance/promoting-interoperability-programs

[152] Centers for Medicare & Medicaid Services. CMS Interoperability and Patient Access Final Rule (CMS-9115-F). September 10, 2024. Accessed April 8, 2025. https://www.cms.gov/priorities/key-initiatives/burden-reduction/interoperability/policies-and-regulations/cms-interoperability-and-patient-access-final-rule-cms-9115-f#:~:text=The%20Centers%20for%20Medicare%20%26%20Medicaid,they%20can%20best%20use%20it.

[153] Centers for Medicare & Medicaid Services. 2022 Medicare Promoting Interoperability Program Requirements. September 10, 2024. Accessed March 26, 2025. https://www.cms.gov/2022-medicare-promoting-interoperability-program-requirements

[154] Oracle. Interoperability in Healthcare Explained. June 24, 2024. Accessed April 8, 2025. https://www.oracle.com/health/interoperability-healthcare/

[155] Centers for Disease Control and Prevention. About Public Health Data Interoperability. Accessed April 11, 2025. https://www.cdc.gov/data-interoperability/php/about/index.html

[156] Dinh-Le C, Chuang R, Chokshi S, Mann D. Wearable health technology and electronic health record integration: scoping review and future directions. *JMIR Mhealth Uhealth*. 2019 Sep;7(9):e12861. doi:10.2196/12861

---

[157] Pylypchuk Y, Everson J. Interoperability and Methods of Exchange among Hospitals in 2021. Office of the National Coordinator for Health Information Technology. ONC Data Brief No 64. January 2023. Accessed April 28, 2025. https://www.healthit.gov/sites/default/files/2023-01/DB64_Interop_and_Methods_of_Exchange_Among_Hosp.pdf

[158] Pylypchuk Y, Everson J. Interoperability and Methods of Exchange among Hospitals in 2021. Office of the National Coordinator for Health Information Technology. ONC Data Brief No 64. January 2023. Accessed April 28, 2025. https://www.healthit.gov/sites/default/files/2023-01/DB64_Interop_and_Methods_of_Exchange_Among_Hosp.pdf

[159] Nahm ES, Zhu S, Bellantoni M, Keldsen L, Charters K, Russomanno V, et al. Patient portal use among older adults: what is really happening nationwide? *Journal of Applied Gerontology*. 2020;39(4):442-50. doi:10.1177/0733464818776125

[160] MyChart. Your Information in One Place. https://www.mychart.org/HappyTogether

[161] Centers for Medicare & Medicaid Services. Blue Button 2.0 API. Accessed March 27, 2025. https://bluebutton.cms.gov/

[162] Centers for Medicare & Medicaid Services. Trump Administration Announces MyHealthEData Initiative to Put Patients at the Center of the US Healthcare System. March 3, 2018. Accessed March 25, 2025. https://www.cms.gov/newsroom/press-releases/trump-administration-announces-myhealthedata-initiative-put-patients-center-us-healthcare-system

[163] Medicare.gov. Medicare Connected Apps Directory. https://www.medicare.gov/providers-services/claims-appeals-complaints/claims/share-your-medicare-claims/connected-apps?clear

[164] Mishra R, Kaur I, Sahu S, Saxena S, Malsa N, Narwaria M. Establishing three layer architecture to improve interoperability in Medicare using smart and strategic API led integration. *SoftwareX*. 2023;22:101376.

[165] Centers for Medicare & Medicaid Services. Promoting Interoperability Programs. December 12, 2024. Accessed March 26, 2025. https://www.cms.gov/medicare/regulations-guidance/promoting-interoperability-programs

[166] Salmi L, Blease C, Hägglund M, Walker J, DesRoches CM. US policy requires immediate release of records to patients. *BMJ*. 2021;372:n426. https://doi.org/10.1136/bmj.n426

[167] Fritz Z, Schlindwein A, Slowther AM. Patient engagement or information overload: patient and physician views on sharing the medical record in the acute setting. *Clin Med (Lond)*. 2019;19(5):386-391. doi:10.7861/clinmed.2019-0079

[168] Dambrino RJ IV, Domenico HJ, Graves JA, et al. Unsolicited Patient Complaints Following the 21st Century Cures Act Information-Blocking Rule. *JAMA Health Forum*. 2023;4(9):e233244. doi:10.1001/jamahealthforum.2023.3244

[169] Delbanco T, Wachenheim D. Open notes: new federal rules promoting open and transparent communication. Joint Commission Journal on Quality and Patient Safety. 2021;47(4):207-9. doi:10.1016/j.jcjq.2021.02.004

[170] Tapuria A, Porat T, Kalra D, Dsouza G, Xiaohui S, Curcin V. Impact of patient access to their electronic health record: systematic review. *Inform Health Soc Care*. 2021;46(2):192-204. doi:10.1080/17538157.2021.1879810

[171] Niazkhani Z, Toni E, Cheshmekaboodi M, Georgiou A, Pirnejad H. Barriers to patient, provider, and caregiver adoption and use of electronic personal health records in chronic care: a systematic review. *BMC Medical Informatics and Decision Making*. 2020;20:1-36. https://doi.org/10.1186/s12911-020-01159-1

[172] Latulipe C, Quandt SA, Melius KA, et al. Insights into older adult patient concerns around the caregiver proxy portal use: qualitative interview study. *J Med Internet Res*. 2018;20(11):e10524. doi:10.2196/10524

[173] Tapuria A, Porat T, Kalra D, Dsouza G, Xiaohui S, Curcin V. Impact of patient access to their electronic health record: systematic review. *Inform Health Soc Care*. 2021;46(2):192-204. doi: 10.1080/17538157.2021.1879810

[174] Madanian S, Nakarada-Kordic I, Reay S, Chetty T. Patients' perspectives on digital health tools. *PEC Innov*. 2023;2:100171. doi:10.1016/j.pecinn.2023.100171

[175] Niazkhani Z, Toni E, Cheshmekaboodi M, Georgiou A, Pirnejad H. Barriers to patient, provider, and caregiver adoption and use of electronic personal health records in chronic care: a systematic review. *BMC Medical Informatics and Decision Making*. 2020;20:1-36. https://doi.org/10.1186/s12911-020-01159-1

[176] Holmstrom SE, Stukus K, Goyal MK. Raising confidentiality concerns with a law mandating access to electronic notes. *JAMA Health Forum*. 2021;2(3):e210269. doi:10.1001/jamahealthforum.2021.0269

---

[177] G. Karway, J. Ivanova, T. Kaing, M. Todd, D. Chern, A. Murcko, et al. My Data Choices: Pilot evaluation of patient-controlled medical record sharing technology. *Health Informatics Journal*. 2022;28(4). https://doi.org/10.1177/14604582221143893

[178] IQVIA Institute for Human Data Science. Digital Health Trends 2024: Implications for Research and Patient Care. December 2024. https://www.iqvia.com/insights/the-iqvia-institute/reports-and-publications/reports/digital-health-trends-2024

[179] Wade B, Abraham J, Coder M. *Guidance to Industry: Classification of Digital Health Technologies*. Digital Therapeutic Alliance; Health Advances; 2023. Accessed May 15, 2025. https://dtxalliance.org/wp-content/uploads/2023/06/Guidance-to-Industry-Classification-of-Digital-Health-Technologies-2023Jun05.pdf

[180] Wade B, Abraham J, Coder M. *Guidance to Industry: Classification of Digital Health Technologies*. Digital Therapeutic Alliance; Health Advances; 2023. Accessed May 15, 2025. https://dtxalliance.org/wp-content/uploads/2023/06/Guidance-to-Industry-Classification-of-Digital-Health-Technologies-2023Jun05.pdf

[181] Mueller KJ, Potter AJ, MacKinney AC, Ward MM. Lessons from tele-emergency: improving care quality and health outcomes by expanding support for rural care systems. *Health Aff*. 2014;33(2):228-234. https://doi.org/10.1377/hlthaff.2013.1016

[182] Ward MM, Jaana M, Natafgi N. Systematic review of telemedicine applications in emergency rooms. *Int J Med Inform*. 2015;84(9):601-616. doi: 10.1016/j.ijmedinf.2015.05.009

[183] Komaromy M, Duhigg D, Metcalf A, Carlson C, et al. Project ECHO (Extension for Community Healthcare Outcomes): a new model for educating primary care providers about treatment of substance use disorders. *Substance Abuse*. 2016;37(1):20-24. https://doi.org/10.1080/08897077.2015.1129388

[184] Wade B, Abraham J, Coder M. *Guidance to Industry: Classification of Digital Health Technologies*. Digital Therapeutic Alliance; Health Advances; 2023. Accessed May 15, 2025. https://dtxalliance.org/wp-content/uploads/2023/06/Guidance-to-Industry-Classification-of-Digital-Health-Technologies-2023Jun05.pdf

[185] Wade B, Abraham J, Coder M. *Guidance to Industry: Classification of Digital Health Technologies*. Digital Therapeutic Alliance; Health Advances; 2023. Accessed May 15, 2025. https://dtxalliance.org/wp-content/uploads/2023/06/Guidance-to-Industry-Classification-of-Digital-Health-Technologies-2023Jun05.pdf

[186] IQVIA Institute for Human Data Science. Digital Health Trends 2024: Implications for Research and Patient Care. December 2024. https://www.iqvia.com/insights/the-iqvia-institute/reports-and-publications/reports/digital-health-trends-2024

[187] IQVIA Institute for Human Data Science. Digital Health Trends 2024: Implications for Research and Patient Care. December 2024. https://www.iqvia.com/insights/the-iqvia-institute/reports-and-publications/reports/digital-health-trends-2024

[188] IQVIA Institute for Human Data Science. Digital Health Trends 2024: Implications for Research and Patient Care. December 2024. https://www.iqvia.com/insights/the-iqvia-institute/reports-and-publications/reports/digital-health-trends-2024

[189] IQVIA Institute for Human Data Science. Digital Health Trends 2024: Implications for Research and Patient Care. December 2024. https://www.iqvia.com/insights/the-iqvia-institute/reports-and-publications/reports/digital-health-trends-2024

[190] IQVIA Institute for Human Data Science. Digital Health Trends 2024: Implications for Research and Patient Care. December 2024. https://www.iqvia.com/insights/the-iqvia-institute/reports-and-publications/reports/digital-health-trends-2024

[191] US Preventive Services Task Force; Davidson KW, Mangione CM, Barry MJ, Nicholson WK, Cabana MD, Caughey AB, et al. Collaboration and shared decision-making between patients and clinicians in preventive health care decisions and US Preventive Services Task Force recommendations. *JAMA*. 2022 Mar 22;327(12):1171-1176. doi:10.1001/jama.2022.3267

[192]Agency for Healthcare Research and Quality. *The CAHPS Ambulatory Care Improvement Guide: Strategy 6I: Shared Decisionmaking*.; 2017. Accessed May 19, 2025. https://www.ahrq.gov/cahps/quality-improvement/improvement-guide/6-strategies-for-improving/communication/strategy6i-shared-decisionmaking.html

---

[193] Desai PJ, Nanji K, Dullabh PM, Cope E, Catlett M, Adler J, et al. and the CDSiC Outcomes and Objectives Workgroup. Integration of Patient-Centered Clinical Decision Support Into Shared Decision Making. Prepared under Contract No. 75Q80120D00018. AHRQ Publication No. 23-0084. Rockville, MD: Agency for Healthcare Research and Quality; September 2023. https://cdsic.ahrq.gov/sites/default/files/2023-09/FINAL%20OO%20PC%20CDS%20SDM%20Report.pdf

[194] Wade B, Abraham J, Coder M. *Guidance to Industry: Classification of Digital Health Technologies*. Digital Therapeutic Alliance; Health Advances; 2023. Accessed May 15, 2025. https://dtxalliance.org/wp-content/uploads/2023/06/Guidance-to-Industry-Classification-of-Digital-Health-Technologies-2023Jun05.pdf

[195] Desai PJ, Nanji K, Dullabh PM, Cope E, Catlett M, Adler J, et al. and the CDSiC Outcomes and Objectives Workgroup. Integration of Patient-Centered Clinical Decision Support Into Shared Decision Making. Prepared under Contract No. 75Q80120D00018. AHRQ Publication No. 23-0084. Rockville, MD: Agency for Healthcare Research and Quality; September 2023. https://cdsic.ahrq.gov/sites/default/files/2023-09/FINAL%20OO%20PC%20CDS%20SDM%20Report.pdf

[196] Wade B, Abraham J, Coder M. *Guidance to Industry: Classification of Digital Health Technologies*. Digital Therapeutic Alliance; Health Advances; 2023. Accessed May 15, 2025. https://dtxalliance.org/wp-content/uploads/2023/06/Guidance-to-Industry-Classification-of-Digital-Health-Technologies-2023Jun05.pdf

[197] Stacey D, Lewis KB, Smith M, Carley M, Volk R, Douglas EE, et al. Decision aids for people facing health treatment or screening decisions. *Cochrane Database of Systematic Reviews*. 2024;(1):CD001431. doi:10.1002/14651858.CD001431.pub6

[198] Commonwealth Fund. *Helping Patients Make Better Treatment Choices with Decision Aids*. Commonwealth Fund Accessed May 19, 2025. https://www.commonwealthfund.org/publications/newsletter-article/helping-patients-make-better-treatment-choices-decision-aids

[199] Stacey D, Lewis KB, Smith M, et al. Decision aids for people facing health treatment or screening decisions. *Cochrane Database Syst Rev*. 2024;1(1):CD001431. doi:10.1002/14651858.CD001431.pub6

[200] Stacey D, Lewis KB, Smith M, et al. Decision aids for people facing health treatment or screening decisions. *Cochrane Database Syst Rev*. 2024;1(1):CD001431. doi:10.1002/14651858.CD001431.pub6

[201] Stacey D, Lewis KB, Smith M, Carley M, Volk R, Douglas EE, et al. Decision aids for people facing health treatment or screening decisions. *Cochrane Database of Systematic Reviews*. 2024;(1):CD001431. doi:10.1002/14651858.CD001431.pub6

[202] Miller-Rosales C, Lewis VA, Shortell SM, Rodriguez HP. Adoption of patient engagement strategies by physician practices in the United States. *Med Care*. 2022;60(9):691-699. doi:10.1097/MLR.0000000000001748

[203] Agency for Healthcare Research and Quality. Strategy 6I: Shared Decisionmaking. Accessed April 10, 2025. https://www.ahrq.gov/cahps/quality-improvement/improvement-guide/6-strategies-for-improving/communication/strategy6i-shared-decisionmaking.html#:~:text=Patients%20understand%20their%20options%20and,12

[204] Serrano LP, Maita KC, Avila FR, et al. Benefits and challenges of remote patient monitoring as perceived by health care practitioners: a systematic review. *Perm J*. 27(4):100-111. doi:10.7812/TPP/23.022

[205] Serrano LP, Maita KC, Avila FR, et al. Benefits and challenges of remote patient monitoring as perceived by health care practitioners: a systematic review. *Perm J*. 27(4):100-111. doi:10.7812/TPP/23.022

[206] Milani RV, Lavie CJ, Bober RM, Milani AR, Ventura HO. Improving hypertension control and patient engagement using digital tools. *The American Journal of Medicine*. 2017;130(1):14-20. doi:10.1016/j.amjmed.2016.07.029

[207] Milani RV, Lavie CJ, Bober RM, Milani AR, Ventura HO. Improving hypertension control and patient engagement using digital tools. *The American Journal of Medicine*. 2017;130(1):14-20. doi:10.1016/j.amjmed.2016.07.029

[208] Jiang X, Ming WK, You JH. The cost-effectiveness of digital health interventions on the management of cardiovascular diseases: systematic review. *Journal of Medical Internet Research*. 2019;21(6):e13166. doi:10.2196/13166

[209] Romeo A, Edney S, Plotnikoff R, Curtis R, Ryan J, Sanders I, et al. Can smartphone apps increase physical activity? systematic review and meta-analysis. *J Med Internet Res*. 2019;21(3):e12053. doi:10.2196/12053

---

[210] Gal R, May AM, van Overmeeren EJ, et al. The effect of physical activity interventions comprising wearables and smartphone applications on physical activity: a systematic review and meta-analysis. *Sports Med Open*. 2018;4:42. doi:10.1186/s40798-018-0157-9

[211] Austin CA, Mohottige D, Sudore RL, Smith AK, Hanson LC. Tools to promote shared decision making in serious illness: a systematic review. *JAMA Internal Medicine*. 2015;175(7):1213-1221.

[212] Austin CA, Mohottige D, Sudore RL, Smith AK, Hanson LC. Tools to promote shared decision making in serious illness: a systematic review. *JAMA Internal Medicine*. 2015;175(7):1213-1221. doi:10.1001/jamainternmed.2015.1679

[213] Bulaj G, Clark J, Ebrahimi M, Bald E. From Precision Metapharmacology to Patient Empowerment: Delivery of Self-Care Practices for Epilepsy, Pain, Depression and Cancer Using Digital Health Technologies. *Frontiers in pharmacology*. 2021;12:p612602.

[214] Bulaj G, Clark J, Ebrahimi M, Bald E. From Precision Metapharmacology to Patient Empowerment: Delivery of Self-Care Practices for Epilepsy, Pain, Depression and Cancer Using Digital Health Technologies. *Frontiers in pharmacology*. 2021;12:p612602.

[215] What is Value-Based Care? America Medical Association. April 16, 2025. Accessed April 29, 2025. https://www.ama-assn.org/practice-management/payment-delivery-models/what-value-based-care

[216] Innovation in Behavioral Health (IBH) Model. Centers for Medicare & Medicaid Services. Accessed April 29, 2025. https://www.cms.gov/priorities/innovation/innovation-models/innovation-behavioral-health-ibh-model

[217] Medicare Diabetes Prevention Program (MDPP) Expanded Model. Accessed April 29, 2025. https://www.cms.gov/priorities/innovation/innovation-models/medicare-diabetes-prevention-program

[218] Medicare Diabetes Prevention Program (MDPP) Expanded Model. Accessed April 29, 2025. https://www.cms.gov/priorities/innovation/innovation-models/medicare-diabetes-prevention-program

[219] Transforming Maternal Health (TMaH) Model. Centers for Medicare & Medicaid Services. Accessed April 29, 2025. https://www.cms.gov/priorities/innovation/innovation-models/transforming-maternal-health-tmah-model

[220] Katz DA, Wu C, Jaske E, Stewart GL, Mohr DC. Care practices to promote patient engagement in VA primary care: factors associated with high performance. *The Annals of Family Medicine*. 2020;18(5):397-405. https://doi.org/10.1370/afm.2569

[221] Katz DA, Wu C, Jaske E, Stewart GL, Mohr DC. Care practices to promote patient engagement in VA primary care: factors associated with high performance. *The Annals of Family Medicine*. 2020;18(5):397-405. https://doi.org/10.1370/afm.2569

[222] CMS Innovation Center Strategy to Make America Healthy Again. Accessed May 21, 2025. https://www.cms.gov/priorities/innovation/about/cms-innovation-center-strategy-make-america-healthy-again

[223] Schlesinger M, Kanouse DE, Martino SC, Shaller D, Rybowski L. Complexity, public reporting, and choice of doctors: a look inside the blackest box of consumer behavior. Medical Care Research and Review. 2014;71(5 Suppl):38S-64S. doi:10.1177/1077558713496321