Digital Health Lexicon and Program/Policy Evaluation Framework

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Premise for a defined and standardized lexicon: An excerpt from **Digital Health Consumers on the Road to the Future.** Digital health is the broad umbrella term which, according to the World Health Organization (WHO), encompasses electronic health (eHealth) but has also been broadened to include connected software solutions (Internet of Things [IoT]), as well as computational methods applied to big data, genomics, and artificial intelligence (AI) [1][1]. Agreement on how to define related terms has been brewing for more than a decade[2-4][2][3][4], and a key benefit to proclaiming an umbrella term stems from the need to integrate related concepts that are agnostic to specificities, such as purpose and type of technology. Notably, the *Journal of Medical Internet Research* (JMIR) advanced the need for a broad, unifying term decades ago [2], and early on embraced the ubiquitous and transformative nature of digital technologies:

e-health is an emerging field in the intersection of medical informatics, public health, and business, referring to health services and information delivered or enhanced through the Internet and related technologies. In a broader sense, the term characterizes not only a technical development, but also a state-of-mind, a way of thinking, an attitude, and a commitment for networked, global thinking, to improve health care locally, regionally, and worldwide by using information and communication technology.

Regarding the expanding lexicon of terms, two points pertinent to the future path of digital consumers can be made. First, the quest to redefine terms will naturally occur as the field emerges, typically as a result of interdisciplinary, multidisciplinary, and transdisciplinary interactions of individuals and concepts in a way that transcends conventional field boundaries [5[5]]. Nonetheless, it is the preservation of information contained in thousands of published articles and lessons learned that remain the core for understanding digital health consumers moving forward. The second, interrelated point also pertains to field boundaries and provides a clue to a future road. The WHO's declaration to designate digital health as an umbrella term to encompass and broaden eHealth does not arise from expansion to new domains or of novel digital health technologies. Instead, it reflects the convergence of the eHealth landscape with fields such as AI, big data, and genomics. Big data, IoT, advances in computing power, and memory collectively set the stage for the future, enabling a remarkable uncharted path for digital health consumers and our conception of the space they encounter. It is at this

[1] *World Health Organization.* 2019. [2019-09-14]. WHO guideline: recommendations on digital health interventions for health system strengthening https://www.who.int/reproductivehealth/publications/digital-interventions-health-system-strengthening/en/

[2] Eysenbach G. What is e-health? *J Med Internet Res.* 2001 Jun 18;3(2):e20. doi: 10.2196/jmir.3.2.e20. https://www.jmir.org/2001/2/e20/ [PMC free article] [PubMed] [CrossRef] [Google Scholar]

[3] Boogerd EA, Arts T, Engelen LJ, van de Belt TH. "What Is eHealth": Time for An Update? *JMIR Res Protoc.* 2015 Mar 12;4(1):e29. doi: 10.2196/resprot.4065. https://www.researchprotocols.org/2015/1/e29/ [PMC free article] [PubMed] [CrossRef] [Google Scholar]

[4] Oh H, Rizo C, Enkin M, Jadad A. What is eHealth (3): a systematic review of published definitions. *J Med Internet Res.* 2005 Feb 24;7(1):e1. doi: 10.2196/jmir.7.1.e1. https://www.jmir.org/2005/1/e1/ [PMC free article] [PubMed] [CrossRef] [Google Scholar]

[5] Casadevall A, Fang FC. Field Science—the Nature and Utility of Scientific Fields. *mBio.* 2015 Sep 08;6(5):1–4. doi: 10.1128/mbio.01259-15. [PMC free article] [PubMed] [CrossRef] [Google Scholar]

intersection that the eHealth landscape is therefore positioned to advance and transform health care.

Kukafka R. Digital Health Consumers on the Road to the Future. J Med Internet Res. 2019 Nov 21;21(11):e16359. doi: 10.2196/16359. PMID: 31750835; PMCID: PMC6895867.

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6895867/

Policy Glossary:

Asynchronous Telehealth: Asynchronous telemedicine refers to the "store-and-forward" technique, a patient or physician collects medical history, images, and pathology reports and then sends it to a specialist physician for diagnostic and treatment expertise. (NCBI) https://www.ncbi.nlm.nih.gov/books/NBK459384/

Client: An individual who is a potential or current user of health services; may also be referred to as patient or non-patient who uses health information and services. (Although WHO's Classification of digital health interventions v1.0 uses the term "client" (13), the terms "individual" and "patient" may be used interchangeably, where appropriate.) (WHO)

Care coordination: A function that helps ensure that the patient's needs and preferences for health services and information sharing across people, functions, and sites that are met over time.(NQF)

Data Exchange: The process of sending and receiving data in such a manner that the information content or meaning assigned to the data is not altered during the transmission. (NQF)

Digital Health: An overarching term that comprises eHealth (which includes mHealth – see below), and emerging areas, such as the use of computing sciences in the fields of artificial intelligence, big data, and genomics (3,4). (WHO)

Digital Health Intervention: A discrete function of a digital technology to achieve health sector objectives. The WHO Classification of digital health interventions v1.0 provides an overview of the range of digital health interventions identified in the literature and implementation practices (13). Table 2.1 lists definitions of the specific digital health interventions included in this guideline. (WHO)

Digital Health Ecosystem: The combined set of digital health components representing the enabling environment, foundational architecture, and ICT capabilities available in a given context or country. (WHO)

Direct to Consumer telehealth (DTC): Telehealth services delivered to a patient or customer without a facilitator or health care professional engaged at the originating (patient) site. This is an industry term that most often refers to on-demand (customer-initiated) telehealth services provided to a patient in their home, workplace, or on a mobile device for minor, acute

conditions. DTC services can be synchronous or asynchronous and can include a variety of modalities, including web portals, mobile applications, audio-only interactions, and audio-video interactions.

Digital Therapeutics: Evidence-based therapeutic interventions driven by high quality software programs to prevent, manage, or treat a medical disorder or disease. Digital therapeutics are a subset of digital health. (Digital Therapeutics Alliance)

Distant Site: (AKA Hub Site) the site where the physician or practitioner, providing the professional service, is located at the time the service is provided via a telecommunications system. (CMS) https://www.cms.gov/Regulations-and-Guidance/Guidance/Transmittals/downloads/AB02052.pdf

eHealth: The use of information and communications technology (ICT) in support of health and health related fields, including health care services, health surveillance, health literature, and health education, knowledge, and research. (WHO)

eHealth policies: eHealth in its broadest sense is about improving the flow of information, through electronic means, to support the delivery of health services and the management of health systems. eHealth policies usually explain why a national approach to eHealth is needed, what a national eHealth plan will need to achieve, and how it will be done. (WHO)

Electronic Health Record (EHR): a longitudinal electronic record of patient health information generated by one or more encounters in any care delivery setting. Included in this information are patient demographics, progress notes, problems, medications, vital signs, past medical history, immunizations, laboratory data and radiology reports. The EHR automates and streamlines the clinician's workflow. The EHR can generate a complete record of a clinical patient encounter - as well as supporting other care-related activities directly or indirectly via interface - including evidence-based decision support, quality management, and outcomes reporting. (NQF)

Electronic Medical Record: (EMR) A digital version of a paper chart that contains all of a patient's medical history from one practice. An EMR is mostly used by providers for diagnosis and treatment. The difference between an EMR and an EHR is that an EHR is designed to share information with other health care providers, such as laboratories and specialists, The National Alliance for Health Information Technology stated that EHR data "can be created, managed, and consulted by authorized clinicians and staff across more than one healthcare organization." (NQF)

Eligible Professional)/Eligible Provider (EP): Individual physicians and private practices that wish to participate in the EHR Incentive Program. (NQF) (Do not confuse with covered provider)

Health Information Exchange: (HIE) A term used to describe both the sharing of health information electronically among two or more entities and an organization which provides services that enable the sharing electronically of health information. (NQF)

Health Information System: Any system that captures, stores, manages, or transmits information related to the health of individuals or activities of organizations that work within

the health sector. The system typically maps the business process of an organization (e.g., a hospital, a health insurance fund, disease management program) and focuses on data processing (e.g., claim reimbursement) rather than data collection only. (WHO)

Health Identification (ID) Unique personal health identifier: A unique, numerical, and lifetime identifier used to specifically identify an individual client who has had any interaction with a national health-care system. It is assigned to, and used by, only one person and is mandatory for every person receiving a health care service in a country. It is also called the health ID, master patient index, universal health key, or primary health key. (WHO)

Informed Consent: In health care and health care research, this is a process of communication between a patient or customer and a health service provider or research team to reach agreement or permission for care, treatment, services, or research participation. The requirements for informed consent can differ depending on the purpose for which consent is obtained.

Internet of Things (IoT): The ever-growing network of physical objects that features an Internet Protocol address for Internet connectivity, and the communication that occurs between these objects and other Internet-enabled devices and systems. (WHO)

Interoperability: The ability of health information systems to work together within and across organizational boundaries to advance the effective delivery of healthcare for individuals and communities. (NQF)

Meaningful Use: The American Recovery and Reinvestment Act of 2009 authorizes the Centers for Medicare & Medicaid Services (CMS) to provide incentive payments to eligible professionals (EPs) and hospitals who adopt, implement, upgrade, or demonstrate meaningful use of certified electronic health record (EHR) technology. (NQF)

Medicare and Medicaid EHR Incentive Programs: Provides incentive payments to Eligible Professionals (EPs) and Eligible Hospitals (EHs) as they adopt, implement, upgrade, or demonstrate Meaningful Use (MU) of certified EHRs. (NQF)

mHealth: Most used in reference to using mobile communication devices, such as mobile phones and tablet computers for health services and health information. mHealth is a subsegment of eHealth. Enabling environment attitudes, actions, policies, and practices that stimulate and support the effective and efficient functioning of organizations, individuals and programs or projects. The enabling environment includes legal, regulatory and policy frameworks, and political, sociocultural, institutional, and economic factors. (WHO)

Originating Site (AKA Patient Site): An originating site is the location of an eligible Medicare beneficiary at the time the service being furnished via a telecommunications system occurs. (CMS) Pre-PHE the covered originating sites included:

- The office of a physician or practitioner.

- A hospital.

- A critical access hospital.

- A rural health clinic.

- A federally qualified health center.

During the COVID-19 public health emergency (PHE), Medicare and many Medicaid programs expanded the types of originating sites that a patient could be at while receiving services via telehealth, to include the home and other locations. These policies are temporary, and most will expire at the end of the PHE. (CCHP)

Parity: There are two types of parity requirements when it comes to telehealth laws. One is referred to as coverage or 'service parity' and requires the same services be covered via telehealth as would be covered if delivered in-person. This type of parity does not guarantee the same rate of payment. The other type of parity, which is less common among states, is 'payment parity'. This is a requirement for the same payment rate or amount to be reimbursed via telehealth as would be if it had been delivered in-person. In determining whether a state has payment parity, CCHP looks for an explicit mention of the *payment rate* or *amount* and requirement for it to be the same as in-person services. (CCHP)

Store and Forward Telemedicine: store and forward means the asynchronous transmission of medical information to be reviewed at a later time by physician or practitioner at the distant site. A patient's medical information may include, but not limited to, video clips, still images, x-rays, MRIs, EKGs and EEGs, laboratory results, audio clips, and text. The physician or practitioner at the distant site reviews the case without the patient being present. Store and forward substitutes for an interactive encounter with the patient present; the patient is not present in real-time. (CMS)

Synchronous Telemedicine: the delivery of health information in real-time. This allows for a live discussion with the patient or provider to deliver medical expertise. Another type of a live (or synchronous) telemedicine visit is a Facilitated Virtual Visit (FVV). An example of a facilitated virtual visit occurs when the patient is located at an accessible site (i.e., clinic) where diagnostic equipment is available, and the medical provider is at a distant site. Here, a telefacilitator (i.e., medical assistant, nurse, etc.) gathers objective measures using equipment (i.e., digital stethoscope, thermometer, pulse oximeter, etc.) and transmits this data to the provider. (NIH)

Telemedicine: The remote diagnosis and treatment of patients by means of telecommunications technology. (WHO)

Telehealth: The use of a technology-based virtual platform to deliver various aspects of health information, prevention, monitoring, and medical care.(NCBI)
https://www.ncbi.nlm.nih.gov/books/NBK459384/

Telepresenters: Personnel at the patient site trained to assist in the telehealth encounter, including presenting the patient to the distant site physician or practitioner and operating examination devices as needed.

Measurement and Outcomes Glossary

Clinical quality measures: (CQM) Clinical quality measures, also called CQMs, are tools that help us measure and monitor the quality of healthcare and the contribution of those healthcare services towards improved health outcomes. In the past, quality measures primarily used data that came from claims, but as technology has improved and become more prominent in the healthcare setting, many quality measures now use data that comes from a provider's electronic health record (EHR). These electronic CQMs use EHR data to measure health outcomes, clinical processes, patient safety, efficient use of healthcare resources, care coordination, patient engagement, and population and public health improvement. (NQF)

eCQM: Electronic clinical quality measures, or eCQMs, are eMeasures specified for use in the Medicare and Medicaid Electronic Health Record (EHR) Incentive Programs. Eligible professionals, eligible hospitals and critical access hospitals (CAHs) are required to submit CQM data from certified EHR technology, to help measure and track the quality of health care services provided within our health care system. These measures use data associated with providers' ability to deliver high-quality care or relate to long term goals for quality health care. (NQF)

Electronic Measure (eMeasure): standardized performance measure in an electronic format. eMeasures can promote greater consistency in measure development and in measuring and comparing performance results. (NQF)

Logical Observation Identifiers Names and Codes (LOINC): LOINC is a database and universal standard for identifying medical laboratory observations. It was developed and is maintained by the Regenstrief Institute, a US non-profit medical research organization, in 1994. LOINC was created in response to the demand for an electronic database for clinical care and management and is publicly available at no cost. (NQF)

Quality Data Model (QDM) Element: A QDM element is a discrete unit of information used in quality measurement to describe part of the clinical care process, including a clinical entity and its context of use. It can include criteria for any relevant metadata about a clinical or administrative concept relevant to quality measurement. A QDM element provides an unambiguous definition and enables consistent capture and use of data for quality measurement. It may be defined for any given measure and reused when the same information is required for another measure. Reuse encourages standardization of quality measures and reduces the generation of additional software requirements for every new measure. (NQF)

Quality Reporting Document Architecture (QRDA): ONC adopted standard - The Health Level Seven International (HL7) Quality Reporting Document Architecture (QRDA) is a standard document format for the exchange of electronic clinical quality measure (eCQM) data. (NQF)

QRDA reports:

• Contain data extracted from electronic health records (EHRs) and other health information technology systems.

• Can be used to exchange eCQM data between systems.

•Are the data submission standards for a variety of quality measurement and reporting initiatives.

Technology Glossary:

Application Programming Interface: (API) allows two applications to communicate with one another to access data. Every action you take on your phone, like sending a direct message or checking the score of the baseball game, uses an API to access and deliver that information. (g2.com)

Artificial Intelligence (AI): A broad and general term encompassing many approaches and technologies focused on getting computers to do tasks that historically require human intelligence. The field encompasses not only computer science but also psychology, philosophy, linguistics, and other areas. (Deloitte)

Examples include:

- Deep learning
- Digital Coaching and Virtual Assistants
- Computer vision
- Machine learning
- Natural language processing
- Neural networks
- Voice recognition technologies

Defining each of these technologies clearly is complex and beyond the scope of this work.

Continuity of Care Document: An HL7 standard containing a core data set of the most relevant information necessary for continuity of care. It is used to share summary information about the patient within the broader context of the personal health record. Also referred to as CCD. (NQF)

Clinical decision support: A process for enhancing health-related decisions and actions with pertinent, organized clinical knowledge and patient information to improve health and healthcare delivery. The information delivered can include general clinical knowledge and guidance, intelligently processed patient data, or a mixture of both. Information delivery formats can include data and order entry facilitators, filtered data displays, reference information, alerts, and others. Also referred to as CDS. (NQF)

Digital Health Architecture: An overview or blueprint used to design and describe how different digital applications (software and ICT systems) and other core functionalities will interact with each other within a given context (25). (WHO)

Digital Health Application: The software, ICT systems, and communication channels used in the health sector, such as a software being used for health management information systems (HMIS) or an interactive messaging application (“app”) (25). (WHO)

Digital Health Intervention: A discrete function of a digital technology to achieve health sector objectives. The WHO Classification of digital health interventions v1.0 provides an overview of

the range of digital health interventions identified in the literature and implementation practices. (WHO)

Data Infrastructure: Technology, processes, tools, and standards needed to promote data sharing and consumption. (NQF)

International Organization of Standards: (ISO) ISO (International Organization for Standardization) is a worldwide federation of national standards bodies and nongovernmental organization that comprises standards bodies from more than 160 countries, with one standards body representing each member country. For example, the American National Standards Institute (ANSI) represents the United States.

Mobile cloud applications: A software program that is designed to be accessed over the Internet by many types of portable computing devices. Mobile cloud apps and mobile web apps are similar. They both run on servers external to the mobile device, they both store data externally, and they are both accessed over the Internet with a browser. However, it is often said that, while all cloud apps are web apps, not all web apps are cloud apps. Simply put, not all mobile web apps can run in a virtual environment without being reengineered. This is because a web app may have originally been written to run and store data on a dedicated physical server in a data center. A cloud app, on the other hand, will always be written to live on virtual servers in a distributed, multi-tenant architecture and store data in the cloud. (WHO)

Health Level Seven (HL7): HL7 refers to a both a set of international standards for transfer of clinical and administrative data between software applications used by various healthcare providers, and a not-for-profit, ANSI-accredited standards developing organization. HL7 standards focus on the application layer, which is “layer 7” in the OSI model. The HL7 standards are produced by the Health Level Seven International, an international standards organization, and are adopted by other standards issuing bodies such as American National Standards Institute and International Organization for Standardization. (NQF)

Fast Healthcare Interoperability Resources (FHIR): A draft standard describing data formats, elements, and an API for exchanging electronic health records. (WHO)

United States Core Data for Interoperability (USCDI): A standardized set of health data classes and constituent data elements for nationwide, interoperable health information exchange. (ONC)

Clinical Technology Glossary

Hybrid Cardiac Rehabilitation: any combination of supervised center-based and monitored home-based exercise, where at least two of the core components of CR are addressed. (Heindl B, Ramirez L, Joseph L, Clarkson S, Thomas R, Bittner V. Hybrid cardiac rehabilitation - The state of the science and the way forward. Prog Cardiovasc Dis. 2022 Jan-Feb;70:175-182. doi: 10.1016/j.pcad.2021.12.004. Epub 2021 Dec 24. PMID: 34958846.)

e-Iatrogenesis: harm caused to a patient directly by health information technology. (NQF)

Genomics: Genomics is the study of all a person's genes (the genome), including interactions of those genes with each other and with the person's environment. (NIH) https://www.genome.gov/about-genomics/fact-sheets/A-Brief-Guide-to-Genomics#:~:text=Genomics%20is%20the%20study%20of,and%20with%20the%20person's%20environment.

Peripheral Devices: Clinical devices designed for use with telemedicine platforms. Often equipped with USB connections or Bluetooth capabilities. Common peripheral devices include (but are not limited to): dermatoscopes, glucomoters, otoscopes, digital stethoscopes, vascular and abdominal ultrasound wands, pulse oximeters, blood pressure cuffs, single or 12 lead EKG devices.

Precision Medicine: Precision medicine considers an individual's genetics, environment and lifestyle in tailoring treatments and looks for patterns across diverse datasets to identify disease triggers or to explain lack of disease. https://precision.heart.org/about

Self-Measured Blood Pressure: (SMBP) Self-measured blood pressure (SMBP) monitoring refers to the regular measurement of BP by a patient at their home or elsewhere outside the clinical setting. https://targetbp.org/patient-measured-bp/

Remote Patient Monitoring (RPM): Personal health and medical data collection from an individual in one location, which is transmitted via electronic communication technologies to a provider in a different location for use in care and related support. (Center for Connected Health Policy) This is a broad term that also includes Remote Physiologic Monitoring and Remote Therapeutic Monitoring. The latter two are distinguished largely for billing purposes.

Remote Physiologic Monitoring: Non-face-to-face monitoring and analysis of physiologic factors used to understand a patient's health status (CMS). Similar to RPM, but distinct to specific reimbursement service codes. These codes are covered by Medicare, but do not fall under the telehealth label in the Medicare program. They are instead remote communication technology-based services. (CCHP) Physiologic data includes measurements such as blood pressure, weight, oxygen saturation, or blood sugar. For reimbursement under CMS, data must be collected by the device and not self-reported by the patient.

Remote Therapeutic Monitoring: This term is also distinct to specific reimbursement services codes from CMS, proposed in the 2022 Physician Fee Schedule. They are intended for the management of patients utilizing medical devices (including software that fits the definition of a medical device) that collect *non-physiological data* (such as medication adherence and response to therapy). Unlike Remote Physiologic Monitoring codes, they allow for data to be either self-reported or collected by a physical device. (Foley and Lardner)

Related Agencies, Oversight, and Regulatory Glossary

American National Standards Institute (ANSI): The current ONC-Approved Accreditor (ONCAA) for the Permanent Certification Program (PCP). The ONC-AA will accredit organizations to certify HER technology and perform other responsibilities under the PCP. (NQF)

Health Information Technology Advisory Committee: (HITAC) The Health IT Advisory Committee provides ongoing guidance to NQF's HIT portfolio and offers specific expertise on HIT projects, including specification of testing requirements for eMeasures and maintenance of the quality data set. HITAC is a standing committee of the Board of Directors and was created in December 2009. (NQF)

Health Information Technology for Economic and Clinical Health (HITECH) Act: The HITECH Act provides HHS with the authority to establish programs to improve health care quality, safety, and efficiency through the promotion of Health IT, including EHRs and private and secure electronic health information exchange. (NQF)

Health Insurance Portability and Accountability Act (HIPAA): HIPPA provides federal protections for personal health information held by covered entities and gives patients an array of rights with respect to that information. (NQF)

Health IT Policy Committee (HITPC) A Federal Advisory Committee that coordinates industry and provider input regarding the Medicare and Medicaid Incentive Programs, as well as in consideration of current program data for the Medicare and Medicaid EHR Incentive Programs. (NQF)

Regional Extension Centers (RECs): The ONC's RECs, located in every region of the country, serve as a support and resource center to assist providers in EHR implementation and HealthIT needs. As trusted advisors, RECs "bridge the technology gap" by helping providers navigate the EHR adoption process from vendor selection and workflow analysis to implementation and meaningful use. RECs are part of eight working groups on emerging business lines in support of practice transformation including: privacy and security, accountable care organizations, patient centered medical home, health information exchange, and patient engagement. (NQF)

State Health Information Exchange: The state HIE program promotes innovative approaches to the secure exchange of health information within and across states. It also works to ensure that health care providers and hospitals meet national standards and meaningful use requirements. Demonstrating the secure sharing of information among providers is an essential part of using electronic health records in a meaningful way to qualify for the Medicare and Medicaid EHR Incentive Programs. The Office of the National Coordinator for Health Information Technology (ONC) funds the State Health Information Exchange (HIE) Cooperative Agreement Program. (NQF)

Billing, Coding, and Reimbursement/Payment Glossary

Current Procedural Terminology: (CPT) This code set is maintained by the American Medical Association. The CPT code set describes medical, surgical, and diagnostic services and is

designed to communicate uniform information about medical services and procedures among physicians, coders, patients, accreditation organizations, and payers for administrative, financial, and analytical purposes. CPT coding is similar to ICD-9 and ICD-10 coding, except that it identifies the services rendered rather than the diagnosis on the claim. ICD code sets also contain procedure codes, but these are only used in the inpatient setting. CPT is currently identified by the Centers for Medicare and Medicaid Services as Level 1 of the Healthcare Common Procedure Coding System. (NQF)

Healthcare Common Procedure Coding System (HCPCS): A set of health care procedure codes based on the American Medical Association's Current Procedural Terminology (CPT). HCPCS was established in 1978 to provide a standardized coding system for describing the specific items and services provided in the delivery of health care necessary for Medicare, Medicaid, and other health insurance programs to ensure that insurance claims are processed in an orderly and consistent manner. With the implementation of the Health Insurance Portability and Accountability Act of 1996 (HIPAA) use of the HCPCS for transactions involving health care information became mandatory HCPCS is divided into two principal subsystems, referred to as Level I and Level II. Level I is comprised of the CPT-4 to identify medical services and procedures furnished by physicians and other health care professionals. The Level II HCPCS is a standardized coding system that is used primarily to identify products, supplies, and services not included in the CPT-4 codes. It is maintained and distributed by CMS. (NQF)

International Classification of Diseases 10th Revision (ICD-10) Code: Coding system published by the World Health Organization (WHO), which was implemented for mortality coding and classification from death certificates in the U.S. in 1999. The U.S. developed a Clinical Modification (ICD-10-CM) for medical diagnoses based on WHO's ICD-10 and CMS developed a new Procedure Coding System (ICD-10-PCS) for inpatient procedures. ICD-10-CM replaces ICD-9-CM, volumes 1 and 2, and ICD-10-PCS replaces ICD-9-CM, volume 3. (National Center for Health Statistics)

Defining Characteristics of Telehealth Programs

Telehealth services vary widely by program and can be combined in multiple combinations to deliver the most appropriate care for specific populations and scenarios (if you've seen one telehealth program, you've seen one telehealth program). These characteristics help distinguish different types of telehealth and remote patient monitoring – not exhaustive.

- Patient characteristics
    - Patient location (home, clinic, hospital, school, mobile, etc.)
    - Direct communication with patient, communication with remote provider (provider-to-provider consultation or education), or both
- Provider characteristics
    - Provider location (home, clinic, hospital, mobile, etc.)
    - Provider discipline
    - Single or multi-provider (care team) interaction

- Real-time vs. Asynchronous
- Means of remote communication (single or multiple)
    - Audio
    - Video
    - Patient-entered data
    - SMS/Text
    - Remote monitoring devices
- Frequency of interaction/monitoring
    - Continuous
    - Routine/scheduled recurring
    - Episodic
- Means of encounter initiation
    - On-demand by patient/parent/guardian
    - On-demand by remote provider
    - Referred
    - Scheduled
    - Continuous

Use Cases

Use Case 1: Telestroke

- Patient characteristics:
    - Patient location: emergency department/hospital
    - Communication with remote provider +/- patient
- Provider characteristics
    - Provider location: anywhere
    - Provider discipline: multiple
    - Single or multi-provider (care team) interaction: generally single provider
- Real-time vs. Asynchronous: real-time
- Means of remote communication: Audio/video
- Frequency of interaction/monitoring: episodic
- Means of encounter initiation: on demand by remote provider

Use Case 2: Direct-to-Patient Tele-mental health

- Patient characteristics
    - Patient location: home
    - Direct communication with patient
- Provider characteristics
    - Provider location: anywhere
    - Provider discipline: psychology, psychiatry, mental health counseling
    - Single or multi-provider (care team) interaction: usually single provider
- Real-time vs. Asynchronous: real-time

- Means of remote communication (single or multiple)
    - Audio/video
- Frequency of interaction/monitoring: episodic or routine scheduled/recurring
- Means of encounter initiation
    - On-demand by patient/parent/guardian or referred/scheduled

Use Case 3: Remote Home Blood-Pressure Monitoring

- Patient characteristics
    - Patient location: home
    - Direct communication with patient
- Provider characteristics
    - Provider location: central monitoring unit, or anywhere
    - Provider discipline: varies (nurse, APP, physician)
    - Single or multi-provider (care team) interaction: care team
- Real-time vs. Asynchronous: asynchronous
- Means of remote communication (single or multiple)
    - Patient-entered data
    - SMS/Text
    - Remote monitoring devices
- Frequency of interaction/monitoring: routine scheduled/recurring
- Means of encounter initiation
    - Referred

Mapping to CPT Codes:

- Review existing CPT codes relevant to telehealth and determine whether the listed characteristics allow complete discrimination between different codes.
    - RPM
    - SMBP
    - CCM/TCM
    - Virtual visit
    - Cardiac rehab
    - Mental health

Telehealth / Digital Health – Related CPT© Codes

CPT/ HCPCS Code	Description	Clinician eligible to bill code
99441	Telephone E/M service provided by a physician or other qualified health professional who may report E/M services provided to an established patient, parent, or guardian not originating from a related E/M service provided within the previous 7 days nor leading to an E/M service or procedure within the next 24 hours or soonest available appointment; 5-10 minutes of medical discussion	Physician and qualified health care professionals
99442	;11-20 minutes of medical discussion	Physician and qualified health care professionals
99443	;21-30 minutes of medical discussion	Physician and qualified health care professionals
99091	Collection and interpretation of physiologic data (e.g., ECG, blood pressure, glucose monitoring) digitally stored and/or transmitted by the patient and/or caregiver to the physician or other qualified health care professional, qualified by education, training, licensure/regulation (when applicable) requiring a minimum of 30 minutes of time	Physician and qualified health care professionals
99453	Remote monitoring of physiologic parameter(s) (e.g., weight, blood pressure, pulse oximetry, respiratory flow rate), initial; set-up and patient education on use of equipment	Physician and qualified health care professionals
99454	Remote monitoring of physiologic parameter(s) (e.g., weight, blood pressure, pulse oximetry, respiratory flow rate), initial; device(s) supply with daily recording(s) or programmed alert(s) transmission, each 30 days	Physician and qualified health care professionals
99457	Remote physiologic monitoring treatment management services, clinical staff/physician/other qualified health care professional time in a calendar month requiring interactive communication with the patient/caregiver during the month; initial 20 minutes	Physician and qualified health care professionals
99458	Remote physiologic monitoring treatment management services, clinical staff/physician/other qualified health care professional time in a calendar month requiring interactive communication with the patient/caregiver during the month; additional 20 minutes	Physician and qualified health care professionals
98970	Qualified nonphysician health care professional online digital evaluation and management service, for an established patient, for up to 7 days, cumulative time during the 7 days; 5-10 minutes	Qualified non-physician health care professional
98971	;11-20 minutes	Qualified non-physician health care professional
98972	; 21 or more minutes	Qualified non-physician health care professional

99421	Online digital evaluation and management service, for an established patient, for up to 7 days cumulative time during the 7 days; 5-10 minutes	Physician and qualified health care professionals
99422	; 11-20 minutes	Physician and qualified health care professionals
99423	; 21 or more minutes	Physician and qualified health care professionals
G2010	Remote evaluation of recorded video and/or images submitted by an established patient (e.g., store and forward), including interpretation with follow-up with the patient within 24 business hours, not originating from a related E/M service provided within the previous 7 days nor leading to an E/M service or procedure within the next 24 hours or soonest available appointment	Physician and qualified health care professionals
G2012	Brief communication technology-based service, e.g., virtual check-in, by a physician or other qualified health care professional who can report evaluation and management services, provided to an established patient, not originating from a related e/m service provided within the previous 7 days nor leading to an e/m service or procedure within the next 24 hours or soonest available appointment ;5-10 minutes of medical discussion	Physician and qualified health care professionals

Resources

Table 1 - SPROUT STEM FRAMEWORK – Stakeholder's Table

This table is intended to assist in determining how differing stakeholders may evaluate telehealth programs through the lens of the NQF Quality Domains and by policy implications.

SPROUT STEM FRAMEWORK – STAKEHOLDER's TABLE
Version 3.0

Table 1. Stakeholder's Table

<table>
<tr><th></th><th>Patient</th><th>Provider</th><th>Health System</th><th>Payor</th><th>Policy</th></tr>
<tr><td rowspan="4">Quality</td><td>Patient Reported Outcome</td><td>Reimbursement</td><td>Reputation</td><td>Revenue (# of policy holders)</td><td>Condition specific outcomes</td></tr>
<tr><td>Timely resolution of health issues (Access to care)</td><td rowspan="2">Patient Health outcomes</td><td colspan="3" rowspan="2">Hospital Readmissions - Hospital Readmission Reduction Program (HRRP)</td></tr>
<tr><td>Patient satisfaction with healthcare being provided</td></tr>
<tr><td>Objective health outcomes</td><td>Burnout reduction</td><td>Outcomes of patient served (i.e. 5-year mortality of cardiac bypass)</td><td>Reduce LOS</td><td>Increase availability of actionable patient information that could lead to better health delivery or outcomes</td></tr>
<tr><td rowspan="3">Access</td><td>Wait times</td><td>Provider capacity</td><td># and types of patient served</td><td>Outcomes of patient served (i.e. 5 year mortality of cardiac bypass) - paying for high quality care with good health outcomes</td><td># and types of patient served</td></tr>
<tr><td>Patient follow-up</td><td>Visit length</td><td>Annual growth rate of # of patient served</td><td>Approved care/prescriptions</td><td>Reduction in disparities and inequities</td></tr>
<tr><td>Fulfilled appointments</td><td>Overall telehealth visits</td><td>Telehealth programs offered</td><td colspan="2">Reimbursable services</td></tr>
</table>

<table>
<tr><td rowspan="9">Cost</td><td colspan="2">QALY</td><td colspan="2">Provider/Health system efficiency vs. in-person care</td><td colspan="2">Efficiencies – cost effectiveness (need to define variables)</td></tr>
<tr><td colspan="2" rowspan="2">Technology purchase/use</td><td colspan="2">Degree of alignment with Mission/strategy</td><td colspan="2">Appropriate types of encounters that matches the clinical need – reduce overutilization</td></tr>
<tr><td colspan="2">Coordination of Care</td><td colspan="2">Expedite earlier care if needed, increase adherence to best practices</td></tr>
<tr><td colspan="2">Travel cost (Financial Impact)</td><td>$$ Financial Impact</td><td rowspan="2">$$ Reimbursements for care</td><td rowspan="2">Increase in disparities and inequities</td></tr>
<tr><td colspan="2">Undergo training for digital literacy</td><td>Education for digital literacy provision</td></tr>
<tr><td rowspan="3">Time spent attending to health-related tasks (cost)</td><td>Increased Burnout</td><td>Technical events</td><td rowspan="2">Over utilization - # of telehealth visits</td><td rowspan="2">Increased utilization/unnecessary telehealth usage</td></tr>
<tr><td>Time spent waiting (Cost)</td><td>Resource expenditure (Cost)</td></tr>
<tr><td>Degree to which provider can accomplish everything they would have been able to do in an in-person visit</td><td>Deferred Competing Priorities and their potential benefits missed</td><td>Time spent on data collection on chronic care management</td><td>Safety (unrecognized worsening conditions, related to burnout deviations from best practices like prescribing, etc.)</td></tr>
</table>

	Benefits
	Cost burdens

Table 2: Strategies and Tools for measuring key policy implications

Table 2. Strategies, tools and resources needed to capture measures

Policy	Strategies for capturing measure	Tools/Resources needed
Health Outcomes – (for example, diabetes - % of patients with HgbA1C < 7, hypertension control rates, etc.)	Condition/procedure specific frequencies/percentages from EHR; Elixhauser/Charlson co-morbidity indices; CPT telehealth code frequencies	Patient clinical record/EHR data; Agency for Healthcare Research and Quality (AHRQ) Healthcare Cost and Utilization Project Nationwide Inpatient Sample (NIS) ;Medicare/Medicaid claims data
Hospital readmission reduction program - Avoided readmission (Medicare cost reports, 7 conditions under the hospital readmission reduction program.	Difference between index visit and readmission; total intermediary encounters post-telehealth visit	CMS Medicare Cost reports (Healthcare Cost Report Information System – HCRIS); Patient clinical record/EHR data for six condition/procedure specific 30-day risk-standardized unplanned readmissions measures as part of HRRP: 1) acute myocardial infarction (AMI); 2) COPD; 3) Heart Failure; 4) Pneumonia; 5) Coronary Artery Bypass Graft (CABG) Surgery; 6) Elective Primary Total Hip Replacement and/or Total Knee Arthroplasty (THA/TKA)
# and types of patient served	Frequency/percentage of patients (treated via telehealth) by encounter characteristics, demographics, socioeconomic status, condition, co-morbidity	Patient clinical record/EHR data; Medicare claims data
Reduction/increase in disparities and inequities	Demographic & socioeconomic variation in telehealth access/utilization over time, SDoH in EHR, Community-level change (% unemployed, % ≥65 years of age, % FPL), rural/urban difference in utilization, broadband connectivity, digital literacy	CDC Social Vulnerability Index; Area Health Resource File (from HRSA); US Census Bureau American Community Survey, Patient clinical record/EHR data; Dashboard for societal determinants of health
Increase availability of actionable patient information that could lead to better health delivery or outcomes	Event notifications from ADT feeds; frequency/percentage of shared patient health information exchange; electronic summaries of care reports	Patient clinical record/EHR data (Unstructured, structured, signal data); log data
Efficiencies – cost effectiveness (need to define variables)	Allocative efficiencies in telehealth care delivery (PAs, NPs) vs. Physicians (specialty/PCP) per capita,	American Hospital Association (AHA) Annual Survey Data; HCRIS Data; Medicare/Medicaid claims data

	Market change/competition for telehealth (Herfindahl-Hirschman Index), Time spent on telehealth visit	
Expedite earlier care if needed, increase adherence to best practices	Semi-structured interviews (providers, administrators); instrument development	Existing practice standards review; Technology Acceptance Model; FITT Framework, IS Success Model
Patient satisfaction with healthcare being provided (CAHPS)	Frequencies/percentages of selected items; Exploratory Factor Analysis or Principal Component Analysis to generate variable measures	Hospital Consumer Assessment of Healthcare Providers and Systems (CAHPS); HINTS (Health Information National Trends Survey)
Increase utilization/unnecessary telehealth usage	Utilization management by payer (copay, coinsurance); telehealth CPT code review	Patient clinical record/EHR data (patient portal); Medicare/Medicaid claims data
Safety (unrecognized worsening conditions, related to burnout deviations from best practices like prescribing, etc.)	Levels of exhaustion/burnout (Maslach); provider telehealth proficiency; prescribing patterns	Survey on Patient Safety Culture; Consumer Assessment of Healthcare Providers and Systems (CAHPS); Work experience survey; Maslach Burnout Inventory Survey log data; health system administrative data;); Oldenburg inventory, MBI:EE, Physician Work-Life Study Single Item measure, Professional Fulfillment Index, Well-being Index);

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WHO Digital Interventions table: https://www.ncbi.nlm.nih.gov/books/NBK541896/table/ch2.tab1/?report=objectonly

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