

Using Health Information Systems to Identify and Control Hypertension: Lessons from the ASTHO Million Hearts Learning Collaborative

EXECUTIVE SUMMARY

Health information systems play a critical role in ensuring clinical, public health, and community data is collected, analyzed, and shared in a timely way to identify individuals with uncontrolled hypertension and help them manage their blood pressure. States in the ASTHO Million Hearts Learning Collaborative are testing a variety of strategies to use health information systems to improve blood pressure control among their residents. Key lessons learned from their experiences include:

- Effective health information systems require adequate clinical and public health infrastructure and capacity. This includes broad electronic health records (EHR) adoption and EHR optimization, as well as staff capacity.
- Effective health information systems require close collaboration and partner alignment to share and govern data. Key aspects of this work include addressing health information technology interoperability, data governance issues, and data format and quality.

Public health agencies can support strong, effective health information systems in their state by:

- Engaging stakeholders at the local, regional, and state levels.
- Supporting broad EHR adoption and optimization.
- Using public health infrastructure and resources to support health information sharing.
- Identifying existing and innovative opportunities to strengthen health information systems.
- Providing technical assistance and support to facilitate data sharing.

States also identified two key opportunities for ASTHO and other national and federal partners to support health information systems and health information sharing. These opportunities include:

- Promoting alignment of clinical quality measures.
- Supporting EHR optimization and interoperability.

BACKGROUND

Health information technology (health IT) refers to electronic systems used to store, share, and analyze health information.¹ It encompasses a variety of tools and applications to support providers, patients, payers, and other stakeholders accessing and using health information, including clinical decision support systems, health information exchanges (HIEs), patient or disease registries, patient applications (e.g., patient portals, [personal health records](#)), electronic health records (EHRs), telehealth applications,² and [e-prescribing](#) systems that allow providers and pharmacists to communicate directly. Adopting health IT tools broadly and ensuring they are interoperable has the potential to improve healthcare quality and save costs for patients, providers, and payers.³ Some experts estimate that national implementation of fully interoperable systems could result in net savings of \$77.8 billion annually.⁴

Health information systems (HIS) use health IT to manage, analyze, and share data to get the right information into the right hands at the right time. HIS may be local or state level in scope, and can manage a wide variety of clinical, public health, and payer data, including EHRs, medical or medication claims, healthcare utilization data (e.g., hospital discharges, emergency department admissions), quality or performance monitoring metrics, demographic data, and disease surveillance and prevalence data. Sharing data through HIS enables a broad range of stakeholders, such as policymakers, public health professionals, and healthcare providers, to make informed decisions about many aspects of population health and healthcare, from patient care to state budgets. Strong HIS also support greater transparency and accountability by increasing access to information,⁵ as well as support efforts to address health equity and ensure priority populations are identified and targeted.

HIS can be used to address a wide variety of health issues, including identifying and managing chronic diseases such as hypertension. States in the ASTHO Million Hearts Learning Collaborative are using HIS to test and spread strategies to improve hypertension control, including:

- Identifying individuals with undiagnosed and/or uncontrolled hypertension to target for outreach, follow up, or clinical management efforts.
- Identifying priority populations or geographic areas to target for intervention.
- Monitoring individuals to help them manage their blood pressure.
- Informing clinical quality improvement (QI) efforts.
- Monitoring population-level trends and measures over time.
- Reporting on clinical quality measures.

LESSONS LEARNED

Learning collaborative states have identified a number of successes, challenges, and lessons learned on how to effectively use and share HIS to improve hypertension identification, management, and control. These lessons learned align with findings from other initiatives on using health IT to improve chronic disease management, such [HHS Agency for Healthcare Research and Quality \(AHRQ\)-funded projects](#). Key findings are described below.

Effective HIS require adequate clinical and public health infrastructure and capacity. An HIS' robustness depends on the extent to which healthcare and public health partners have the technology infrastructure and capacity to manage, share, and use data effectively. Three critical components include EHR adoption, EHR optimization, and staff capacity.

EHR adoption. EHR adoption rates are low in some states, particularly those that are predominately rural. Helping clinics move from paper-based records to EHR systems is a monumental task. While some states, including Alabama, have used the learning collaborative as an opportunity to assist clinics in making this transition, low EHR adoption remains a major barrier to building robust HIS in some states. Local health departments (LHDs) can also ensure their direct service clinics have adopted EHR systems.

EHR optimization. EHR optimization ensures that EHR systems are configured to maximize their [meaningful use](#). Within the context of hypertension identification and control, this may involve ensuring EHRs can generate patient lists or registries to inform targeted outreach and follow up; developing clinical decision support tools, such as provider alerts for elevated blood pressure readings; and generating patient population-level quality reports that allow clinics to benchmark overall blood pressure control rates over time and inform QI efforts.

Learning collaborative states have consistently identified challenges in optimizing EHR systems with these functions. One major challenge relates to cost barriers for EHR optimization. EHR vendors may lock certain EHR functions, such as quality reports, that can only be accessed when additional fees are paid. In other cases, EHRs may be configured without vendor assistance, but this requires expertise that clinic staff often do not possess.

Staff capacity. Another major challenge learning collaborative states identified is clinical staff capacity and knowledge to use EHRs optimally. Some learning collaborative participants have addressed this by providing technical assistance (TA) and training to clinic staff to help them generate patient lists, registries, and reports needed to inform population health initiatives and identify patients with undiagnosed or uncontrolled hypertension, or respond to data requests from public health agencies or other partners. However, lack of staff time and capacity remain significant challenges.

Effective HIS require close collaboration and alignment to share and govern data. Learning collaborative states have identified several challenges to sharing data in a seamless, effective manner to inform action. These challenges relate to health IT tool interoperability and data governance.

Health IT interoperability. Interoperability is the ability of different health IT systems and software applications to communicate, exchange data, and use that data.⁶ Interoperability between EHR systems, HIEs, and other clinical and public health data systems is critical to sharing information efficiently to improve healthcare quality, inform population health initiatives, and monitor outcomes.

States have identified lack of interoperability as a critical barrier to building robust HIS to support hypertension control. For example, lack of EHR interoperability limits the ability of clinical and public health partners to share health data about a patient to coordinate their care. Lack of interoperability of pharmacy data systems create [barriers](#) to improving medication adherence. In addition, HIEs, which have strong potential for linking and sharing public health and clinical data in a well-integrated way, have not been widely adopted, and all critical users may not yet have access. For example, 51 percent of state health agencies use HIEs, and just 13 percent use them to monitor chronic disease indicators and risk factors.⁷ In addition, cost barriers may prevent new users from optimizing HIE access and use. For example, the state HIE in Virginia charges a fee for activating provider encounter alerts. Finally, in states with multiple HIEs, the different HIEs may not be interoperable with each other.

Data governance. Data governance refers to the processes, policies, and procedures that determine how data is managed, shared, and used. Many challenges to sharing data arise due to liability and security

concerns about sharing protected health informationⁱ in ways that could compromise data security or potentially violate the Health Insurance Portability and Accountability Act (HIPAA) [Privacy Rule](#) or [Security Rule](#). Promoting data sharing requires building an organizational culture that strongly emphasizes data protection. Encouraging data sharing may be even more challenging due to increased concerns about hacking and other data security breaches. To address this issue, experts recommend focusing on the benefits of data sharing to encourage continuous QI and establish strong data governance structures. They discourage viewing it as a tool for punishing underperformance.

Many organizations have their own internal data governance processes, but may not have any for sharing data externally.⁸ Addressing governance for shared data often requires establishing data sharing agreements. Learning collaborative states are exploring the best methods for sharing data between state and local public health agencies, primary care practices, community pharmacies, health systems, state Medicaid agencies, and private payers. One promising approach is developing memorandums of understanding and similar data sharing agreements. For example, the Alabama Department of Public Health (ADPH) Bureau of Health Promotion and Chronic Disease developed a memorandum of understanding with the Alabama Medicaid Agency to establish terms to address security requirements and conditions for ADPH to access state Medicaid data. A variety of example data sharing agreements from states and partner organizations are available on the ASTHO Million Hearts [Tools for Change webpage](#).

Data format and quality. Learning collaborative states have identified the quality and format of the data being shared as challenges. For example, some state health agencies have received data from clinical partners in faxed PDF formats, which requires significantly more time to manually enter into a data system than an electronic upload. Other states say it is a major concern that they do not have a method for validating the quality of data from partners. One potential solution to ensure all partners use the same data validation methods is to establish data quality and submission standards through data sharing agreements or other data governance tools.

OPPORTUNITIES FOR STATE HEALTH AGENCIES

State health agencies have several opportunities to support HIS to improve hypertension identification and control.

Engage stakeholders at the local, regional, and state levels. Data is a powerful lever to engage partners. Sharing data with a variety of partners, particularly healthcare providers, is key to achieving buy-in and coordinating efforts for population health management initiatives. State health agencies are uniquely positioned to engage and convene partners across sectors to identify existing HIS resources and opportunities to strengthen these systems. Key partners include [QI organizations or networks](#) (QIN-QIOs), other QI experts (either within the public health agency or external organizations), state primary care and safety net clinic networks such as [health center-controlled networks](#), health IT vendors,

ⁱ The HIPAA Privacy Rule defines “protected health information” as individually identifiable health information that is transmitted or maintained in any form or medium (electronic, oral, or paper) by a covered entity or its business associates, excluding certain educational and employment records. (Source: National Institutes of Health. “What Information is Protected by the Privacy Rule?” Available at https://privacypolicyandresearch.nih.gov/pr_07.asp. Accessed 6-2-2016.)

regional health information organizations, regional extension centers, state Medicaid agencies, and private payers.

State health agencies should understand their state's clinical safety net infrastructure and the partners that support it, such as state primary care associations or health center-controlled networks. They likely already support health IT and health information sharing across their networks of clinical sites, and have the health IT capacity and expertise to access and analyze population health data. QIN-QIOs, regional health information organizations, and health information organizations play similar roles for non-safety net clinic networks. Connecting with these partners streamlines data sharing and the data use agreement process, and avoids the need to develop agreements with multiple individual clinics.

Support broad EHR adoption and optimization. State health agencies can help connect and coordinate partners to provide TA and support for broad EHR adoption and optimization. In some cases, state health agencies' own QI or epidemiology experts may also provide direct technical support or training. TA may involve supporting clinics and local public health agencies in generating patient lists or hypertension registries using their EHR systems, or running population health and clinical quality reports to monitor blood pressure control rates across their patient population.

Multiple learning collaborative states are working with health IT and QI partners to address these issues. For example, the Oklahoma State Department of Health partnered with the Oklahoma Foundation for Medical Quality (OFMQ), the state's regional extension center, to assess the reporting capabilities of EHR systems in clinical sites participating in the learning collaborative and CDC 1305-funded activities. An initial assessment found that many of these sites did not have EHR systems that could generate reports on blood pressure control. With OFMQ support, these sites have improved capacity to generate reports that help providers understand blood pressure control rates among their patients.⁹

In New Hampshire, the Community Health Access Network (CHAN)—the state's only health center-controlled network—hosts a robust data warehouse that supports the creation of clinical and operational reports for its health center members. Through the learning collaborative, CHAN created customized hypertension registries for each clinic in its network, including two federally qualified health centers (FQHCs). CHAN also provides technical support to help the FQHCs use their registries and reports effectively.

Use public health infrastructure and resources to support health information sharing. State health agencies can contribute their own data, infrastructure, and chronic disease prevention activities to support strengthening HIS. They can also support including hypertension-related indicators in quality metric sets and state strategic plans. Achieving the public health and population health objectives of meaningful use of EHRs will require healthcare providers and public health agencies to partner to leverage public health infrastructure that can help providers receive and share data.¹⁰

Learning collaborative states are testing strategies to use public health resources to support health information sharing. For example, Virginia is using CDC 1422 funding to work with five local health districts to develop regional dashboards. These locally-driven websites display community health

indicators selected by each community, and include socioeconomic, health, education, and transportation measures and resources. They were developed using a collective impact approach that engaged local and regional community partners across governmental, nonprofit, private, and healthcare sectors. The dashboards serve as a nexus for health information sharing, supporting cross-sectoral partnerships, and informing strategic planning.

Identify existing and innovative opportunities to strengthen HIS. In addition to leveraging internal infrastructure and capacity, state health agencies can work with partners to expand development of comprehensive statewide HIS such as HIEs and [all-payer claims databases](#). They can also identify other existing infrastructure within their state to collect and share hypertension data, as well as explore innovative health IT applications, including open source platforms such as [popHealth](#).

Provide TA and support to facilitate data sharing. State health agencies can support health information sharing between LHDs, healthcare sites or networks, payers, and other partners in several ways. First, they can help partners clearly communicate the value of sharing public health and clinical data for all partners. Accessing and analyzing data is a significant time and resource investment for healthcare networks and clinics. Communicating the benefit to them of sharing their data is important to achieving buy-in. For example, they can learn from healthcare partners about the types of data analysis that would help them demonstrate the return on investment of population health management initiatives, and then conduct that analysis. Alternatively, they could pair clinical data with public health data to develop GIS maps to help target population health interventions. Second, state health agencies can work with partners to collaboratively identify standards for data elements and data sharing. Finally, they can identify or develop example data sharing agreements.

STATE EXAMPLES

Learning collaborative states are testing a variety of approaches to expand and strengthen HIS to support hypertension identification, management, and control.

Colorado tests care coordination platform to support referrals between community and clinical resources. The Colorado Department of Public Health and Environment partnered with an LHD and clinics in two counties to test the [Crimson Care Management](#) (CCM) platform as a tool to facilitate care coordination and referrals for individuals identified with hypertension. CCM allows physicians, public health nurses, and other care team members to coordinate patient care by accessing and updating patient blood pressure and care plan data. It also facilitates referrals to other healthcare providers or community resources using a resources list and standardized referral and consent forms. CCM is connected to a centralized data warehouse that allows users to monitor outcomes. During the two month pilot period, 221 patients with elevated blood pressure were referred to services including medical care or lifestyle interventions, and 10 of these patients brought their blood pressure under control.

North Dakota tests novel use of emergency management IT platform to facilitate community-clinical linkages. The North Dakota Department of Health (ND DOH) is working with six local health districts across the state to improve data sharing between community, clinical, and public health partners, with

the goal of improving hypertension identification and referral to care. Community partners, including EMS personnel and public health nurses, are using the emergency management IT platform [HC Standard](#) to track community blood pressure screening measurements and facilitate referral for individuals with elevated blood pressure. HC Standard is convenient and efficient for local health districts that do not have EHR systems to collect blood pressure data and track individuals for follow up. ND DOH developed a user manual for using HC Standard and trained five local public health units and one tribal health entity to use HC Standard to capture blood pressure screening data from community screenings. ND DOH also developed kits for community partners that include tablet computers, mobile wireless hotspot devices, printers, and label writers. As of June 2016, local public health partners screened 1,309 individuals for hypertension, including 142 Native American residents. Of these, 210 individuals (20%) had elevated blood pressure and were referred to primary care. Partners are also working to connect HC Standard to EHR systems and the [North Dakota Health Information Network](#), the state HIE.

New York uses regional HIE to calculate county hypertension rates and improve EHR optimization. The New York State Department of Health (NYSDOH) partnered with a regional health IT organization to use a regional HIE to conduct county-level hypertension surveillance. Through initial conversations with LHDs and primary care provider partners, state-level partners identified several gaps in data available to support clinical hypertension management and clinical QI efforts. One of these gaps was a lack of county-level data on hypertension control and undiagnosed hypertension rates.

NYSDOH partnered with the regional health information organization Hixny to calculate real-time county-level rates of hypertension, hypertension control, and undiagnosed hypertension in Albany County. Hixny developed registries of patients within the county who met the following criteria: (1) had been diagnosed with hypertension but had their blood pressure under control; (2) had been diagnosed with hypertension but whose blood pressure was not controlled; and (3) had elevated blood pressure readings but did not have a diagnosis of hypertension. This was the first time partners were able to measure undiagnosed hypertension or access and analyze real-time clinical data using a health information exchange. The full methods and findings from this work are described in a Hixny [report](#). Since the initial pilot, NYSDOH has also used these three measures in an additional 23 practices across the state.¹¹

NYSDOH also partnered with the Health Center Network of New York (HCNNY), a federally designated health center-controlled network with nine health center members across the state, to provide TA to member FQHCs in three counties, serving a total of 135,000 patients. Their goal was to optimize their EHR systems to identify and follow-up with patients with undiagnosed hypertension, develop and adopt evidence-based clinical hypertension management protocols, and improve blood pressure measurement and recording accuracy. HCNNY's [overall approach](#) involved developing an algorithm to identify patients with undiagnosed hypertension within eClinicalWorks (the FQHCs' EHR system), developing clinical hypertension reports and patient registries to benchmark trends and identify individuals with hypertension, and supporting health centers in developing protocols for patient follow up. In addition, based on findings that a high percentage of EHR blood pressure measurements ended in zero—an indicator of terminal digit bias—HCNNY trained clinical staff on proper blood pressure measurement and entry into the EHR system. The data generated from these activities informed collaborative efforts

between the FQHCs and LHDs to improve linkages between clinical and community resources to support blood pressure self-management. Overall, between September 30, 2013 and May 31, 2015, the hypertension control rate across the three participating FQHCs with a total patient population of 10,218 improved by 18.7 percent, from 56.9 percent to 67.5 percent.¹²

D.C. establishes citywide HIS to identify undiagnosed and uncontrolled hypertension and facilitate referral to care. In 2013-2015, the District of Columbia Department of Health (DC DOH) led a cross-sectoral team to establish a citywide HIS to identify undiagnosed and uncontrolled hypertension, support clinical QI, and improve follow up, particularly for low-income, African American, and under- or uninsured individuals served by FQHCs. As described in an [ASTHO success story](#), DC DOH and one FQHC analyzed EHR data to establish baseline blood pressure control rates across eight health centers in the district, and identified more than 6,000 patients with undiagnosed or uncontrolled hypertension.

DC DOH, the D.C. Primary Care Association, and health centers also developed a standardized electronic data reporting system and dashboard using QlikView, a software package that integrates and visualizes data in real time. The dashboard aggregates city-level data on hypertension prevalence, diabetes prevalence, hypertension control (NQF 0018), and diabetes control (NQF 0059), and stratifies these measures rates by race, ward, zip code, gender, and age. Eventually, partners hope to expand the dashboard's data pool to include the largest FQHC in the district, as well as two major hospital systems. In total, this data pool will represent half of the city's population. Once fully operational, it will allow DC DOH, primary care sites, and other partners to monitor hypertension prevalence, provider performance on controlling hypertension, and areas of the city with higher hypertension prevalence.

Overall, data from 20 health center sites and approximately 200,000 patients showed that blood pressure control rates in D.C., measured using NQF 0018, improved from 53.8 percent in 2013 to 63.2 percent in 2014. In addition, among a group of 10,317 patients who were identified with uncontrolled hypertension in 2013 and targeted for follow up, 3,480 (34%) were under control in October 2014.¹³

WHAT IS STILL NEEDED?

Learning collaborative states identified actions that ASTHO and other national and federal partners can take to support broader adoption and use of HIS to promote hypertension identification and control.

Promote alignment of clinical quality measures. As described in an [ASTHO white paper](#), promoting alignment of clinical quality measures for blood pressure control will reduce the time and administrative burden required for public health and healthcare partners to meet reporting requirements. In turn, this will support stronger partnerships across sectors, allow more time and resources to be devoted to QI and data quality assurance activities, and advance innovative healthcare delivery.

Support EHR optimization and interoperability. The most common request from states was for national and federal partners to address the need to improve EHR optimization and interoperability. This may involve making the business case for why maximizing access to EHRs and their data sharing capabilities will benefit a range of stakeholders, including EHR vendors. It may also involve addressing alignment of clinical quality measures and leveraging incentive programs such as meaningful use.

CONCLUSION

States in the learning collaborative are using HIS to test and spread a variety of strategies to improve hypertension identification and control. They have identified a number of successes, challenges, and lessons learned about how to effectively use HIS to improve hypertension identification, management, and control. For example, they learned that effective health information systems require adequate clinical and public health infrastructure and capacity. This includes broad electronic health records (EHR) adoption and EHR optimization, as well as staff capacity. In addition, effective health information systems require close collaboration and partner alignment to share and govern data. Key aspects of this work include addressing health information technology interoperability, data governance issues, and data format and quality. Public health agencies can support strong, effective health information systems in their state by: engaging stakeholders at the local, regional, and state levels; supporting broad EHR adoption and optimization; using public health infrastructure and resources to support health information sharing; identifying existing and innovative opportunities to strengthen health information systems; and providing technical assistance and support to facilitate data sharing. National and federal partners can also play important roles in supporting state efforts to establish and strengthen HIS use for population health and chronic disease prevention initiatives.

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² Agency for Healthcare Research and Quality (AHRQ). "Health IT for Improved Chronic Disease Management." Available at <https://healthit.ahrq.gov/ahrq-funded-projects/emerging-lessons/health-it-improved-chronic-disease-management>. Accessed 6-10-2016.

³ AHRQ. *Decisionmaker Brief: Chronic Disease Management*. Available at https://healthit.ahrq.gov/sites/default/files/docs/page/08-0084_cdm_0.pdf. Accessed 5-31-2016.

⁴ Walker J, Pan E, Johnston D, *et al.* "The Value of Health Care Information Exchange and Interoperability." *Health Affairs*. 2005. W5-10. Available at <http://content.healthaffairs.org/content/suppl/2005/02/07/hlthaff.w5.10.DC1>. Accessed 5-31-2016.

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⁶ Healthcare Information and Management Systems Society. "What is Interoperability?" Available at <http://www.himss.org/library/interoperability-standards/what-is-interoperability>. Accessed 6-10-2016.

⁷ ASTHO. *ASTHO Profile of State Public Health, Volume Three*. "Issue Brief: Health Information Management at State Health Agencies." Washington, DC: Association of State and Territorial Health Officials. 2014. Available at <http://www.astho.org/Profile/Volume-Three/Issue-Briefs/Information-Management/>. Accessed 5-31-2016.

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⁹⁹ ASTHO. "Aligning Clinical Quality Measures for Blood Pressure Control: Potential Impact on Public Health and Healthcare Reporting and Quality Improvement Efforts." 2015. Available at <http://www.astho.org/Prevention/Aligning-Clinical-Quality-Measures-White-Paper/>. Accessed 6-1-2016.

¹⁰ ASTHO. *ASTHO Profile of State Public Health, Volume Three*. "Issue Brief: Health Information Management at State Health Agencies." Washington, DC: Association of State and Territorial Health Officials. 2014. Available at <http://www.astho.org/Profile/Volume-Three/Issue-Briefs/Information-Management/>. Accessed 5-31-2016.

¹¹ Wyrick T, personal communication, June 2, 2016.

¹² ASTHO. "New York Strengthens Data Systems to Improve Hypertension Identification, Management, and Control." 2015. Available at <http://www.astho.org/Prevention/Chronic-Disease/Million-Hearts/Million-Hearts-Systems-Change-Case-Study--New-York/>. Accessed 6-10-2016.

¹³ ASTHO. "Washington, D.C. Establishes District-Wide Data Systems to Improve Hypertension Identification and Control." 2015. Available at <http://www.astho.org/Prevention/Chronic-Disease/Million-Hearts/Million-Hearts-Case-Study--District-of-Columbia/>. Accessed 6-10-2016.