NC HealthConnex and Value-based Care:
Statewide Health Information Exchange as a Technology Tool for All

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A statewide health information exchange (HIE) can be a vital technology tool and play a pivotal role in driving health care innovation and better health outcomes, especially for providers participating in value-based care models. NC HealthConnex is the state-designated HIE network that gives participating providers secure and timely access to important patient data from more than 4,700 health care facilities spanning geographic locations and care settings.

Seven years after its inception in North Carolina, the statewide health information exchange (HIE) has taken root. NC HealthConnex has operated under state governance since 2016 and serves as a form of public utility connecting communities of care throughout the state to facilitate the exchange of important patient information. All providers may participate in NC HealthConnex regardless of their location, medical specialty, or financial or technological limitations [1]. Strong support from state government leaders and policymakers and an array of stakeholders across the health care sector, including a legislatively appointed advisory board of representatives, has driven a thoughtful approach and high rate of participation by the health care community in recent years. The result is a rich data network and accompanying technology services that offer the promise of greatly improved health care for North Carolinians.

In 2015, the North Carolina General Assembly passed sweeping changes to the state's HIE Act [2]. These changes envisioned an improved HIE network to support Medicaid managed care and provide a more comprehensive centralized health information database to improve health care quality for all the state's citizens while also ensuring cost-effective state-funded services [1, 2]. In 2016, the statewide HIE network was placed under a newly created Health Information Exchange Authority (NC HIEA), part of the North Carolina Department of Information Technology (DIT)'s Government Data Analytics Center. The law requires that most North Carolina health care providers connect to NC HealthConnex and contribute patient data by varying deadlines between 2018 and 2021 [2, 3].

As of April 2019, 97 hospitals and more than 4,600 other health care facilities send data to NC HealthConnex (a five-fold increase in three years) [1]. More than 41,000 providers are contributing data on over 6 million patients. With approximately 4,500 additional facilities being onboarded—including behavioral health providers, long term and post-acute care providers, emergency medical services, and laboratories (as well as more hospitals and clinics)—the current trajectory would make NC HealthConnex one of the nation's largest state health information exchanges by 2021 [1].

In addition to a data repository, a clinical document exchange, and a clinical portal, the NC HIEA aims to provide modern, flexible, and accessible technology that can be used by all the state's providers regardless of their technological constraints or workflow. The NC*Notify event notification service, launched in 2018, alerts providers to important health events patients experience outside of the provider's immediate practice and not otherwise captured by their electronic health record (EHR) [4]. This service promotes better-informed care transitions and improved care management, and it may also help practices and organizations meet requirements for enhanced reimbursements from North Carolina Medicaid [5], Medicare, and other payers. Enrollment alone, assuring a daily data feed of both hospital and ambulatory events for a provider's patient panel, will qualify providers for many of the more highly compensated, value-based tiers or quality programs that health plans offer [5]. Also, using these daily feeds to schedule appointments within prompt time frames, as specified by a health plan, may result in higher reimbursements for follow-up visits [6]. The recently released NC HIEA Roadmap 2021 charts improvements to the NC*Notify service and other strategic HIE initiatives for the next three years and is referenced throughout this article [1].

As with social network technologies, the value of NC HealthConnex will increase as provider participation

increases and the available data become broader and richer. To this end, the NC HIEA is adding new data sources, like state data registries and repositories, and connecting to nationwide health data networks to expand the scope and quality of information available. Providers will be able to access this data through the NC HealthConnex Clinical Portal, or by searching directly from within their EHRs, and benefit from other services like health event notifications. Of note, NC HealthConnex and other HIEs nationwide will be held to new information blocking requirements under Section 4004 of the 21st Century Cures Act (Cures Act) and federal regulations to be developed pursuant to the Cures Act. The federal statute provides that any action that prevents or "materially discourages" access to electronic health data for patient care or other permitted purposes under applicable law could result in civil penalties [7, 8]. The NC HIEA's position as a government agency, with its singular focus on improving the health of all the state's citizens without regard for profit, is by and large aligned with this approach. It is anticipated that this freeing of data will enable access to previously untapped patient information for disaster response and emergency medical services workers, correctional health care providers, human and social services workers, and others who have an appropriate need to use the information in compliance with the Health Insurance Portability and Accountability Act (HIPAA) and other state and federal law.

A Place for Statewide HIE in a Practice's Health Care Technology Strategy

Physician frustration with EHRs and the difficulty they sometimes have communicating with each other is a well-documented problem. A 2018 Harris Poll conducted on behalf of Stanford Medicine found that, although 91% of respondents acknowledged the importance of an EHR, only 44% of 521 primary care physicians responding were satisfied with their EHR's abilities [9]. More than two-thirds of respondents noted the need for improved interoperability and "the need to make patient data available easily and readily to professionals from all parts of the health care system for the benefit of the patient" [9]. A 2019 analysis by Kaiser Health News and *Fortune Magazine* found that over the past decade hundreds of EHR companies have capitalized on a federal incentive structure that inadvertently promoted siloed health information technologies, complicating efforts to achieve interoperability in health care [10].

With EHRs now nearly ubiquitous throughout the country, interoperability is in high demand by both providers and the patients they serve. Dr. Pranay Sinha of the Boston University School of Medicine writes: "Not only does the fragmentation of records worsen the care we provide, but it also increases costs...A study from Boston Children's Hospital estimated that one in three patients received duplicate tests because of fragmented health records" [11]. He argues, "It's time to end the fragmentation of care for the sake of our patients. A doctor's place is by the patient's bedside, not in the shadow of their fax machine" [11]. A recent poll conducted by Siena College Research Institute indicates that nearly 85% of 1,000 adult residents in eastern New York "expect their providers to use an electronic health information exchange (HIE), if one is available" [12]. However, like EHRs, HIEs must continue to adapt, moving beyond traditional document exchange to the provision of timely, concise, intelligent information to providers.

Statewide HIEs are but one player in the expanding space of patient data sharing, but their role should not be discounted. Nationwide models (both public and private) are garnering much attention, but John Kansky, president and CEO of the Indiana Health Information Exchange and member of the Office of the National Coordinator for Health Information Technology (ONC)'s Health IT Advisory Committee argues that they are functionally "oversimplified" and don't offer practical solutions to the challenges of interoperability [13]. Rather, says Kansky, many state and regional HIEs are the "workhorses of interoperability today," because health care is largely local: "if you are interoperable local [sic], or interoperable in a region, you're providing a heck of a lot more value than if you're a tiny bit interoperable, nationally" [13]. Kansky notes that moving a piece of patient data from one EHR to another is not the end game. "What about notifying people about clinical events? What about population health? What about community health records? [14] What about electronic delivery of clinical results? Aren't all those use cases part of what we need to declare ourselves interoperable as a healthcare system?" [13].

As a vendor-agnostic, centralized database of health information with strong financial support from the state, NC HealthConnex is well positioned to meet the types of interoperability use cases Kansky identifies to better serve North Carolina's 10.3 million citizens [15]. NC HealthConnex services may be particularly influential in closing care gaps in rural areas where technology and funding to achieve advanced health data analytics may be limited. Further, the NC HIEA aims to simplify statutory obligations for health care practices in regard to state health registries and repositories by streamlining automated reporting and enabling database referencing for public health purposes through a single interface between NC HealthConnex and their EHR systems. Examples of this include automating submission of reportable immunizations and lab results via the HIE and enabling access to the state's controlled substance reporting system within a provider EHR or the NC HealthConnex Clinical Portal. Finally, the NC HIEA is expanding its provider training and data quality programs in 2019. The North Carolina Area Health Education Centers (NC AHEC) will employ staff to train providers on how to most effectively use NC HealthConnex services, as well as how to work with practice staff and EHR vendors to improve the quality and completeness of data being sent from their EHRs to NC HealthConnex.

Transparency in Health Data Movement and Access

Fear and distrust of health information technology (HIT) and its ability to safeguard patient privacy are widespread among health care consumers. A 2016 Black Book survey of over 12,000 adult patients revealed that 57% felt skeptical of HIT, citing concerns over the privacy of their medical records (pharmacy, mental health, and chronic condition records in particular), as well as the financial information contained in these records [16]. Fearing this information may be leaked to third parties, including the government, 89% report withholding information from their providers [16]. This trust gap contributes to data gaps, and in turn, care gaps. Paul Marceau of The Enrichment Center in Winston-Salem, a chapter of The Arc of North Carolina, argues, "The real fear should be that patients do not receive the treatment they need because their health providers cannot make informed decisions because they lack access to the total picture. Or worse, they should fear they might die for want of a piece of life-saving information" (personal communication, Paul Marceau, quality and training manager, The Enrichment Center, April 12, 2019).

Providers must acknowledge the important role they play in educating patients about the benefits of sharing their health data, and the laws and safeguards in place to protect this data from inappropriate disclosure. Providers may allay their patients' concerns by pointing out that while the system is not devoid of risk it is certainly no less secure—and in most respects is considerably more secure—than other activities where personal data is shared, like faxing of medical records, electronic banking, and social media. As provider payment models shift to reward data sharing and better health outcomes, providers and affiliated organizations must set aside any fears they may have that participating in this process will make them less competitive or unduly compromise privacy.

Many HIEs in the United States are privately held. In contrast, NC HealthConnex is part of NC DIT, the lead state agency responsible for technology with considerable experience managing and protecting the state's sensitive data assets. By state law, NC DIT and the NC HIEA are held to account for transparency in how patient data moves through the HIE and connected state and patient health data systems. It must be clear how data is protected and may (and may not) be used by parties that access it. This includes an explicit prohibition of disclosure for commercial purposes [2, 17]. Figure 1 depicts high level data flow through NC HealthConnex, both with connected provider systems and with other patient data systems. The only exceptions to this regulation of the data flow are for use cases permitted under North Carolina statute and HIPAA (eg, provision of select data for research, data quality training with HIE participants, public health initiatives) [2, 8]. Of note, the NC HIEA introduced additional security measures in April 2019, upgrading its core HIE technology platform.

With privacy and security as guiding principles, expanding provider access to patient data—and promoting ease of that access—is a primary objective of the NC HIEA. NC HealthConnex is designed to serve providers at every level—from front desk and triage staff to mid-level personnel, and, of course, physicians—including those treating patients in

FIGURE 1.
NC HealthConnex Data Flow, 2019
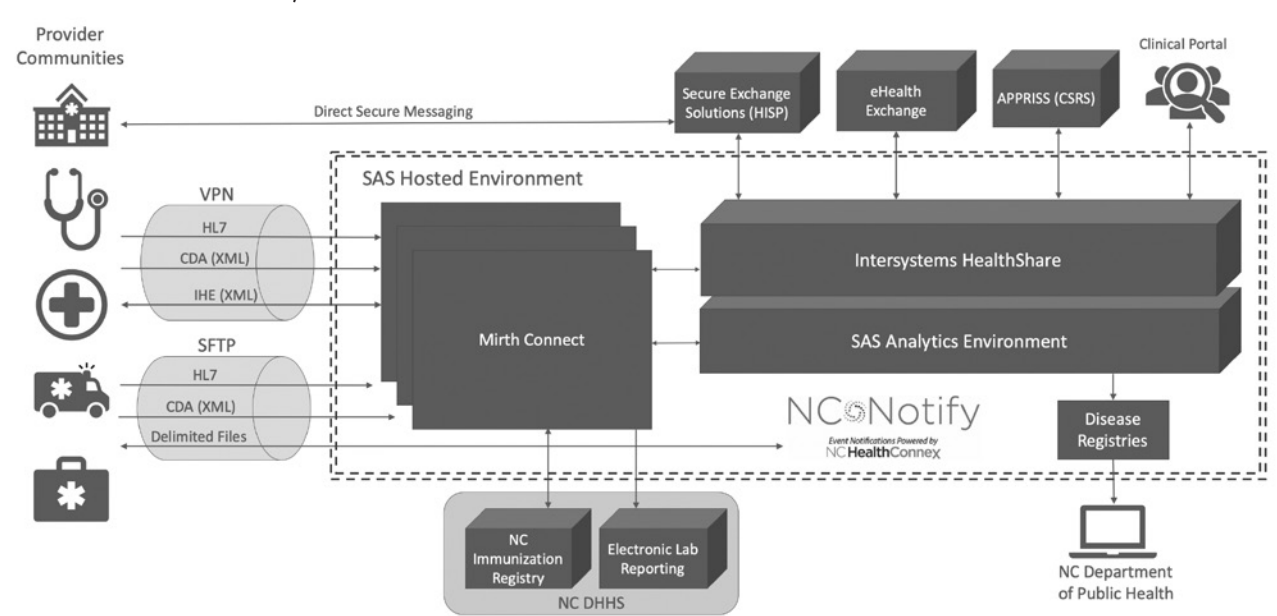
Source. NC HIEA/NC HealthConnex.

unconventional settings or without access to an EHR. The HIE's opt-out consent model automatically shares patients' data (opts them in) unless they explicitly opt out. This model benefits both patients and providers: consumers are offered a choice, but the default favors consent, assuring the wide availability of records (the current opt-out rate is less than 1%) [1, 17].

Supporting Value-based Care with Modern Technology Services

The administrative and technological requirements placed on physicians and organizations by payers and regulators have been increasing at a rapid pace in recent years. Providers have struggled to keep up. Physician burnout has been called a "public health crisis" by the Harvard T.H. Chan School of Public Health and Massachusetts Medical Society [10]. As North Carolina Medicaid moves to a multi-payer value-based managed care system in 2019, administrative complexity and associated reporting burdens almost certainly will increase. These challenges are compounded by the fact that there are hundreds of distinct EHRs and technology solutions in use by facilities across the state. Despite national standards for information sharing, not all solutions interpret them in the same manner. This creates usability and data quality problems. The National Quality Forum, a consortium of public- and private-sector experts, recently addressed the question of how to "mak[e] health data and analytics meaningful, usable, and available in real time for providers and consumers," calling on "health information technology policymakers [to] improve the healthcare delivery system's ability to retrieve and act on data" [18].

One of the NC HIEA's five focus areas for 2019-2021 is the delivery of high-quality, no-cost clinical event notifications, using NC*Notify [4]. The goal is to deliver providers timely, actionable intelligence on their patients' interactions with the health care system outside of their organizational walls to promote follow-up care and care planning. The service currently offers daily or weekly notifications through direct secure messaging (DSM) or secure file transfer protocol (sFTP) that indicate where a patient has received care and describe the chief complaint or diagnosis associated with that care. Beyond basic health plan requirements of tracking hospital events, NC*Notify includes events at all connected ambulatory facilities in its alerts so providers are also informed of care provided by specialists, urgent care providers, behavioral health providers, and others in community settings. This service is developed in coordination with NC Medicaid and is aligned with value-based quality and payment models to help providers promote continuity of care and maximize their own reimbursements.

In 2020, NC*Notify will offer providers more options, including additional delivery methods (eg, mobile), near-real-time frequency, more data inputs and sources (eg, state registries and repositories and connected HIE and patient

data systems nationwide), and "smart" notifications. Smart notifications will be the product of a clinical intelligence engine (CIE), whereby a scan of the entire HIE network for patient attributes will inform inclusion of data determined relevant for follow-up care in the notification message (eg, patient is diabetic, include latest hemoglobin A1C results). The service will aim to minimize alert fatigue and information overload by including data only as directed by a provider or flagged as relevant by the CIE.

Another new service to improve HIE data usability is a consolidated continuity of care document that will consolidate information from all HIE-connected care sites, customized for the HIE participant based on their clinical needs, and fed back within their workflow. As NC HealthConnex continues to mature, a future phase of systems development will allow providers to request and instantly receive discrete data elements on demand. The NC HIEA anticipates that this next level of on-demand interoperability will leverage the Fast Healthcare Interoperability Resources (FHIR, pronounced "fire") technology standard and data integration methodology, which has been promoted by the ONC [19]. As referenced by the recently released rules on the Cures Act, there is an expectation that data will be moved and accessed via these new technological standards and application programming interfaces (APIs) [7]. FHIR enablement and testing with EHRs is included in the NC HIEA Roadmap 2021 [1].

A 2018 study found "significant cost reductions in healthcare markets that have established operational HIEs, with an average reduction in spending of $139 (1.4% decrease) per Medicare beneficiary per year" [20]. The authors note that,

> "[W]ith payment reform and the rise in value-based payments, providers will need to more seriously consider strategies that improve quality and reduce spending. HIE has the potential to reduce spending, particularly when provider incentives are aligned, as they will be under payment reform. However, as with any effort to adopt new technology, it will be critical for those leading provider organizations to ensure that HIE is integrated into provider workflow in ways that ensure that newly available information is readily accessible at the point-of-care and is presented in ways that facilitate incorporation into clinical decision-making" [20].

Fully supported by state appropriations and a federal grant, NC HealthConnex and its services are available at no cost to all providers of health care services statewide. As reliable data and quality technology services become increasingly important to the success of health care delivery, providers should consider the benefits of leveraging NC HealthConnex and its services. NCMJ

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