California Department of Health Care Services

Health Information Exchange (HIE) Landscape Assessment

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Executive Summary

California is one of the most diverse states in the country in terms of people, geography, and economy. Approximately 80% of California is rural, yet 85% of the population lives in urban areas, creating diverse scenarios regarding access to care in both rural and urban communities. This huge range of diversity creates a complicated and divided health information technology landscape. No single entity manages health information exchange (HIE) services to move data between providers, patients, and government entities – rather, a patchwork of regional and local initiatives plays the role. In this way, California is truly a microcosm of the entire United States, reflecting the diverse technology challenges seen on a national level.

In collaboration with California Health and Human Services Agency (CHHS), DHCS has been working on developing a strategy to incorporate clinical data into the Medicaid enterprise and participate in the statewide HIE landscape. This strategy includes sending and receiving data to and from electronic health records (EHRs) and health information exchange organizations, providing data to beneficiaries, and exchanging data with state and county departments to support beneficiaries. The proposed strategy advances Medicaid Information Technology Architecture (MITA) Maturity, which requires connecting to EHRs and participating in intrastate exchange of clinical data, and maximizes enhanced federal financial participation.

A thorough understanding of the current state and national landscape is an important step in implementing the clinical data strategy. The purpose of this document is to provide a brief overview of HIE, the current HIE landscape in California (i.e. organizations, county coverage, etc.), and national HIE initiatives that DHCS will need to consider when developing the short and long-term strategy.

Overview of HIE

Health information exchange (HIE) is defined as the ability to electronically move health information among disparate healthcare information systems while maintaining the integrity of the information being exchanged. The term refers to the electronic movement of health-related information among organizations according to nationally recognized standards, as well as an organization that facilitates, oversees, and governs that movement of information among a specific group of health care organizations. Such organizations may also be referred to as health information organizations (HIOs) or health information networks. The primary goal of HIE is to facilitate access to, and retrieval of, clinical data to improve the quality, accessibility, and cost-effectiveness of healthcare.

The Health Information Technology for Economic and Clinical Health (HITECH) Act of 2009 began laying the building blocks for interoperable data systems in health care. In addition to widespread adoption of electronic health records (EHRs), HITECH also provided funding to states to advance HIE and interoperability[1] efforts. Through the State HIE Cooperative Agreement Grant, states have generally followed one of several options: (1) establish a single statewide HIE run by a state government entity or a contracted entity, (2) establish a network of community or regional health information organizations, or (3) some other public-private partnership. In all instances, the goal has been to promote the adoption and meaningful use of health IT and connect providers to ensure the right information is available when and where it is needed for patient care.

[1] Interoperability is defined as the ability of health information systems to work together within and across organizational boundaries in order to advance the effective delivery of healthcare for individuals and communities.

There are typically three different HIO architecture models: centralized, federated (or decentralized), and hybrid.[2] The choice of model is driven by the organization's strategic priorities, governance, and privacy and security policies and procedures.

- Centralized – data is taken from multiple data sources and is stored in a single data repository as a patient-centric, consolidated longitudinal health record comprising information generated across the community. Since all data is stored in a single location, it is available for analytics to help understand health trends in the community, as well as better manage chronic conditions of a patient.
- Federated – data is taken from several sources, but is stored in multiple data repositories associated with and under the control of HIE participants that generated the data, or for whom the data was generated (e.g., lab results transmitted to a provider). When requested, data is retrieved from all repositories to create a patient-centric, consolidated longitudinal health record on demand.
- Hybrid – combines features from both centralized and federated models. It still produces a patient-centric, consolidated longitudinal health record on demand, and much of the data still resides in multiple repositories under the control of HIE participants. Selected data is also stored in a centralized repository to enable analytics on population or chronic disease management priorities of the community.

In addition, there are two primary methods of HIE: directed exchange ("push") and query-based exchange ("pull"). Directed exchange gives healthcare providers the ability to send and receive patient information over the internet via encrypted, secure and reliable channels. Data does not "stop" anywhere en route to the destination and it is often distributed automatically. Query-based exchange allows providers to find and/or request information on a patient from other providers, sometimes from a centralized repository. Query-based exchange is implemented as a manual process with approximately the same frequency that it is deployed as an automated function.

California HIE Landscape

Long before the passage of the HITECH Act, California had a community-oriented, decentralized approach to health data sharing[3]. Whereas many states developed single, statewide health information exchanges to collect and share healthcare data, California opted for a strategy that follows a neutral connectivity model: an approach in which any organization that meets a minimum set of policies, procedures, and technical standards may connect and exchange information. Stakeholders favored this approach because it preserved local autonomy to create and operate the services best meeting the needs of the local users, but they also endorsed leveraging national and state policies, standards, and capabilities for exchange within and between existing HIE initiatives (some of the nation's earliest efforts took root in California).

California Approach to HIE

- Promote community/enterprise activities;
- Promote exchange among communities/enterprises;
- Make any centralized infrastructure lightweight;
- Support access to government systems; and
- Support access to national networks.

Under HITECH, CHHS administered the State HIE Cooperative Agreement Grant, which provided assistance to communities establishing regional health information organizations (HIOs), but there is no state mandate,

[2] Office of National Coordinator for Health Information Technology, http://www.healthit.gov/
[3] CalOHII, Consent Demonstration Project Report to Legislature, March 2014, p. 24

directive, or regulatory oversight. CHHS opted to remain a neutral convener and allow existing HIE stakeholders adopt best practices and govern themselves. Most of the HIOs in the state participate in the California Association of Health Information Exchanges (CAHIE), a non-profit association whose mission is to facilitate and promote the exchange of information through voluntary self-governance. CAHIE was formed to help eliminate the HIE "white space" in California - those areas with little or no electronic exchange capabilities. While this privately-driven, publicly-assisted approach made the most sense given the diversity and size of the state, large portions of the geography remain disconnected.

Since the passage of the HITECH Act, two types of HIOs have emerged in California:

- Community – local or community-based initiative, supported by a number of unaffiliated health care organizations, often within a geographic medical service area
- Enterprise – supported by a single hospital, health system, or integrated delivery network

Community HIOs are characterized by a neutral, accountable governance entity (community board, local government, etc.). Commonly referred to as regional HIOs, HIEs, or clinical data networks, they are typically non-profit 501(c)(3) entities and may be operated by a government entity or as public-private partnership. Participants include primary care and specialty providers, acute care hospitals, skilled nursing facilities, ancillary providers (e.g. laboratory, radiology), mental health and/or substance use treatment providers, home health, public health or other government agencies, emergency medical services, and payers. The most common source of funding is from subscription pricing, although some entities are supported by local assistance or public funding. Primary services provided are longitudinal health records of patients, Direct secure messaging (a standard form of Directed Exchange endorsed by CMS), alerts/notifications (e.g. ADT), reports delivery (including unstructured data), public health and/or quality measures reporting, and personal health record or patient portal.

In enterprise HIOs, governance is controlled by a single, sponsoring organization or small, static group of organizations. They are typically comprised of a single hospital, health system, or integrated delivery network, and there is no public board that is accountable for decision-making. The organization bears all costs of the exchange efforts and they typically provide many of the same services as community HIOs within their network.

A third exchange model, known as point-to-point exchange, also exists in some communities within California. With point-to-point exchange, governance exists in the direct relationships between organizations, but it is not centrally controlled or managed. Exchange is typically limited to specific use cases; a simple structure may consist of bi-directional business associate agreements (BAAs) between organizations, whereas a more complex structure may utilize a multi-party data sharing agreement. Point-to-point exchange is often difficult to manage beyond a small network of organizations due to the lack of common agreements or technical infrastructure, and it is principally due to this difficulty and associated expense that HIOs have arisen nationwide.

California HIE Snapshot

- 11 Community HIOs
- 6 Enterprise HIOs operating statewide
- 38 of 58 counties with community HIO presence
- 14.9M individuals in community HIOs
- 19.6M ADTs transmitted per month

Figure 1 identifies the current community and enterprise HIOs in California. This is intended to provide a snapshot of the current landscape, which is undergoing significant change. Manifest MedEx recently formed as a merger

between Inland Empire Health Information Exchange (IEHIE) and California Integrated Data Exchange Network (Cal INDEX). Prior to the merger, IEHIE provided the technical infrastructure to three other community HIOs: Central Valley Health Information Exchange, ConnectHealthcare, and San Joaquin Community Health Information Exchange. All of the affiliated organizations are in the process of harmonizing their privacy and security policies and processes; the HIOs will operate under the governance umbrella of Manifest MedEx, with nested local governance and management of local services and use cases.[4] In addition, Santa Cruz Health Information Organization (SCHIO) and Orange County Partnership Regional Health Information Organization (OCPRHIO) announced that they will be merging and consolidating their combined 3 million patients into a single infrastructure.[5]

Also identified are the enterprise HIOs that operate statewide, although other regional organizations may exist. University of California Health comprises the five academic medical centers and 18 health professional schools within the University of California system. Traditionally, each medical center and affiliated provider clinics and groups operated independently, but the system is currently working to consolidate operations for a majority of health activities such as overseeing and coordinating business and financial activities of the clinical enterprise.[6] The map also indicates the public and DRG hospitals participating in the TAR-free program.

[4] Source: conference call with Erica Galvez on May 10, 2017
[5] Source: email announcement from Santa Cruz HIE on May 16, 2017
[6] Source: Presentation by Jita Buño on May 3, 2017 and University of California Health website http://www.ucop.edu/uc-health/index.html

Figure 1 Health Information Exchange in California

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National Perspective

Over a decade ago, the Office of the National Coordinator for Health IT (ONC) first conceived of the Nationwide Health Information Network (formerly NHIN/NwHIN, now eHealth Exchange), with the goal of establishing uniform expectations while minimizing one-off approaches. The nationwide network would establish a common "dial tone" for nationwide data sharing across geographies, technology platforms, and healthcare settings, using a federated approach and building a common trust agreement through a cooperative effort of the private sector and government. While participation and use of the nationwide network has expanded, additional initiatives have emerged, increasing the quality and types of content shared. Communities of data sharing now exist to promote exchange of information within a given geographic region or to support a particular technology, standard, or use case. Because of overlap in governance agreements, policies and processes, recently the trend has been towards consolidation of and/or coordination among the various initiatives to improve interoperability.

Following the end of the HITECH grant period, the ONC released the "Connecting Health and Care for the Nation: A Shared Nationwide Interoperability Roadmap" (Roadmap) in 2015. The Roadmap outlines the ONC's vision for a "learning health system" meant to "build upon and shore up the existing foundation of health IT, move quickly to short-term success, and lay out a longer term set of drivers and policy and technical components that will achieve the outcomes necessary to achieve the vision." One of the critical pathways identified in the Roadmap is coordination among stakeholders to promote and align policies and business practices that support interoperability. Similarly, the 21st Century Cures Act of 2015 also includes provisions designed to build consensus and develop a trusted exchange framework. Because of overlap in governance agreements, policies and processes, recently the trend has been towards consolidation of and/or coordination among the various initiatives to improve interoperability.

Table 1 compares several of the most common approaches to interoperability, or initiatives, prevalent throughout California (and across the country). The Sequoia Project[7] is an independent non-profit organization that manages both the eHealth Exchange and Carequality. The eHealth Exchange is a network of organizations connected by a multiparty data sharing agreement and federated architecture, whereas Carequality is an interoperability framework comprised of a common set of rules, technical specifications, and a participant directory. CommonWell Health Alliance is a not-for-profit trade association of health IT companies, including acute care and ambulatory EHRs, post-acute care, imaging, laboratory, retail pharmacy, and emergency services. The California Trusted Exchange Network (CTEN), managed by the California Association of Health Information Exchanges (CAHIE), is a trust framework that includes a common set of policies and procedures, plus lightweight technical infrastructure to enable primarily HIO-to-HIO information exchange.

Although only the four primary interoperability approaches are included for comparison, several more exist and/or are emerging, such as DirectTrust, the Strategic Health Information Exchange (SHIEC) Patient-Centered Data Home (PCDH), and the National Association for Trusted Exchange (NATE). The EHR vendor Epic has an HIE product called Care Everywhere that is typically included in comparisons of interoperability approaches, but is not included here because it is a closed network, only available to Epic customers.

[7] The Sequoia Project, http://sequoiaproject.org/about-us/

Table 1 Comparison of Interoperability Approaches

	eHealth Exchange	Carequality	CommonWell	CTEN
Relevant history	Evolved out of federal government's NHIN/NwHIN as the public-private national network of networks	Created by Sequoia Project, in part to accommodate needs of EHR vendors since they are ineligible to join the eHealth Exchange directly	Created by a group of EHR vendors led by Cerner, Athena, and others (not EPIC), partially as market response to EPIC's Care Everywhere network	Established to provide voluntary self-governance of HIE in California
Interoperability goal	Onboard enough participating providers and HIEs to cover the country	Gain participation of EHR vendors, which gain participation of their customers to cover the country	Gain participation of EHR vendors, which gain participation of their customers to cover the country	Enable trusted exchange among California HIOs and eliminate HIE "white space"
Governance	The Sequoia Project (legal entity) and the Coordinating Committee	The Sequoia Project	Board of Directors	CAHIE (legal entity) and the California Interoperability Committee (CIC)
Eligible participants	Any HIPAA-covered entity	Implementers may be HIO, EHR vendor, payer, clearinghouse, or other organization	EHR vendors (who may pass access to the network down to their customers)	Any organization that oversees and conducts electronic exchange of health information among groups of persons or organizations[8]
Legal document	DURSA[9]	Carequality Connected Agreement[10]	Membership agreement	CalDURSA[11]
Network type	Provider-centric *network*	Provider-centric, network-to-network *trust framework*	Patient-centric *network*	Provider-centric *network*
Exchange type	Peer-to-peer, query-based exchange	Peer-to-peer, query-based exchange	Query-based exchange based on centralized record location	Query-based exchange and secure messaging

[8] A Participant is any business or government agency in good standing, with headquarters in California, that oversees and conducts, on their own behalf and/or on behalf of their Participant Users, electronic transactions or exchanges of health information among groups or organizations and that (i) have the technical ability to electronically transact health information on their own behalf or on behalf of their Participant Users, (ii) have the organizational infrastructure and legal authority to comply with, and require their Participant Users to comply with, the CalDURSA, and (ii) has a system implemented in a production-ready environment and is ready to begin exchanging data with other Participants in production.

[9] Restatement I of the Data Use and Reciprocal Support Agreement (DURSA), version September 30, 2014, http://sequoiaproject.org/ehealth-exchange/onboarding/dursa/

[10] Carequality Connected Agreement (CCA), approved version November 5, 2015, http://sequoiaproject.org/carequality/resources/

[11] California Data Use and Reciprocal Support Agreement (CalDURSA) version 1.0.2 approved July 24, 2014, http://www.ca-hie.org/site-content/California-Data-Use-and-Reciprocal-Support-Agreement-v1.0.2.pdf

	eHealth Exchange	Carequality	CommonWell	CTEN
Most common transaction	Hospital or HIE to SSA or VA *Least common: hospital to hospital for patient care*	EHR vendor or HIO on behalf of user to another EHR vendor or HIO to get clinical data to the point of care	EHR vendor on behalf of customer to another EHR vendor to get clinical data to the point of care	HIO to HIO exchange
Onboarding process, costs, barriers	Annual fee: $19,900[12] Testing fee: $19,000 Onboarding Process: 1. Sign DURSA 2. Submit application package 3. Complete testing Barrier: limited use cases beyond treatment	Fees: unknown – paid by EHR vendors, who can pass down the fee to providers Onboarding Process: 1. Complete application packet Barrier: framework is driven by use cases; currently only query-based document exchange using IHE XCPD and XCA profiles	Fees: variable, included in cost of EHR system Onboarding Process: purchase HIT from participating vendor Barrier: subscription to services limited to HIT vendors (EHRs, PHRs, etc.)	Onboarding fee: $5,000 Annual fee: $400 quarterly Onboarding Process: 1. Sign CalDURSA 2. Submit CTEN application and be approved 3. Complete testing Barriers: 1. Small number of participants 2. Large hospital systems unlikely to join without incentive
Technical specifications	Exchange specifications (2011 version)	Query-based Document Exchange Implementation Guide	Not available	Exchange Policies and Procedures, Testing Form
Number of endpoints/ participants	Total endpoints: unknown 4 federal agencies 65% of hospitals 50,000 medical groups 3,400 dialysis centers 8,300 pharmacies	Total Implementers: unknown 19,000 clinics 800 hospitals 250,000 providers	Live at 4,700 sites, plus 3,200 in process	8 HIOs 1 Government Agency

[12] Annual fee covers ongoing support and maintenance of trust framework, specifications, service registry, certificate management, etc. For government agencies, fees are based on annual operating costs. Annual fee cited is based on annual operating costs of more than $10 million.