Health Information Exchange in California:
Overview of Network Types and Characteristics

This brief is a companion piece to "Health Information Exchange in California: Assessment of Regional Market Activity" produced by Intrepid Ascent with the California Health Care Foundation. Information contained here is informed by interviews, online research, and industry expertise.

How do health care providers access patient information from outside their practice, clinic, or hospital to deliver informed care? How do organizations and the communities they serve aggregate and analyze patient information to guide population health improvement? How do care teams that span organizations and sectors (such as health care and housing) use data to collaborate and communicate to provide integrated services that address whole-person needs?

This document answers these questions through a high-level overview of the types of infrastructure used to exchange health-related information in California today.[1] The methods identified put information at the fingertips of clinicians, their organizations, and partnering service providers for the care of individuals and populations.[2]

While based on similar technology standards, each type of data exchange infrastructure described is built and organized to address distinct priorities, has specific strengths and weaknesses, and operates differently in scale and geographic distribution. Many of these networks overlap, and organizations often participate in more than one. While the networks represent a significant advance in capabilities across the state, without further progress and alignment, they leave significant gaps that contribute to fragmented services for most Californians.

The primary types of health information exchange networks are:

EHR-centered clinical data exchange. A majority of clinical data exchange in California happens through approaches that connect health care providers to each other and to other partners through their electronic health record (EHR) systems. Large hospital and health systems have made significant investments in their data systems such that employed and contracted providers across the networks can share information through a single enterprise health information organization (enterprise HIO). EHR vendors also have created the ability for their own customers to share data with each other on common patients (e.g., Epic Care Everywhere). However, the overwhelming focus of EHR vendors today is on enabling data exchange across organizations and between EHRs via national networks. National networks do not store patient records, but they provide a framework of technical standards and governance agreements with nonprofit oversight, which enables participants to query one another for information on common patients. These networks are particularly useful for large provider organizations with significant IT resources to configure the data systems to meet their needs.

HIO-centered clinical data exchange. Health information organizations (HIOs) operate in California at local and regional levels, with one operating across multiple regions. While these networks vary greatly in their focus and capabilities, they all exchange clinical data regardless of the EHR systems used. HIOs both augment EHR-centered exchange networks to fill critical gaps and at times compete directly with them. Some HIOs have focused on aggregating data, laying the foundation for population-level insights. Importantly, these networks convene a diverse set of local stakeholders to solve data-sharing problems, fostering trust among them. While the methods for data submission to HIOs are largely standardized, methods for accessing HIO data are much more variable. Some HIOs primarily push data into their participants' EHR, while another common approach is to make data available via an HIO's web portal. Given the providers' interest to stay in the EHR workflow, use of HIO portals to access a patient's comprehensive community record remains limited.

Some HIOs share data with one another through the California Trusted Exchange Network (CTEN), which also gives them access to national networks, and through the Patient-Centered Data Home, an approach that alerts a patient's "home HIO" of clinical events that happen outside the patient's residing area. CTEN provides a governance framework with technical requirements for participation by organizations, including regional HIOs, large health systems such as Sutter and Dignity Health, and state agencies such as the California Department of Health Care Services (DHCS) and the California Emergency Medical Services Authority (CalEMSA). In this way, CTEN functions as a "network-of-networks," enabling HIOs, for instance, to query each other for information on common patients, or, for example, for DHCS to query Sutter Health.

Specialized clinical data exchange networks. A number of private companies operate large-scale data exchange networks that connect many of the same participating organizations as the EHR-centered exchange and HIOs, but that deliver a specific type of data or subset of the full patient record. These networks tend to embed data — such as electronic prescriptions, lab results, and clinical event notifications to providers — into provider workflow and EHR systems when patients present at a hospital or emergency department, to support efficient clinical decisionmaking at the point of care.

Whole-person data exchange networks. With the widespread recognition that social and behavioral factors largely determine population health outcomes, data-sharing networks have emerged throughout the state that facilitate the coordination of services across sectors so patients can be supported holistically. Many of these emerging networks address whole-person needs, combining medical, behavioral health, and social data with electronic tools for collaboration across these settings. They are generally in an earlier stage of development than the other networks described here. These networks include Whole Person Care Pilots, a waiver program focused on vulnerable populations and funded by DHCS, and efforts across the state to enable referrals between health care providers to community-based and government social service providers (e.g., housing, food banks). With the transition from Whole Person Care to CalAIM (California Advancing and Innovating Medi-Cal), data sharing across sectors will become more critical to meet the rigorous new requirements for qualifying patients and managing them over time.[3]

Prominent Data Exchange Networks: Characteristics and Key Metrics, by Network Type

	DATA EXCHANGE SERVICE PRIORITIES	REACH (FOOTPRINT IN CALIFORNIA)	PRIMARY PARTICIPANTS	GOVERNANCE	GAPS/CHALLENGES
EHR-Centered Clinical Data Exchange					
Hospital and Health Systems Integrated health and hospital systems support clinical data sharing among affiliated facilities and providers via the system's EHR and supporting technology ("enterprise HIOs").	Record of all clinical services provided by a health system to its patients; integration of external data as available; increasingly, analytics tools for population health management; benefit from participating in the EHR vendor and national networks below.	Most health and hospital systems in California have made significant strides to integrate their numerous data systems, centered on their EHR. **EXAMPLES** Kaiser Permanente, Sutter Health, and Contra Costa County Health Care Services use Epic; Common Spirit and USC (University of Southern California) use Cerner.	Providers and staff within the health system; may extend to non-employed provider network; patients can access some information through health system patient portals.	System-driven	▶ Limited to members of organization and contracted providers ▶ Primarily benefit large provider organizations with resources to purchase and configure EHR systems predominant in the hospital market (e.g., Epic) ▶ Limited behavioral health (BH) and social determinants of health (SDOH) data
EHR Vendor Networks EHR vendor networks allow provider organizations that use a vendor's EHR to share clinical data with other users of that EHR.	Clinical data sharing across a vendor's client base creates more access to complete patient records.	These networks are prevalent in both inpatient and ambulatory settings across the state; they have limited reach into nonmedical settings like BH and social service organizations. **EXAMPLES** Care Everywhere, the network internal to the EHR vendor Epic, exchanged 221 million records nationally during one month in late 2020 (includes data shared with other vendors).[4]	Hospital and provider organizations with the same EHR vendor	Vendor-driven with user input	▶ Limited to providers using a particular vendor's EHR platform ▶ Primarily benefit large provider organizations with resources to purchase and configure EHR systems predominant in the hospital market (e.g., Epic) ▶ Limited BH and SDOH data
National Networks (eHealth Exchange, Carequality, and Commonwell) National networks exchange clinical records between provider organizations and health systems by establishing common data-sharing agreements and standards.	Query-based exchange of electronic clinical data across diverse provider organizations and networks Carequality and CommonWell support multiple EHR vendors. eHealth Exchange supports organizations rather than EHRs and anchors on the Veterans Health Administration health systems and other major health systems.	Major health systems, large EHR vendors, community clinics, and physician practices use these networks. **EXAMPLES** At the national level, Carequality supports over 150 million documents exchanged per month, Commonwell data represent more than 135 million unique individuals, and 77% of the nation's state and regional HIEs exchange data within the eHealth Exchange network.	Health systems, EHR and other vendors, government agencies, regional HIOs and similar networks, practices that use certain EHRs	Combination of system-driven and vendor-driven; nonprofit organizations	▶ Not all EHR vendors or provider organizations participate. ▶ Data overload and quality issues reduce utilization at the point of care. ▶ Without customization, cumbersome workflows inhibit small provider organizations lacking internal IT resources from using ▶ Query-based exchange does not "push out" data that no one knows to ask for. ▶ Robust governance at the national level, but limited ability to respond to state and local priorities

Prominent Data Exchange Networks: Characteristics and Key Metrics, by Network Type, *continued*

	DATA EXCHANGE SERVICE PRIORITIES	REACH (FOOTPRINT IN CALIFORNIA)	PRIMARY PARTICIPANTS	GOVERNANCE	GAPS/CHALLENGES
HIO-Centered Clinical Data Exchange					
Health Information Organizations (HIOs) Typically regional nonprofit networks, supported by unaffiliated health care organizations	Robust clinical record for individuals in network service area; lab results delivery and hospital event notifications; growing analytics capabilities for population health management	▶ 15 HIOs in California with participants in at least 39 of the 58 counties ▶ More than 20 million messages exchanged per month on patient encounters[5] **EXAMPLES** ▶ Most HIOs focus on building density in their home geographies. ▶ One HIO, Manifest MedEx, has a presence in multiple regions with 120 hospitals, 700 ambulatory sites, and eight health plans participating across the state and emphasizes integrating clinical and claims data.	Hospital and provider organizations, county health services organizations (especially primary care and BH), payers, other stakeholders	Typically, participant-driven	▶ Variable participation and service levels ▶ Large areas of the state with no significant HIO ▶ Limited BH and SDOH data ▶ Questions about financial sustainability — large providers leverage EHRs for data-sharing; EHR vendors bundle national network fees into base costs, making it difficult for HIOs to compete on price.
California Trusted Exchange Network (CTEN) A governance framework with technical requirements creating a network connecting HIOs, health systems, and others, including state agencies specific to California	Exchange of electronic clinical documents; primary data network for the California EMS (emergency medical services) data system PULSE (Patient Unified Look-up System for Emergencies) CTEN also provides a ramp for member HIOs to onboard to the national networks, specifically eHealth Exchange, effectively and economically.	16 participating organizations in California, most of which are HIOs, with the addition of several major health systems and state agencies, including EMS and DHCS[6] **EXAMPLES** HIOs in San Diego and Santa Cruz can query each other for information on common patients.	HIOs, health systems, and California state agencies (EMS and DHCS)	User-driven and managed by CAHIE, a public/private partnership supported by the state of California	▶ Not all clinical data in participants' underlying systems can be exchanged and technical methods of exchange are limited, but network is more able to respond to California-specific needs than national networks. ▶ Limited number of participating organizations
Patient-Centered Data Home Network-of-networks approach connecting HIOs	Enables a patient's "home" HIO to be notified when the patient receives care outside of their HIO's service area.	45 HIOs nationwide, with five HIOs in California participating in the western US regional network[7] **EXAMPLES** Data sharing between HIOs in San Diego, Santa Cruz, and northern Central Valley with HIOs in Texas and Utah.	Regional and state HIOs nationally	Participant-driven and managed through a national HIO association, the Strategic Health Information Exchange Collaborative	▶ Minority of California HIOs participate. ▶ Governance managed by a national nonprofit. ▶ Only nonprofit HIOs can participate.

	DATA EXCHANGE SERVICE PRIORITIES	REACH (FOOTPRINT IN CALIFORNIA)	PRIMARY PARTICIPANTS	GOVERNANCE	GAPS/CHALLENGES
Specialized Clinical Data Exchange Networks					
Clinical Event Notifications Event notification services used to coordinate patient care, most commonly via ADT (admission, discharge, transfer) messages	Notifications sent to providers and/or embedded in the EHR when their patients receive services in other organizations; patient information beyond the ADT shared depending on the specific service	Collective Medical Technologies (CMT) supports about 50% of California hospitals with an ED (178 of 340 hospitals) and 744 skilled nursing facilities.[8] EXAMPLES CMT embeds alerts in a provider's EHR; alerts summarize actionable information about the patient, such as drug-seeking behavior, security threats, existing diagnostic and lab results, and care team contact information. PatientPing is also present with a small California footprint. HIOs like Manifest MedEx offer event notifications, as does DirectTrust, a secure messaging capability required for EHR certification, that allows providers to push event notifications out of the EHR.	Hospital and provider organizations, payers	Mix of vendor-driven and participant-driven	▶ Inherently limited in scope because shared data are just a portion of the full patient record ▶ While scope is narrow, data provided by these networks are designed to be especially actionable. ▶ Emerging but limited connections between clinical, behavioral, and social service organizations
Other Specialized Data Exchange Networks for exchange of specific types of clinical data.	Sharing of specific types of data and health care transactions, such as e-prescriptions or diagnostic lab results	Critical infrastructure in specific areas such as e-prescribing and lab results delivery EXAMPLES Surescripts, the leading e-prescribing network, counts 95% of US providers as members of its network.[9] Quest Diagnostics and LabCorp dominate the clinical reference laboratory market and are the primary source of lab result data.	Hospital and provider organizations; ancillary providers (pharmacies, labs)	Vendor-driven	▶ Inherently limited in scope because they generally involve a single data type ▶ Many primarily deliver one-way sharing for specific use cases. ▶ During the COVID-19 pandemic, public health and "pop-up" testing labs that have varying technical ability present challenges to data sharing. ▶ While scope is narrow, data provided by these networks are designed to be especially actionable.

Prominent Data Exchange Networks: Characteristics and Key Metrics, by Network Type, *continued*

	DATA EXCHANGE SERVICE PRIORITIES	REACH (FOOTPRINT IN CALIFORNIA)	PRIMARY PARTICIPANTS	GOVERNANCE	GAPS/CHALLENGES
Whole-Person Data Exchange Networks[10]					
Whole Person Care (WPC) Pilots[11] Medi-Cal delivery system integration pilots focused on high-risk populations; most managed by county health departments.	Clinical data sharing within California counties, combined with tools for collaboration across organizations and sectors, including BH and SDOH data	➤ 26 individual pilots in California ➤ Approximately 200,000 enrolled WPC enrollees, as of June 2020[12] ➤ CalAIM to scale up WPC approaches EXAMPLES Alameda County, which lacked an HIO, developed a robust data exchange system combining clinical, BH, and SDOH data with collaboration tools; has emerged as a viable Community Information Exchange (see note 11).	Driven by county health departments, with local participation from hospital and provider organizations, social services providers, other stakeholders	Government-driven, at the state and county levels	➤ Relatively small compared to EHR- and HIO-based exchanges ➤ Variable levels of integration and coordination across service sectors, depending on the county or pilot ➤ CalAIM will shift control of the WPC program to managed care plans to scale, which has both opportunities and risks.
Social Services Referrals Networks These initiatives focus on data sharing to enable social service coordination through referrals between health care organizations and non-health care social service organizations.	Referral and coordination tools that leverage "electronic phone books" of service providers	Rapidly emerging capability across the state, partly driven by major health systems and payers, and sometimes related to county-based WPC initiatives. EXAMPLES In Los Angeles, L.A. Care has partnered with Aunt Bertha for access to a social service referral platform for use by contracted provider organizations. Other prominent vendors include One Degree, NowPow, and Unite Us.	Hospital and provider organizations, county and public health services, social services, payers, other local stakeholders	Mix of participant-driven and vendor-driven	➤ These networks are gaining a significant footprint only now. ➤ Implementation is complex and there are significant organizational growing pains. ➤ Interoperability with EHRs, HIOs, IT platforms used by social service providers, and among competing referral platforms, is lacking. ➤ Use of multiple platforms in a region may place an undue burden on social service providers expected to use multiple platforms to manage patients.

About the Author

Mark Elson, PhD, the principal of **Intrepid Ascent**, and members of his team developed this snapshot. Intrepid Ascent supports communities in the exchange and use of data to improve health.

About the Foundation

The **California Health Care Foundation** is dedicated to advancing meaningful, measurable improvements in the way the health care delivery system provides care to the people of California, particularly those with low incomes and those whose needs are not well served by the status quo. We work to ensure that people have access to the care they need, when they need it, at a price they can afford.

CHCF informs policymakers and industry leaders, invests in ideas and innovations, and connects with changemakers to create a more responsive, patient-centered health care system.

Endnotes

1. Health information exchange infrastructure has two primary components, technical and governance, both of which are examined in this report.

2. As such, this overview does not address claims data and payment systems, state-level disease registries, public health surveillance databases, or quality reporting. The full report, *Health Information Exchange in California: Assessment of Regional Market Activity*, provides examples of how these parallel ecosystems at times do inform decisionmaking at the point of care (e.g., the state CURES database, public health labs with COVID-19 test results, and claims data integrated into clinical services).

3. Another Medi-Cal program, Health Homes for Patients with Complex Needs, provides an additional foundation for CalAIM through investments made by Medicaid managed care plans, although these investments did not result in infrastructure for data sharing across sectors to the extent seen with Whole Person Care.

4. Kat Jercich, "Epic's Care Everywhere Interoperability Platform Shows Big Jump in Data Exchange," *Healthcare IT News*, December 14, 2020.

5. "HIE in California," California Assn. of Health Information Exchanges, n.d.

6. "CTEN," California Assn. of Health Information Exchanges, n.d.

7. "Patient Centered Data Home," Strategic Health Information Exchange Collaborative, n.d.

8. Information provided by CMT.

9. Kate Rusciano, "Why It Matters: Prescribers Can Now Access Accurate Medication History Data for Virtually Every American," Surescripts, May 31, 2019.

10. Such a network is sometimes referred to as a "Community Information Exchange" (CIE). Whole Person Data Exchange Networks was selected as a heading instead for the following reasons. First, DHCS refers to "Whole Person Care Approaches" as an organizing concept for the CalAIM program, and the networks described here support this approach. Second, being a relatively new term, CIE means different things to different people — usually either corresponding to social referrals or to comprehensive exchange and use of medical, behavioral, and social data within a community. With the latter of these two definitions, CIE remains more of a goal than a reality in California today.

11. Health Homes represented another Medi-Cal delivery system integration pilot run through the managed Medicaid plans. This program did not emphasize cross-sector data sharing. As a result, the development of data exchange infrastructure was limited in this program.

12. For more information about Whole Person Care, please visit the "Whole Person Care Pilots" page on the DHCS website.