



Population Health Management Software: An Opportunity to Advance Primary Care and Public Health Integration

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Acronyms Used in this Report

AHRQ - Agency for Healthcare Research and Quality

BI - business intelligence

CDC - Centers for Disease Control and Prevention

CIO - chief information officer

CSV - comma separated values

CVD - cardiovascular disease

eCQM - electronic clinical quality measures

EHR - electronic health record

ER - emergency room

FQHC - Federally Qualified Health Center

HIE - health information exchange

HIMSS - Healthcare Information and Management Systems Society

IT - information technology

PHII - Public Health Informatics Institute

PHM - population health management

SES - socioeconomic status

U.S. - United States

XML - extensible markup language

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Executive Summary

Small- to medium-sized health care practices and independent provider groups often lack electronic health records (EHRs) that provide the robust reporting and analytic capacity provided by population health management (PHM) products. Both health care providers and public health agencies stand to benefit from further data sharing enabled by PHM use. This project seeks to provide guidance to health care providers and public health agencies on selection and use of PHM products and the data they can provide.

We used a sequenced, two-phased approach to interview PHM vendors on product functionality and conducted key informant interviews with clinical and public health stakeholders. While PHM vendors often expressed that EHRs should meet the needs of smaller health care practices, key informants stated that their needs for timely and valuable data aggregation can go beyond the functionality offered by EHRs at this time. Both vendors and informants cautioned against the idea that technology alone will improve population health outcomes. Organizations seeking to implement PHM products must first consider the workforce needed to take action upon these new data and prioritize the needs of the clinical practice. Public health agencies may be well positioned to partner with clinical data owners to help define analytic needs and assist with funding mechanisms. As interoperability standards evolve, health care providers and public health agencies will have increased opportunities to explore data exchange and information sharing approaches.

Project Overview

Background

Cardiovascular disease (CVD) is America's leading health problem and the leading cause of death. More than 1 in 3 U.S. adults (approximately 85.6 million) suffer from at least one type of CVD.¹ Approximately 32 percent of U.S. adults have high blood pressure², and 12 percent have diabetes mellitus³ - two conditions that are important risk factors for CVD.

Approximately 85.6 million U.S. adults suffer from at least one type of cardiovascular disease.

The economic burden of CVD is staggering. Approximately 1 in every 6 American health care dollars is spent on CVD.⁴ Direct health care costs and indirect costs of lost productivity attributable to heart disease and stroke averaged over 316 billion dollars (U.S.) in 2011-2012.¹ These costs are anticipated to rise considerably as the population ages. One study predicts that 40 percent of the U.S. population will have at least one form of CVD by 2030.⁴

An aging population with a substantial chronic disease burden will continue to strain health care services, drive the need for clinical quality improvement, and increase focus on population health. Kindig and Stoddart's 2003 definition of population health references the collective "health outcomes of a group of individuals, including the distribution of these outcomes within the group."⁵ Recognizing the need to define goals for achieving a high-value health care system, the Institute for Healthcare Improvement

advanced the “Triple Aim” - improving the patient experience, improving population health, and reducing per capita costs.⁶ While the three goals are interrelated, defining a patient population of concern and improving the quality of their clinical care is an initial step towards measuring progress toward the Triple Aim.⁶

Population health management (PHM) has been defined as “the discipline of managing the clinical and financial risk of a defined group of individuals” and is increasingly stressed as a critical component for value-based care models and other alternatives to traditional fee-for-service.⁷ In a clinical setting, population health typically refers to the health of the patients of a particular health care provider or health plan. For public health agencies, population health can refer to the health of all the inhabitants of an agency’s jurisdiction. Because of the impact of heart disease and other chronic diseases on morbidity and mortality, public health departments have a vested interest in a clinic’s population health and the data that can result from a clinic’s practice of PHM.

In recent years, due largely to the meaningful use provisions of the HITECH Act, many health care providers have adopted electronic health record (EHR) systems that encode patient information in ways that can make those data more readily available and useable for analysis. Larger health care organizations with inpatient facilities are more likely to have the resources to purchase an EHR that includes some tools to support both population health analytics and the corresponding workflows of PHM. Their size and bargaining power with payors may make it easier for them to experiment in emerging value-based care models.⁸

In contrast, smaller health care practices and independent provider groups are more likely to have less functional EHRs that do not readily provide PHM functions. Fortunately for them, there are a variety of software vendors that offer PHM products that are designed to integrate with any EHR product.

Objective

This project seeks to provide guidance to health care providers and public health agencies on selection and use of PHM products and the data they can provide. These entities often lack experience with these software and could benefit from an assessment of existing products using criteria that are important to both clinical and public health practitioners seeking to prevent CVD and other chronic conditions.

Project Scope

This report describes findings from an effort focused on PHM products used by small- or medium-sized ambulatory primary care practices. We define a *population health management product* as software that integrates or exchanges data with EHR systems and generates aggregate information on a group of patients to improve chronic disease care and clinical outcomes. Further, we limited products to only those created by vendors who were not also EHR vendors. The rationale for this decision was to increase the likelihood that a PHM product could integrate with the variety of EHRs used in small and medium-sized ambulatory primary care settings. While we recognize that there is a large number of business intelligence (BI) tools that may be suitable for clinical settings, we elected to focus this project on products specifically developed for the PHM market.

Methods

The project utilized two evaluation methods implemented in sequenced phases. The first phase entailed a PHM product assessment based on review of vendor materials and interviews. The second phase utilized key informant interviews of PHM product end-users and public health representatives to identify themes related to improved chronic disease surveillance and patient outcomes.

PHM Product Assessment

Our assessment of PHM products entailed a desk review of product marketing material and similar documentation, semi-structured interviews of product representatives, and, in some instances, software demonstrations to assess the degree to which products met the evaluation criteria. PHM product evaluation criteria were developed to guide the data collection process. PHM products were identified through conversations with stakeholder subject matter experts and review of related market research.

Evaluation Criteria Design

Design of the PHM product evaluation criteria was initiated with a literature review conducted by PHII staff. A report by the Agency for Healthcare Research and Quality (AHRQ) defines 5 domains for population health management: 1) identify patient subpopulations, 2) examine detailed characteristics of those patient subpopulations, 3) create reminders for patients and providers, 4) track performance measures, and 5) make data available in multiple forms.⁹ These domains were the starting point for our evaluation criteria design. More detailed assessment criteria were further informed by previous market research and consultation with project stakeholders.¹⁰

With the input of health IT, primary care, and public health stakeholders (see Appendix A), final PHM product assessment criteria were organized into 6 domains: 1) identifying patient subpopulations, 2) examining detailed characteristics of patient subpopulations, 3) creating and sending notifications, 4) tracking clinical performance measures, 5) integrating data, and 6) sharing data with external systems. These criteria are described in Table 1 below.

Table 1: Population Health Management (PHM) Product Evaluation Criteria

Criterion 1: Identify patient subpopulations by user-selected parameters.
<i>Rationale: A foundational aspect of PHM is to identify groups of patients within a clinical practice. Creating patient sub-population groups based on diagnoses, risk factors, care team, and other factors helps providers identify patterns associated with treatment and outcomes.</i>
1a. Product generates lists/reports of patient subpopulation.
1b. Product provides the ability to create new queries to identify subpopulation that can be saved, re-run and shared with other end users.
1c. Patient query parameters should include diagnoses (e.g., diabetes, hyperlipidemia, hypertension, and obesity), gender, race and ethnicity, insurance status, elevated blood pressure or lipid panel readings, smoking status, treatments prescribed, and treatment adherence.
1d. Provider/facility query parameters should include: provider type, care team, and site (for multi-site healthcare system).

2. Examine detailed characteristics of patient subpopulation.
<i>Rationale: While PHM products are intended to provide information on groups of patients it is useful to be able to “drill-down” to individual patient details or forecast risks associated with patients.</i>
2a. Product provides ability to display a patient's individual clinical record.
2b. Product provides ability to stratify patient subpopulation by severity of condition, degree of risk for negative health outcomes, and degree of risk for high cost treatment.
3. Create and send notifications.
<i>Rationale: In keeping with imperatives to improve care and lower costs through prevention it is important that PHM products facilitate communication between providers and their patients. These communications help patients adhere to treatment guidelines and avail themselves of preventative services.</i>
3a. Product provides customizable notifications to patient subpopulation, preferably according to patient delivery preference.
3b. Product provides customizable notifications to members of the care team.
3c. Product supports non-English language notifications.
4. Track clinical performance measures.
<i>Rationale: Providers are required to report a variety of clinical performance measures to governmental agencies and other stakeholders. Some clinical performance measures are similar to chronic disease prevalence indicators of interest to public health agencies.</i>
4a. Product provides reports describing clinical performance measures and compares clinical outcomes with those measures.
4b. Product provides reports on different clinical measures and allows for exclusions using reasons codes (e.g., guideline conflicts with patient comorbidity).
4c. Product provides reports to evaluate the following Meaningful Use electronic clinical quality measures (eCQMs) ¹⁰ : i. NQF 0018: Controlling High Blood Pressure ii. NQF 0059: Diabetes: Hemoglobin A1c Poor Control iii. NQF 0068: Ischemic Vascular Disease: Use of Aspirin or Another Antithrombotic
4d. Product provides interactive clinical performance measure data visualizations (e.g., clicking pie chart slice will display additional information). Graphical data displays can be saved, exported and printed.
5. Integrate data.
<i>Rationale: PHM products are intended to highlight patients at high risk for negative health outcomes or high cost procedures. These analytical procedures require inputs from a variety of data sources including EHRs, health information exchanges (HIE), and payor claims databases.</i>
5a. Product provides for near real-time data aggregation across two or more sources.
5b. Product provides ability to import or integrate medical claims data.
6. Share data with external systems.
<i>Rationale: Information generated by PHM products could be shared so that multiple clinical settings contribute to a depiction of chronic disease prevalence for an entire public health agency jurisdiction.</i>
6a. Product provides file-based (e.g., spreadsheets, CSV, XML) exports of patient data and performance measures (described above).
6b. Product provides means to share data with external systems without additional HIE-type products.

PHM Product Selection

We conducted an environmental scan to identify potential PHM products for this assessment. We initially collected 28 product candidates based on industry intelligence provided by KLAS Enterprises, Healthcare IT News, Healthcare Information and Management Systems Society (HIMSS), and workgroup member recommendations.¹² Of those 28, 20 products met the inclusion criteria and were sent background on this project and a request for an interview and/or software demonstration. Representatives for 16 PHM products responded to the request, including a representative for the one open-source product included in this assessment, PopHealth. Among those 16, 10 products granted the request and interviews were initiated. Among those 10, 9 provided verbal responses or supporting documentation to address all interview questions. One product initiated but did not complete the interview.

After all preliminary information was gathered, PHM product representatives were given the opportunity to review these findings and request changes. Changes to preliminary findings required either a live system demonstration of the functionality or screenshots to support the claim of the functionality. Of the 9 vendor representatives who completed all interview questions, 6 responded to the request for feedback on preliminary findings. Of those, 4 representatives requested changes and provided appropriate supporting evidence and 2 representatives confirmed that the preliminary findings were accurate.

As a general note on this assessment, none of the PHM staff personally used these products to verify that the functionality claims were accurate. PHM product assessments were based on the claims or demonstrations of the product representatives alone.

Key Informant Interviews

An interview guide was developed to facilitate semi-structured interviews of key informants representing clinical care and public health. Question design was guided by workgroup members and aimed to complement, not validate, earlier PHM product assessments. Depending on key informant responses, the actual interview questions deviated slightly. The interview guide is provided as an appendix to this report (Appendix B).

Key informants were identified through purposeful sampling and chain referral. As part of the PHM product assessment, product representatives were asked to nominate key informants from their user group. Nineteen potential key informants were recommended. Additionally, project stakeholders (see Appendix A) recommended potential key informants.

Results

PHM Product Assessment

Findings from the PHM product assessment of the 10 vendors who initiated interviews are provided in Table 2 below. As described above, the project team was unable to collect complete responses addressing all assessment criteria for one of the products included in the assessment. Also, it is important to note that any products' inability to

meet an assessment criterion does not necessarily represent a flaw or shortcoming with that product. Rather, it could very well represent a strategic decision by a vendor to not implement particular functionality.

Table 2 – Population Health Management Product Assessment Findings

Legend:	Acure QOL	Arcadia Analytics	Azara DRVS	Briegel T	Enli Care Manager	Healthagen Medicity	iZi Tracks	IBM Phytel	PopHealth	Wellcentive Advance
1. Identify patient subpopulations by user selected parameters										
a. Generates lists/reports of patient subpopulations	●	●	●	●	●	●	●	●	●	●
b. Provides the ability to create new queries that can be saved, re-run and shared with other end users	●	●	●	●	●	●	●	●	●	●
c. Patient query parameters should include diagnoses, gender, race and ethnicity, insurance status, elevated blood pressure, smoking status, treatments prescribed and treatment adherence	●	●	●	●	●	●	●	●	●	●
d. Provider/facility query parameters should include provider type, care team and site (for multi-site health care system)	●	●	●	●	●	●	●	●	●	●
2. Examine detailed characteristics of patient subpopulations										
a. Provides ability to display a patient's individual clinical record	●	●	●	●	●	●	●	●	●	●
b. Provides ability to stratify patient subpopulations, degree of risk for negative health outcomes and for high-cost treatment	●	●	●	●	●	●	●	●	●	●
3. Create and send notifications										
a. Provides customizable notifications to patient subpopulations, preferably according to patient delivery preference	○	●	●	●	●	●	●	●	●	●
b. Provides customizable notifications to members of the care team	○	●	●	●	●	●	●	●	●	●
c. Supports non-English language notifications	○	●	●	●	●	●	●	●	●	●
4. Track clinical performance measures										
a. Provides reports describing clinical performance measures and compares clinical outcomes with those measures	●	●	●	●	●	●	●	●	●	●
b. Provides reports on different clinical measures and allows for exclusions using reason codes(e.g., guideline conflicts with patient comorbidity)	○	●	●	●	●	●	●	●	●	●
c. Provides reports to evaluate the following Meaningful Use electronic clinical quality measures (eCQMs): NQF 0018 (controlling high blood pressure); NQF 0059 (diabetes: hemoglobin A1c poor control) and NQF 0068 (ischemic vascular disease: use of aspirin or another antithrombotic)	●	●	●	●	●	●	●	●	●	●
d. Provides interactive clinical performance measure data visualizations and graphical data displays can be saved, exported and printed	○	●	●	●	●	●	●	●	●	●
5. Integrate Data										
a. Provides for near real-time data aggregation across two or more sources	●	●	●	●	●	●	●	●	●	●
b. Provides ability to import or integrate medical claims data	●	●	●	●	●	●	●	●	●	●
6. Share data with external systems										
a. Provides file-based exports of patient data and performance measures	○	●	●	●	●	●	●	●	●	●
b. Provides means to share data with external systems without additional HIE-type products	○	●	●	●	●	●	●	●	●	●

Key Informant Interviews

Two physicians, one clinical chief information officer (CIO), and five public health professionals were interviewed to discuss their experiences with various PHM products and the capacity of those products to help organizations meet larger population health goals. The general themes that emerged from these interviews included 1) know your purpose and skill level before making a decision on a product, 2) examine your data governance and make efforts to standardize documentation before implementing a PHM product, and 3) resources are needed to develop synergies with public health data sources and make those data actionable in the clinical setting. Details on these themes are provided below.

1) Know your purpose and skill level before making a decision on a product.

Among informants from health care settings, the need to use EHR data to improve the health of their populations, particularly among high-risk patients, drove their PHM product implementation. One informant stated, “Like many smaller EHRs, ours doesn’t have strong PHM functionality. Smaller clinics have fewer resources and incentives to make these data available. It’s a real challenge...Federally Qualified Health Centers [FQHCs] are struggling.”

As stated by one informant, “Buy the right tool for what you need it to do. Know your mission before you start. Next, ask the questions. Finally, get the data to answer those questions. Otherwise, you will drown in data. Let the mission drive the data, not the other way around.” Another informant stated, “Know your population and let that drive the questions you ask. Have some early wins and build from there.” “Our main objective is to cut down our ER visits by 25 percent. It was critical that we knew this before we started,” stated another.

Informants shared how PHM products aid in clinical practice. Among all informants, report management and time savings were the most frequently cited key benefits of the PHM product. One informant shared, “I run very few reports out of the EHR anymore. Yes, we still have a long way to go to improve our documentation within our EHR...but our PHM [product] can aggregate and calculate statistics for us to satisfy quality measures.” Informants also shared that pre-visit planning reports are valuable tools to support the transition to value-based care. Benchmarking clinical performance across clinics or entire provider networks was highly valued among informants. One informant stated, “EHRs typically don’t provide the functionality to monitor trends over time, which aids in driving data improvement.”

Several informants emphasized the importance of assessing your organization’s human resources before selecting a PHM product. One informant stated, “You need to know the skill level of your staff and consider your talent pool. Do you need a tool with a larger emphasis on data analytics or a workflow management tool? Does your staff have the skill level to perform the data analytics in house?”

Informants also recommended that organizations looking to implement PHM tools consider the vendor’s market share and interoperability standards before making a decision to purchase a system.

Noting variations in PHM product business models, one informant stated, “Companies are typically very customer-oriented. Be aware of the level of customization you may require, as some companies will charge additional fees for this and others consider it a part of the standard package.”

2) Examine your data governance and make efforts to standardize documentation before implementing a PHM product.

Informants recognized that any PHM implementation will require an intimate understanding of the organization’s data. “Validating and mapping the data is the biggest challenge.” Informants felt that most health centers need better data governance to reduce variance in what providers document in the EHR and where. One informant shared, “Know where all of the data are stored in your system. It is critical that you have stable workflows within your EHR before you implement PHM. Beyond that, make sure your care managers are computer savvy so they can articulate what data they need.” They shared that PHM products provide tools to assist in data mapping, but it does require human bandwidth.

“Know where all of the data are stored in your system. It is critical that you have stable workflows within your EHR before you implement PHM.”

As many health centers do not have this kind of resource, workforce development must be paired with any population health conversations in order to use this kind of software to its maximum potential. Relying only on vendor services for data mapping may be cost prohibitive for smaller health centers. One informant stated, “Have a CIO or someone who understands a data warehouse and can hire an outside consultant if you need such a resource.” One informant warned against homegrown efforts around a PHM product: “Find

someone who knows what they are doing. It will save you time, because this work is very complicated.”

One informant also shared that some PHM tools will make the data more accessible than others. If many different levels of the organization need access to the data, consider this when selecting your PHM system. “If we can ensure our data quality, I am hopeful that our health care providers will start to run their own reports,” shared one informant. Another added, “Some products will not give you access to the raw data. This is important to assess the validity of clinical data and conduct any needed quality improvement. Be sure to assess the impact of any EHR upgrades to your PHM environment. We were frustrated when our data links broke. People generally have this idea that it’s ‘plug and play,’ but that is not realistic.”

Implementation strategies will vary depending on if a clinic is part of a larger health care network or not. One informant summarized, “The concept of ‘garbage in, garbage out’ is very applicable. You cannot fault the PHM product if you do not implement data standards within your EHR documentation. Belonging to a larger network may be a good indicator for success with PHM. Networks can help to standardize workflows. Improvement efforts are tedious and time-consuming but very necessary.”

3) Resources are needed to develop synergies with public health data sources and make those data actionable in the clinical setting.

One informant felt their state health department's informatics capabilities need to be enhanced to make data sharing more realistic. "If the state were to develop a single interface [for data exchange with public health], this could work great." On the current state of data sharing, the informant added, "We are used to regulations getting passed and seeing those regulations get linked to our grant funding. We ask that the federal and state policy makers recognize that data may be the new currency, but the capacity to collect that data isn't free. There needs to be a better understanding of the burden being placed on the backs of the health care providers and the risks of distracting from clinical care. Right now we send off our data and get little, if anything, back from public health."

Another informant stated, "We want public health data that are relevant to our population, but we are focused on managing the data we currently have. We would like more air quality data, violence and crime data by zip code or census tract, and walkability scores. We just aren't there yet." Partnerships are needed to model socioeconomic status (SES) data in a way that can be directly presented to the health care provider during the clinical encounter. "We want to incorporate these data to better understand how it increases a patient's clinical risk, but we need a way to do so that doesn't increase the burden for our primary care providers. We would need the data to be highly tailored to save time. We involve our social workers in SES documentation currently to manage this burden."

"Public health agencies are used to thinking programmatically, not holistically. We must think more creatively to re-imagine how we manage data."

Another informant shared, "Not a lot of money has been invested in public health for systems that can send data back to health care facilities. Providers are asking for data reciprocation from public health, and, largely, not getting it." One informant shared that while health care providers collect data that could be useful for public health surveillance, current policies can prevent data access and use. However,

public health agencies may be better positioned to provide seed funding for clinics to acquire PHM systems, as opposed to purchasing systems themselves. "Public health agencies are used to thinking programmatically, not holistically. We must think more creatively to re-imagine how we manage data." Another stated, "While public health agencies are not responsible for the control of the population's blood pressure, we are responsible for finding ways to be partners around these strategies. We need to invest in the surveillance of the population to drive health outcomes. Each side has resources to bring to the table to understand disease burden. Now we must ask, are these resources sufficient to achieve population health goals?"

However, there are organizations that have been successful in data sharing despite these barriers. One public health informant's organization encouraged health care providers to use PHM systems to manage both the potential and known chronic disease patient population more collectively. The jurisdiction was interested in using PHM systems to measure the prevalence of pre-diabetes, diabetes, undetected hypertension,

hypertension, and uncontrolled hypertension. While different FQHCs used different EHR vendors, an EHR-agnostic PHM product made this measurement possible. Health Information Exchange (HIE) will also play an important role in an upcoming pilot project for this jurisdiction. Health care providers will be able to refer patients to diabetes prevention programs using bidirectional referral, an initiative to better integrate clinics with community services. The informant commented on this project, “It’s an awakening to the consciousness of [public health and health care] entities. Most of the patient’s life is lived outside of these settings.” This informant’s jurisdiction also has another data sharing project underway: “We will use existing performance measures to develop a common measure set that the health department will access via a data portal to see aggregate prevalence estimates of chronic disease. If we can make the case to clinics that together we could lower disease prevalence in our community if we prioritized data management, they will understand this and find it attractive.”

One informant concluded, “We need to be sensitive to the health services environment in which we function. It is critical that health care providers feel that they control their data. We used to have a wall between health services and public health. Now, we are trying to be allies, cheerleaders, and facilitators to provide real financial support to enable FQHCs to manage the health of their patient populations.”

Discussion

This analysis collected data on a sample of available PHM products of interest to small- to medium-sized primary care clinics. It was completed as a point-in-time analysis beginning in August 2015 and concluded in May 2016. There are many other PHM systems designed specifically for health care not included in this analysis. Additionally, there are other general-purpose BI tools that may meet the functional requirements of clinics or provider networks looking to gain PHM analytic capacity.

This analysis was subject to several limitations. System pricing is largely determined by the size and scope of the individual implementation. As such, we were unable to conduct a cost analysis for this evaluation. Secondly, many of the interviewed PHM systems are deployed in a modular fashion. Some products segregate modules based on functionality, while others do so based on user role. Both of these modular strategies make assumptions about the implementing organization’s structure and staffing and may not be appropriate for all health care settings. For these products, the PHM product assessment criteria were satisfied if any one of the modules could perform the function.

Several PHM vendors shared the view that organizations with few providers in a small geographic area should be able to acquire aggregate data directly from their EHR. This perspective underscores the need for this analysis. Stakeholders across the clinical and public health communities continue to believe EHR functionality inhibits the timely and valuable data aggregation offered by PHM products. We acknowledge that there are current efforts driven by the EHR-vendor community underway to address these concerns; however, health care providers are subject to reporting requirements that can often go beyond their current EHR functionality at this time.

In our conversations with both vendors and stakeholders, participants cautioned that analytical technology alone does not improve health outcomes. Clinics looking to implement a PHM product must keep in mind the workforce capacity required to act upon these aggregated data to close gaps in clinical care. Assessment of the clinical practice is critical prior to starting any level of PHM product implementation. We hope that this report can help guide such an assessment.

Organizational leadership must be engaged to define all PHM system requirements and develop a data migration plan. One important consideration is the ability to extract data out of your system should you ever need to change PHM vendors. Talk to your prospective vendors and their current clients to assess these and other capabilities.

The transition to value-based care will continue to increase the value placed on PHM. Organizations should prioritize stabilizing their use of EHR systems and evaluate data quality prior to implementing a PHM product. It is fundamental that clinical and other programmatic goals drive the decisions around a PHM implementation.

While primary care clinics are adopting PHM products, evidence of related increased information sharing between those clinics and the public health jurisdictions in which they operate is limited. While EHRs and PHM products have the technical capability to generate aggregate chronic disease indicators, there can be little incentive for clinics to share that information with their state or local public health agency. Instead of coaxing chronic disease prevalence data sets from health care providers and attempting to stitch them together to depict jurisdictional indicators, public health agencies may be better served by partnering with clinical data owners and collaboratively defining analytic needs. This could entail multiple primary care organizations contributing to a shared data repository, such as a HIE organization, and allowing a public health partner to view analytic reports portraying chronic disease indicators that reflect data from multiple providers within its jurisdiction.

Such partnerships could provide forums for a public health agency to explore what data it might provide to a collaborative PHM product based on a shared, multi-provider clinical data repository. As governmental agencies, public health will likely have environmental and social determinants data that health care settings would not. These include public transportation networks, grocery stores, parks, and crime. These factors and others contribute to chronic disease patients' access to clinical care, healthy diets, and physical exercise.

As health IT and interoperability standards evolve, public health agencies and health care providers will have opportunities to explore data exchange and information sharing approaches. The national transition away from the fee-for-service model and toward value-based care delivery is motivating health care to capture chronic disease prevalence indicators that are of interest to public health departments. Yet despite this interest, health care providers may balk at additional reporting requirements for them to send these data to public health agencies. Additional effort and resources should be devoted to establishing data sharing infrastructure that allows public health agencies to view CVD and other chronic condition indicators provided by a shared clinical data

repository. Such an approach could facilitate aggregation of health data from multiple providers to portray disease prevalence for a geographic jurisdiction. It could also make it easier for public health agencies to share social determinants data with their health care partners.

References

1. Mozaffarian D, Benjamin EJ, Go AS, et al. Heart Disease and Stroke Statistics—2016 Update: A Report From the American Heart Association. *Circulation*. 2015;1-324. doi:10.1161/CIR.0000000000000350.
2. *NHANES 2013-2014 Unpublished Estimates. CDC/DHDS Million Hearts Hypertension Tracking.*; 2014.
3. Centers for Disease Control and Prevention. *National Diabetes Statistics Report: Estimates of Diabetes and Its Burden in the United States, 2014.*; 2014. <https://www.cdc.gov/diabetes/pubs/statsreport14/national-diabetes-report-web.pdf>.
4. Heidenreich PA, Trogon JG, Khavjou OA, et al. Forecasting the future of cardiovascular disease in the United States: a policy statement from the American Heart Association. *Circulation*. 2011;123(8):933-944. <http://circ.ahajournals.org/content/123/8/933.long>.
5. Kindig D, Stoddart G. What is population health? *Am J Public Health*. 2003;93(3):380-383. <http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1447747&tool=pmc-entrez&rendertype=abstract>.
6. Berwick DM, Nolan TW, Whittington J. The Triple Aim: Care, Health, and Cost. *Health Aff*. 2008;27(3):759-769. doi:10.1377/hlthaff.27.3.759.
7. Cassidy BS. The Next HIM Frontier: Population Health Information Management Presents a New Opportunity for HIM. *J AHIMA*. 2013;84(8):40-46. http://library.ahima.org/xpedio/groups/public/documents/ahima/bok1_050281.hcsp?dDocName=bok1_050281.
8. American Academy of Family Physicians. Group Membership Earns Small-practice FPs ACO Opportunities. <http://www.aafp.org/news/practice-professional-issues/20150317klitgaardaco.html>. Published 2015.
9. Cusack CM, Knudson AD, Kronstadt JL, Singer RF, Brown AL. *Practice-Based Population Health: Information Technology to Support Transformation to Proactive Primary Care*. Rockville, MD; 2010. [http://pcmh.ahrq.gov/sites/default/files/attachments/Information Technology to Support Transformation to Proactive Primary Care.pdf](http://pcmh.ahrq.gov/sites/default/files/attachments/Information%20Technology%20to%20Support%20Transformation%20to%20Proactive%20Primary%20Care.pdf).
10. National Association of Community Health Centers. *A Buyer's Guide to Business Intelligence Tools for Health Centers and Primary Care Associations*. Bethesda, MD; 2014. <http://mylearning.nachc.com/diweb/catalog/item/id/415843/q/n=2&o=-v&c=76>.
11. US Centers for Medicare and Medicaid Services. 2014 eCQMs for Eligible Professionals Table Update May 2015. <https://ecqi.healthit.gov/system/files/ecqm/2015/EP/EPMeasuresTableMay2015.pdf>.
12. KLAS. *Population Health Management 2015: How Far Can Your Vendor Take You?*; 2015. doi:10.1089/pop.2010.0079.

Appendix A: Project Stakeholders

Agency for Healthcare Research and Quality
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Health Resources and Services Administration
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Laura Otten
Anca Tabakova

National Association of Community Health Centers
Shane Hickey
Meg Meador

Office of the National Coordinator for Health IT
Daniel Chaput
James Daniel

Appendix B: Key Informant Interview Guide

The following questions were used to guide a semi-structured interview. With a semi-structured interview approach and varying backgrounds and experiences among the key informants, actual interview questions varied slightly.

- a. Please describe your role in primary care or public health.

Potential follow up question(s):

Please describe any current initiatives addressing population health management or public health surveillance for chronic disease?

- b. Population health management software can be used to integrate EHR data with data from other sources to identify high risk patients and improve patient outreach and education. Are you currently using such software? Or are you providing data to clinicians that are using it?

Potential follow up question(s):

(For clinicians) Please describe the software and technical infrastructure you are using.

(For clinicians) What types of data from local or state government systems are being integrated into your population health management system?

(For public health) Are you receiving data from population health management systems and using it for disease surveillance?

Is there a HIE or other intermediary facilitating data exchange between health care providers and public health?

Are there particular health information interoperability standards or shared data models used?

How long has your organization been live on this system?

- c. Please describe your experience implementing your population health management product.

Potential follow up question(s):

Did you use an implementation team?

Can you estimate the person-hours for the implementation?

What technical skills were required?

What was most challenging about the implementation?

What would you do differently if you had to do it again?

How satisfied are you with your vendor?

- d. What questions are you attempting answer by using a population health management product?

Potential follow up question(s):

Are you generating indicators based on National Quality Framework-endorsed electronic clinical quality measures? Other quality reporting initiatives (e.g. HRSA UDS, CMS Physician Quality Reporting System)?

What questions are difficult to answer through use of your population health management product?

What aspect of your population health management product has been the most beneficial to your organization or its stakeholders?

- e. Please describe any data or information sharing occurring between (your) primary care practice and (your) public health agency.

Potential follow up question(s):

Is this done through shared access to reports or visualizations? Or through exchange of electronic data?

What types of analyses and reports are most important to you? How well does the population health management product provide these?

Are there issues that interfere with an information flow that begins with individual patient encounter data and then aggregates up to describe practice-level patient population health? What about aggregation of multiple practices to depict public health surveillance indicators? What would facilitate such information flow?

- f. What policies or governance approaches are you using to address any data or information sharing related to your population health management approach?

Potential follow up question(s):

Please describe any formal mechanisms used to form partnerships. Data use and sharing agreements? Business association agreements?

Do these approaches entail financial support or cost sharing?

How is data ownership and patient privacy/confidentiality addressed?

- g. What advice would you give to an organization considering a population health management product