DRIVING SPEED TO VALUE
THREE DIVERSE APPROACHES TO POPULATION HEALTH MANAGEMENT

A Chilmark Research
PHM Insight Report
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EXECUTIVE SUMMARY

Healthcare organizations (HCOs) are taking a variety of approaches to deploy Population Health Management (PHM) models that are producing positive results. Recognizing there will never be a one-size-fits-all model that generates positive outcomes across all metrics, there is much to be learned from these early adopters that have been implementing PHM strategies for five or more years. By delving into three case studies and examining the clinical and technology models in force, we have identified specific lessons learned and recommendations applicable to other HCOs considering or already deploying PHM.

The following three approaches highlight a stark contrast in PHM strategies and technology models.

- Trenton Health Team: Community collaborative and HIE that relies on a single-sourced HIT vendor.
- Partners Healthcare: Health system that has taken an extremely broad build-and-buy HIT portfolio approach.
- Marshfield Clinical Health System: Health system that has developed and deployed a proprietary EHR and PHM integrated technology platform.

PHM models are difficult to develop due in large part to the specific market circumstances that vary for each HCO, complicating model development efforts. However, to balance this challenge, there is a growing body of case studies and industry toolkits to help HCOs just beginning to develop their PHM strategy. HCOs need to be aware of this emerging collection of best practices, lest they risk reinventing the wheel at their own cost.

**Key Takeaways for HCOs Establishing PHM Strategies**

- Realize that many factors that affect PHM speed to value are within HCO control.
- Develop enterprise-level thinking to establish PHM framework.
- Establish business and clinical strategy prior to workflow modeling and IT adoption.
- Choose one key IT partner but be prepared to recruit others to fully enable strategy, as PHM solutions remain immature.
- Leverage existing PHM best practices and look for them to rapidly evolve.
- Become a methodology-driven organization to effectively scale PHM.

**PHM Deployment Speedbumps Abound**

Regarding the deployment of PHM models, it is often said that “there are many roads to get there.” But...even when there are multiple routes to travel, aren’t a few of the roads better than others? Shorter and less bumpy? Less expensive?

Speed toward meaningful PHM adoption, or lack thereof, has surprised most in the industry, even those well aware that this industry never moves at warp velocity. We all have the desire to maximize value for consumers, clinicians, and payers alike. We’re eager to move forward at a quicker pace with the expansion of PHM models as a highly probable means of delivering increased value.
The long march has already taken decades and seen many iterations of value-based care (VBC) models, including DRGs (1980s), “never events” (2008), and of course, the Affordable Care Act (2010) demonstration models. The ACA was supposed to speed things up, but we have still been slogging through what we incented with 2009 HITECH (Health Information Technology for Economic and Clinical Health) Act – “check the box” EHR implementations that were “just enough” to secure federal incentive dollars. The lack of definitive direction from the new administration has likely not boosted VBC implementation speed.

Year after year, survey after survey, approximately 95% of providers say they are “on the road to VBC”, yet roughly only 30% are now actively participating in a formal VBC arrangement and those VBC contracts typically represent a very small percent of the population served. The year-to-year gain is surprisingly small.

Is this a factor of not enough "skin in the game" with incentives too weak? Providers do not necessarily have to make any large investments or take any large risks, and even if they do, the upside and downside incentives are not large enough.

Is the sheer complexity of changing one-sixth of our national economy – via new business and clinical models, transforming organizational cultures, coupled with procuring, funding, and implementing the enabling HIT – all justification enough for the deliberate pace of VBC adoption we’ve experienced to date?

HCOs begin their PHM journey from different starting points in a complex, diverse, and competitive market. HCOs are comprised of different levels of financial and human resources with varying skillsets and baseline cultural attributes. The PHM road they travel varies accordingly.

About This Report
We tackled this research project with a lens toward increasing PHM speed to value and helping to identify optimal HIT enablement. This report examines the PHM journey for three distinct health systems or collaboratives, distilling common themes and providing recommendations for other HCOs. After reviewing the impetus within each organization for initially undertaking a PHM strategy, we then describe their clinical model and outcomes achieved.

These three case studies also dive into the PHM technology solutions deployed by each organization, reviewing both the timeline for, and the drivers of, technology and vendor decisions that each organization made along their journey. We conclude each case study with the critical lessons learned by each organization.

Summary conclusions and recommendations are based on these case studies and broadened by additional primary and secondary research.

We want to extend a special note of appreciation to the organizations that participated in this report, for sharing their stories so others may benefit, as we grow as an industry to ultimately improve the consumer experience.

Looking Ahead
Will execution speed to value increase? Will PHM program development processes improve over the next two years? Therefore, will more HCOs participate in VBC arrangements and PHM models? We believe yes.

While there is still much concern about the impact that the new administration may have on the momentum of VBC and PHM adoption, we believe HCOs will look for a positive outcomes trend from current PHM participants, coupled with the regulatory incentives of Medicare Access and CHIP Reauthorization Act of 2015 (MACRA), as primary indicators that now is the right time to jump in with both feet. The market will more consistently achieve positive results by applying a renewed focus on speed to value.
Rightfully so, there will never be a one-size-fits-all PHM model due to local market variations; the application of
PHM technology will continue to vary greatly among HCOs. That said, a best practice becomes the application
of a methodology-driven development framework when constructing a customized PHM model, taking full ad-
vantage of existing industry knowledge. This ensures faster value realization at a reduced cost to the HCO. What
do implementation tool kits constructed by industry trade groups, HCO experience/case studies, PHM vendors,
and market stakeholders bring to light on this subject?

In summary, PHM positive results and MACRA legislation help provide the "why," the rationale to forge ahead. A
methodology-driven disciplined approach provides the "how," the most judicious way to execute effectively and
efficiently scale PHM delivery models. The Conclusions and Recommendations at the end of this report provide
supportive details for application of these key principles, including links to additional industry toolkits and case
studies.
TRENTON HEALTH TEAM: COMMUNITY COLLABORATION WITH PHM TECHNOLOGY

Trenton Health Team (THT), a community health improvement collaborative, began its PHM journey seven years ago with a mandate to improve the health status of residents of Trenton, NJ. THT started as a neutral convener of local providers and health systems that were former competitors. THT now facilitates transitions of care and coordinates care for the city’s most vulnerable and underserved residents via a distributed community-wide care management process.

THT’s strategy is to first focus on process redesign and mapping and then use technology to operationalize the improved process. Its progress toward community alignment is particularly notable, with PHM technology particularly focused on data ingestion from across the fragmented provider and social services organizations across Trenton. Its technology partner for data aggregation, harmonization, risk stratification, notification, and workflow management is CareEvolution.

Background
THT serves a diverse population of over 110,000 residents, of which 52% are African-American and 34% are Hispanic. This population confronts both socioeconomic and high baseline chronic disease prevalence challenges – 43% of the target population are Medicaid beneficiaries with over 26% living under the poverty threshold. Following a rigorous data driven decision making approach, THT conducted a rigorous unified Community Health Needs Assessment which pinpointed high prevalence of chronic disease, especially cancer, diabetes (16%), obesity (39%), and hypertension/cardiovascular disease (31%), which are often further complicated by health literacy and transportation challenges.

Against this backdrop, the THT was formed in response to the healthcare crisis in Trenton precipitated by the closure of a dominant local healthcare provider in 2006. Given the severe issues around access to healthcare services, in 2006 emergency room utilization was 54% higher than the national norm. The intent of the collaborative was to bring together traditionally fierce competitors and establish a holistic care management model targeted at the vulnerable and underserved population of Trenton.

THT is working to make this holistic model a reality through five strategic initiatives:

- Expansion of access to primary care
- Community-wide clinical care coordination
- Engagement of residents
- Operation of the Trenton Health information exchange
- Serving as one of only three NJ Medicaid Accountable Care Organizations (ACOs)

THT began a partnership among St. Francis Medical Center, Capital Health, Henry J. Austin Health Center (FQHC), and the Department of Health and Human Services of the City of Trenton and has since expanded to over 60 non-clinical community Primary Health Care (PHC) partners, including nursing and rehabilitation centers, religious organizations, charities, the police department, schools and local universities. THT also functions as the Regional Health Information Organization (RHIO) for the greater Trenton area. THT is governed by a 15-member Board of Directors and organized as a 501(c)(3). THT is funded by a mix of federal and state grants, as well as its own revenue generating services including HIE and Care Management (CM).
Care Management Model

Program Philosophy: THT’s CM model focuses on addressing and resolving barriers to care for community members currently capable of self-management. The THT’s CM Team helps its patients access the full range of services they need as part of their healthcare. If necessary, a CM team member will accompany patients to appointments, take them to the pharmacy to get medications, and help connect them with social services to facilitate improvements related to food, clothing, shelter and finances. This approach to care management is intended to address the whole patient and acknowledge the reach of chronic conditions beyond the exam room.

Early Beginnings: The first CM workgroup assembled upon program launch in 2010 was tasked to tackle the high ER utilization head on. At that time, each hospital representative in the group brought its respective list of the consumers, whom they were personally aware of and who were seeking the ER at a high frequency. The lists were manually compared, to identify the common list of high ER utilizers across all facilities. Interventions deployed consisted of weekly home visits by one of THT’s CM staff.

Operational Framework: The model is a rigorous “I Do, We Do, You Do” progressive support model enabled by technology. This playbook is designed to gradually transition ownership – for the first 30 days, a THT care manager models the desired behavior by doing it for the consumer; during the second 30 days, the care manager sits with the consumer and helps them take action, e.g., make an appointment; and in the final 30 days, the consumers complete tasks for themselves while THT resources are available as needed.

THT uses the Trenton HIE, which receives real-time ADT transactions for local providers, to automatically perform “hot-spotting” and identify those consumers most amenable to CM intervention. The multidisciplinary CM team includes physicians, a registered nurse, a social worker, and community health workers who share access to CM, patient stratification, and notification IT tools within the CareEvolution PHM platform.

Each Community Health Worker is assigned 20 cases per week, and is expected to visit 5 consumers per day, with a fifth day each week dedicated to follow-up activities. Clinical conditions targeted depend on the population of the specific value based care arrangement that THT is asked to engage in. The consumer identification and stratification model is very practical and actionable as demonstrated by the monthly tracking data on engagement effectiveness. For example, February 2017 engagement results show that 56% of referred/identified consumers are, literally, found in the community and participate in an initial touch-point with a Care Manager. Sixty-four percent of those contacted for this introductory conversation remain engaged with the care management team.

Consumer Engagement: THT goes into the community (hospital, home, clinic) to engage partners and consumers. “Meeting” the consumers where they already are is an important design element of the THT model. By making frequent outreach visits to these vulnerable residents, the team can assess and then help with residents’ social issues in addition to keeping tabs on chronic illnesses. The team is better able to see what is needed to keep these patients well. Helping people navigate the system, visiting their home, and making sure appointments are made is how the team connects people to needed care.

Further, THT’s experience confirms that, once a consumer stops engaging in weekly goal setting, they usually drop out of the CM program and successful reengagement is unlikely. Therefore, THT has shortened the window for chasing the consumer from 6 months to 30 days. If, after 30 days, the consumer does not reengage in spite of aggressive outreach efforts, then the case is closed. Of course, THT is readily available should the consumer reach out for help at a later date. The CM’s program for high utilizers offers complete care, known as wrap-around services, which include social and psychological services as well as primary healthcare.

Payer-Provider Convergence: THT uses its technology platform to combine longitudinal claims data (currently for the Medicaid ACO) with provider-sourced information to get a more complete view of the consumer. THT is in the early stages of determining the business and clinical workflows that will allow it to share this unified care plan on its web portal. This is important because, in some cases, consumers have up to five different organizations managing their cases (payer, hospital, community organization, PCP, and specialists).
“A unified care plan enables care providers to defer to another provider that may be able to serve the patient better. Giving up traditional control doesn’t come easy; it’s 80 percent cultural trust and 20 percent technology. In this way, technology helps to break down barriers that prevent more streamlined Care Management models.”

– Gregory Paulson, Executive Director
Trenton Health Team

Provider Engagement: THT’s experience with provider engagement has been boosted by the community structure where the clear majority of physicians are now employed by one of the local facilities. There are very few remaining independent physicians in Trenton who need ground-up engagement and education on what the community is working to achieve together. The Trenton HIE helps keep providers across the community on the same page about the patient longitudinally.

Behavioral Health: In 2012, THT leveraged its technology platform from CareEvolution to implement SBIRT (Screening, Brief Intervention, and Referral to Treatment) for substance abuse and mental health conditions across the urgent care and emergency rooms of Trenton. Through this experience, it learned its greatest impact comes from touching consumers who are capable of self-management vs. those who need to first contend with addiction or behavioral health counseling. Those capable of self-management are most able to benefit from CM interventions such as referrals to supplemental programs, ensuring PCP assignment, and helping consumers navigate coverage and insurance. Through the SBIRT initiative, THT has learned that when a consumer is at a clinical and social stage of first requiring addiction counseling, that counseling need, rightfully and as an example, must be addressed prior to engaging the consumer in CM.

Populations Managed: As health systems and collaboratives such as THT continue to concurrently manage both fee-for-service (FFS) and VBC populations, a common challenge is determining how broadly to deploy VBC means and methods, specifically PHM strategies. THT takes a balanced approach in managing both FFS and VBC lives in identifying patient populations where interventions will have the highest possible impact.

Program Expansion: On the horizon for THT is to more deeply incorporate social determinants of health (SDoH), broader definitions of care in community settings, and even greater degrees of behavioral health integration. THT executes its entire program guided by the philosophy that identifying both the process and key performance indicators toward goal achievement come first. Technology comes secondarily to enable the clinical and business strategy; THT does not let technology drive its strategy.

With that understanding, THT is first working with its community PHC and New Jersey peers (Newark and Camden), as well as participating in the ReThink Health Ventures project (www.rethinkhealth.org), to develop a framework on a national scale for how to best to drive population health while considering even the non-medical aspects of health.

PHM Technology Deployment
As early as 2010, THT recognized a need to have a longitudinal patient record across the multitude of EMRs that were being adopted by its providers. THT committed to implementing an HIE to connect its various providers. As its needs matured and evolved beyond being able to see a holistic patient history across multiple sites of care, THT recognized the need for advanced analytics and workflow tools to enable it to help with community-wide care coordination. Through this process, THT went through two IT vendor relationships that were not able to keep up with rapidly advancing needs. The continuous learning and on-the-ground experience led THT to its third technology solution provider, CareEvolution, in 2014 as a single platform solution for population health.
THT strives to deploy technology only once it fully understands the business and clinical goals, and key performance indicators of success. Its technology strategy helps it identify and impact those vulnerable members in the community who will most benefit from CM intervention. THT’s PHM model is underpinned by strategic analysis to understand specifically what action will drive impact and outcomes. THT continues to seek balance its view into its own data insights as well as its view into what it is clinically attempting to accomplish. It strongly believes neither data analysis nor PHM goal-setting can exist in isolation of each other.

**Data Management:** THT can now reflect on its PHM data strategy and clearly recognize its efforts fall into two categories: 1) obtaining and aggregating data and 2) data mining to drive interventions. As we flash forward a few years, THT expects the industry will have somewhat mastered the up-front data aggregation, so it will not require such a concerted effort. Instead, THT hopes and expects that the industry can dedicate more time to the second aspect of strategic analysis: Drawing insights that will drive actions for improved outcomes. Without a strategic data platform and a technology partner who can bring such expertise, for most this will remain an ongoing challenge, primarily due to the unique mix of data science and clinical acumen required to ask and answer the right series of questions.

**Vendor Procurement:** THT found the technology platform and the consultative expertise it needed in CareEvolution. THT determined that CareEvolution’s platform for PHM offers predictive analytics and CM workflow tools integrated best with their HIE stack. It is worth noting that CareEvolution is THT’s third HIT vendor. THT learned through experience to be wary of vendors that simply become adept at masking their technology inadequacies by putting forward intricate project management plans.

THT’s partner strategy pursues a long-term vendor relationship whereby CareEvolution’s clinical and workflow subject matter experts engage with the THT team around issues of program design and best practices. Through the last several years, THT and CareEvolution have established a very effective means of working to support each other’s organizational goals; hence are able to work through issues as they naturally arise over the course of a client-vendor relationship.

THT was able to shave precious time and funds by executing a fast-cycle procurement process in its selection of CareEvolution. It was able to do so by leveraging work recently completed by its New Jersey peer, the Camden Coalition HIE, which had recently completed a traditional vendor procurement process that selected CareEvolution. In this manner, THT also became more knowledgeable about their own needs by networking with peers. THT chose CareEvolution based on its patient-centered architecture, a company culture that demonstrates top-down support, and commitment to working through any issues as they arise and alignment on PHM strategy.

**Technology Deployment by PHM Component**

**Electronic Health Record**

THT itself does not use an EHR, but, as a regional HIE, works with a wide variety of EHRs in its region, including many EHR vendors within any given facility. Gregory Paulson, who was instrumental in launching the Trenton HIE with CareEvolution, advises providers to be careful about EHR selection and contracting:

“Talk to peers regarding a vendor’s actual implementation process and do not just rely on what you are sold by the vendor. A vendor may demonstrate interoperability during the sales process, but upon implementation you can learn of additional costs to be incurred with your EHR vendor. The EHR vendor may charge to establish and maintain interfaces with other network entities.”

- Gregory Paulson, Executive Director
  Trenton Health Team
To achieve optimal EHR configuration, an HCO should understand and map its clinical workflow in detail. A great EHR on top of a bad process is merely a bad process digitized. The temptation is to allow a flashy EHR to dictate process, which eventually only drives inefficiencies and lack of EHR adoption. As a collaborative with diverse community partners not directly employed by THT, THT has learned to support effective EHR optimization in its community by leading change through best-practice sharing and facilitating peer-to-peer support.

Data Ingestion and Normalization (HIE)

THT leverages CareEvolution’s HIEBus™ for this critical function, and advises others not to assume that an EHR vendor will have this capability. THT uses HIEBus™ to incorporate claims data from regional health plans and have a single payer-provider HIE to enable its PHM efforts, looking at the entire community as a population rather than only viewing populations siloed by payer type.

Analytics and Reporting

THT leverages CareEvolution solutions for all required analytics and reporting, along three different levels:

1. Reliable access to population analytics and subpopulation analysis (Galileo).
2. Consolidation to a single patient record inclusive of clinical and financial data (HIEBus).
3. Surveillance worklist builder, dynamic high risk registries custom and pre-built for prioritizing patient management (Beacon™). Care Management time to patient identification is accelerated by integrated access to the patients clinical and claims data.

Care Management

CM documentation and tasking is performed within CareCoordinate tool. This is a great example of how THT focuses on process redesign before investing in technology configuration: THT will typically prototype any new endeavor using paper solutions, especially when the process is changing too quickly to systematize. Once the process is fine-tuned, THT works to configure the software solution to the specific needs of the new process flow.

“You often do not even realize you are focusing on technology details instead of critical process issues that must first be resolved. CareEvolution provides great templates to start our design but we are able to focus on our specific needs with confidence that we can tweak the solution to meet our unique community needs”

- Gregory Paulson, Executive Director
  Trenton Health Team

Patient Engagement

Traditional mHealth solutions in the socioeconomically challenged population THT focuses are not a great fit. THT attempted a text message pilot for diabetes management and CM engagement for high utilizers. THT experienced similar issues to other Medicaid text pilots, issues with lost cell phones and consumers not wanting to spend their government-funded data plan on such usage. This pilot underscored for THT that technology is not a replacement for, but rather a supplement to, in-person support for the highest risk consumers. THT will leverage findings from other mobile-enabled Medicaid PHM texting pilots to further inform its future patient engagement strategy.

Outcomes
THT has noted improvements since they began their journey. These include:

- Access to care has been improved as evidenced by patient wait times reduced from 37 days to 2 days at the local FQHC - Henry J. Austin Health Center.
- Improved provider efficiency and a reduction in duplicative testing.
- Increased Care Manager time spent actually working with consumers vs hunting and gathering for data to identify, identifying target consumers.
- Ability to run and maintain community-wide registries.

It can be a struggle to identify meaningful measurement methodologies for the nature of working with community members whose baseline metrics are many standard deviations from the mean. However, when a THT Community Health worker engages with a consumer, the impact observed is as often qualitative as quantitative. That said, THT’s PHM initiative achieved some remarkable results in a cohort of the Top 50 ER high-utilizers (Table 1):

More recent data shows the intervention continuing to reduce ER utilization by 30-40% in the 12-month period post-intervention for those who complete the program. Clearly, the interventions work once a member engages and continues to participate with a THT care manager. Ever-increasing program success hinges on getting more individuals to engage and continue participating in the intervention.

### Keys to Success

- Taking time to formally recognize and celebrate each success helps continue momentum and foster motivation.
- Generating truly transformative behavior--getting community stakeholders and groups of providers to talk to each other and collaborate, reducing traditional provider and community silos.

### Lessons Learned

#### Clinical and Business Lessons Learned

- **Evolving Program Maturity:** “You don’t know what you don’t know”; THT realizes this adage every time it turns a corner and make a new discovery. As an example, the organization learned through trial and error the importance of creating registries by utilization cohorts vs. initially by disease condition or severity of illness. This view of high utilizers enabled THT to optimize the impact of its limited care management resources.

- **Definitions and lexicon are everything.** THT realized its core team members could often be on different pages regarding something as simple as how to construct a query, depending on each person’s own interpretation of commonly used terms.

- **Consumer Engagement:**

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Table 1. THT Outcomes from Care Coordination of Top 50 ER High-Utilizers
> CM engagement pursuit has evolved to reflect the current program goal of assisting consumers who are capable of self-management.

> Know the community so that you can go into the field and find high-risk members.

> **Stakeholder Alignment:** Look for issues where there is clear alignment on importance and where you are resourced to do the work.

**Technology Lessons Learned**

> **Vendor Procurement:**

  > Vet vendors carefully; it is much easier to add them than terminate agreements. Ensure you have competence and experience on your end to meaningfully vet that vendor; engage a consultant or peer if you need support. It requires a unique level of technical/clinical/strategic expertise to delve beyond a vendor’s marketing and sales story and understand the type of partner it will be.

  > Clearly define success metrics and priorities prior to beginning any vendor procurement. A good vendor should be asking you for those from the beginning to ensure you are in strategic and tactical alignment.

  > Collaborate with others to shave cost and time from a vendor procurement process. This helps avoid reinventing the wheel especially when a peer has potentially just evaluated the same thing.

> **Vendor Management:**

  > Expect your optimal relationship with a vendor to be an iterative process. As you make requests, a strong vendor will be transparent about which solutions they can and cannot bring to bear as well as a timeline for each.

  > Be on guard for vendors masking technology inadequacies with elaborate-sounding product roadmaps as well as HCO-specific project plans.

> **Data Analytics:** The ability to dive into data and ask the right questions is a nuanced skillset; having access to all clinical and claims data is transformational, but it is an art and a science to uncover the highest potential areas of impact.

> **Decision Timing:** Make a needed vendor or technology architecture change prior to sinking even more money into a solution you know is obsolete or inadequate. The cost of change will not subside the longer you wait.

**Trenton Health Team Looking Ahead**

Next on the horizon for THT’s PHM strategy is to more deeply incorporate SDoH, including screening and documentation in the EHR. THT is first working through establishing the process to determine the scope SDoH should assume at the point of care. Today THT screens for food insecurity and can refer to food banks, but it has not yet figured out point-of-care recommendations for housing/safety/income/physical activity determinants.

Complicated by the nature of being a community collaborative vs. a wholly-owned health system, THT continues to contemplate challenging questions throughout their ongoing design process:
What is a reasonable expectation of healthcare providers at the point of care?

Should only chronic conditions members be screened, or all members?

What are the optimal interventions for various findings?

Is the process sustainable?

What are the key indicators of success?
PARTNERS HEALTHCARE: PHM ENABLED BY A SOPHISTICATED RANGE OF TECHNOLOGY

Partners HealthCare System (PHS) is a health system located in Boston delivering care through one of the most advanced PHM models in the nation. The organization has been on its PHM journey for 10 years and have continuously evolved its clinical and business strategies, enabled by heavy reliance on supporting in-house and vendor-based PHM technologies.

PHS has formalized PHM improvement interventions across the entire continuum of care, including PCP and specialist care, inpatient and outpatient care, post-acute and home care.

The long-standing innovative culture at PHS reveals itself in its technology approach to PHM. PHS has vetted a wide range of HIT vendors and has executed contracts with an astounding number of them. Yet, if a tool does not yet exist in the current market that will meet its needs, it does not hesitate to build that tool on its own. As such, PHS’s development strategy serves as a bellwether of PHM HIT maturity and capabilities.

Background
PHS was founded in 1994 as an integrated delivery system by academic medical centers Brigham and Women’s Hospital and Massachusetts General Hospital. The health system today now includes community and specialty hospitals, some of which function as teaching affiliates of Harvard Medical School, community health centers, home care and other health-related entities, as well as a managed care organization (Neighborhood Health Plan - NHP), and a physician network of more than 6,000 physicians.

PHS voluntarily began its PHM journey 10 years ago, as it aligned to their strategy to be a leader in delivering the highest quality care possible. PHS participated in an early value-based care Medicare demonstration project in 2006, years prior to the ACA. Further propelled by state and federal regulations, it actively launched risk-based contracts across all payer categories (Medicaid, Medicare and Commercial) to increase its commitment to high-quality care and cost efficiency.

Today, PHS continues to participate in the risk-based contracts launched in 2011, that in total cover approximately half (500,000 of the 1 million) of the patients seen by PHS’s primary care physicians.

- Medicare: PHS was an original Pioneer ACO participant, currently participating in the Next Gen ACO Program.
- Medicaid: Risk contract through its NHP affiliate, as well as participating in a Massachusetts Medicaid (MassHealth) ACO pilot.
- Commercial: Represents the majority of the risk contract lives; participates with payers Blue Cross Blue Shield of Massachusetts (BCBSMA), Harvard Pilgrim, and Tufts.
- Self-insured employee plan: Risk contract supported by TPA services largely from BCBSMA.
Interestingly, a large percent of the non-ACO patients belong to another regional ACO. Between the risk contracts mentioned above and that of other regional ACOs, PHS estimates that 60-70% of all patients within the system belong to some type of risk-based contract.

PHS’s PHM technology framework is founded around three categories it considers essential for success.

1. Tools and processes for consumers.
2. Workflow tools for clinical teams.
3. Data warehousing and analytics to drive improvements and measure performance.

Its broad PHM program is funded by each provider as a percent of revenue. PHS realized early on not to depend on any potential shared savings payments as a funding source. Such payments through risk contracts are hampered by latency of payment, up to 24 months after an activity period, as well as the inherent volatility of such contracts.

Care Management Model
PHS’s CM model is defined by its tight integration to primary care. Care Managers are embedded in and assigned to practices. PCPs make final decisions on which patients are care managed.

Risk Stratification: Patients are identified based on the following factors that PHS believes it has the greatest potential to impact:

> Patient need: Chronically ill, medically complex (often with comorbidities)
> Behavioral health complications or substance abuse
> Risk scores: Initially stratified with technology, prospective risk score plus intensity of services, with final review and input from PCP as to which consumers are outreached for CM enrollment
> Highest utilizers: Focused on the top 2-10%, as the top 1-2% are episodic; this includes, such as transplants, traumas, and neonates, which are harder to impact
> Ability to self-manage and benefit from support and coordination
> Top care managed conditions, including mental health, diabetes, cancer, and hypertension

Populations Managed: High-risk CM continues to be offered predominately to patients in risk contracts, although patients from non-risk contracts are included if they are identified as likely to benefit. This is consistent with the PHM’s program-agnostic approach to programs.

Operational Framework: Each Care Manager maintains a caseload of 200, of which one-third are higher acuity. Average enrollment is 24 months, with 12% enrolled for greater than 36 months.

Approximately 11% of the total risk population have been identified as high risk since the start of the program; 4.5% of the total risk population have been enrolled in the high-risk CM program. Currently, 2.5% of the total risk population is actively enrolled.

The CM team today consists of 130 staff in total.

> 88 RN Care Managers
> 22 social workers
> 5 pharmacists
> 10 community resource specialists
> 3 medical directors
> 2 psychiatrists
Location and venue of CM interventions include clinic settings and the telephone, supplemented with home visits when warranted. Patients are originally reached by telephone for assessment, enrollment, and initial care plan development. Any time a patient has a scheduled outpatient visit, the Care Manager receives an alert and sees the patient in person. Similarly, when a patient is discharged from an inpatient stay, the Care Manager receives an alert to begin the transitional process. Nurse practitioners are also available to conduct home visits as needed to prevent avoidable admissions.

PHS deploys a self-monitoring utilization management strategy by running a subset of operating room requests through an internal procedure order entry appropriateness tool to screen and score, allowing only those planned procedures meeting their pre-determined threshold score to successfully schedule OR time.

**Behavioral Health:** Knowing that behavioral conditions as a comorbidity increase costs per patient by as much as 400%, PHS has a purposeful approach to addressing this population. Behavioral health specialists are integrated in PCP practices at the point of care to support patients with behavioral health and/or substance abuse conditions. The Care Manager’s role in medical-behavioral health integration is to conduct initial screening assessments, typically using a PHQ-2 or PHQ-9 tool, and ensure appropriate behavioral interventions are incorporated into a customized care plan that establishes treatment priorities (e.g., diabetes or alcoholism).

**PHM Technology Deployment**

IT is a cornerstone of PHS’s PHM program. It typically pilots new initiatives with the intention to scale and wraps all new launches with a robust measurement plan. Technology to support each use case is first thoroughly researched on the open market. PHS attempts to procure commercial solutions when available. When none is available to meet its needs, it then looks to the internal development team to build a viable solution rather than wait and miss a PHM improvement opportunity.

A build vs. buy decision is reached by determining the cost-benefit of each, including speed to deploy. If the decision is to build internally, PHS then subsequently leverages its internal department to potentially commercialize those specific IT solutions it has developed in-house.

**Technology Deployment by PHM Component**

See Table 2 for a summary list of vendors and the PHM technology function they provide for PHS.

**EHR**

Epic serves as the single EHR for all of PHS, in both acute and ambulatory settings. PHS leverages its EHR as a key component to enable other IT support functions.

- Bi-directional alerts have been developed to improve care coordination. These are created off the ADT feed from network facilities and providers, to notify Care Managers when patients have a clinic visit or hospital admission or discharge.

- Clinical decision support has been embedded to enable point of care adherence to evidence-based medicine. PHS created the content in-house and supplements radiology-specific content from the American College of Radiology via the National Decision Support Company.

- PHS uses Epic registries as one of two types of registries. The Epic registries provide real-time insights based on EHR clinical data.

**Data Ingestion and Normalization (HIE)**

PHS is able to avail themselves of Epic’s Care Everywhere that provides HIE data exchange functionality, including a physician portal for all providers in the community but outside of the PHS’s network to access and view patient data.
PHS also contracts with PatientPing to enable ADT connections with facilities outside the network. It has found PatientPing to be a very collaborative vendor partner. Based on recent market due diligence, PHS feels that PatientPing is the current market leader providing management tools for non-network utilization.

### Analytics and Reporting

PHS has partnered with Health Catalyst to develop approaches and tools related to performance monitoring and data analytics. In partnership, PHS and Health Catalyst continue to expand a comprehensive enterprise data
warehouse (EDW) that incorporates a variety of clinical, administrative, and financial data sources to support advanced analytics for self-monitoring and continuous improvement. The analytics capabilities allow PHS to identify and proactively manage variations in visit rates, testing rates, procedure rates, and use of post-acute care.

Health Catalyst also provides registries that are based on comprehensive data sources, including not only EHR clinical data, but also claims and administrative data (such as scheduling).

For data manipulation, PHS uses a combination of software to meet its needs, including SAS, Excel, and Access to analyze registry data for variation by cohorts. For data visualization, it uses Qlikview Business Intelligence tool for enterprise level reporting, and both Business Objects and Tableau for business level reporting.

**Care Management**

PHS originally used Morrissey and Mosaic CM solutions but sunsetted them after moving to Epic. However, PHS now uses Health Catalyst's newly launched and co-developed CM product, as it improves CM workflows with better analyses and data ingestion than any other CM software PHS has found.

PHS relies on naviHealth for predictive software that enables its behavioral health post-acute management strategy. naviHealth's tool recommends optimal site of care and length of stay at the post-acute setting at the time of discharge from an acute level of care.

PHS has completed an extensive review of risk stratification tools on the market to identify groupers that excel at prospective risk stratification. In an effort to augment the current options on the market, PHS has opted to create, its own custom risk stratification tool. It incorporates a commercial prospective grouper layered with PHS's own custom algorithm employing diagnosis and utilization intensity. The output list of patients is considered a starting point that PCPs then react to, recommending which members would be most likely to benefit from CM interventions. That final list of patients is the one Care Managers then use for attempted enrollment in CM.

PHS realized after a decade of CM experience that each Care Manager was storing its own list of community resources as it uncovered them, often on sticky notes. PHS has now developed a community resource database using Microsoft SharePoint, including geomapping, contacts, and rankings. This "Yelp"-like tool requires an FTE to maintain it; PHS considers it time well spent to formalize its own intel.

**Patient Engagement**

Partner’s strategic goal for patient engagement is to increase member retention, maintain in-network utilization, create a positive experience, and empower patient self-management to improve treatment plan compliance and subsequent outcomes. Tactics include providing non-office based visits, helping patients navigate the health system, and ensuring patients have ready access to their health data.

Further encouraging self-care, PHS provides patients not only educational materials from Healthwise and Health Dialog, but also shared-decision making content content (previously supplied by Health Dialog, soon transitioned to Healthwise). PHS also provides various means for patients to submit clinical health data via remote patient monitoring tools and patient-report outcome measures (PROMs such as quality of life, symptoms, and functional status). PHS uses Epic’s PROMs functionality via the patient portal from home or tablet in the waiting room, so providers have the data during the time of a visit.

Network and benefit navigation is provided by Kyruus, a provider search and scheduling tool that best matches patients with the type of provider they need to see.
PHS’s patients use Epic’s MyChart patient portal to view lab results and launch video visits with their providers.

PHS leverages a few remote monitoring vendors as part of its clinical data collection approach: Heart failure monitoring technology by Phillips, hypertension by Qualcomm, and diabetes monitoring by Glooko.

Telemedicine can take many forms, and PHS makes the most of several technologies in order to shift the site of care and avoid unnecessary visits. For synchronous patient-to-physician visits, PHS has worked with SBR and Vidyo to integrate into its patient portal. For asynchronous patient-to-physician visits, PHS uses a home-grown application called Healthcare 360. This technology allows physicians to follow up with patients at pre-specified time periods with internally validated content for select chronic conditions. For doctor-to-doctor eConsults, PHS is leveraging functionality that has been highly customized by its internal Epic build team.

Outcomes

PHS is not only extremely sophisticated in their PHM strategy, infrastructure, and execution; it also demonstrates superior expertise in measuring the impact of its PHM efforts. PHS deploys progressive statistical methodologies to ensure clean study results. It operates with the expectation that it requires 18 months of patient engagement in order to see measurable clinical and financial impact.

Outcomes to date, measured within two years of program enrollment, include the following:

- Provider and clinical staff increased satisfaction and work/life balance.
- Percent improvements for patients enrolled in the high-risk CM program.
- PHS’s Pioneer ACO achieved over $31 million in savings during the four-year federal initiative.
- PHS scores well in virtually all quality indicators that the federal government tracks as part of the Pioneer ACO initiative. PHS’s overall quality score of 96.04% ranks among the best ACOs in the nation.

While outcomes are positive, PHS expects it will take another several years of deploying its PHM strategies prior to realizing an even greater degree of financial savings (Table 3).

<table>
<thead>
<tr>
<th>Key Indicator</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>IP Rate/1000</td>
<td>20% reduction</td>
</tr>
<tr>
<td>ER Rate/1000</td>
<td>13% reduction</td>
</tr>
<tr>
<td>Annual Mortality</td>
<td>16% enrolled patients vs. 20% matched</td>
</tr>
<tr>
<td></td>
<td>comparison group</td>
</tr>
<tr>
<td>Gross Cost Savings</td>
<td>12% among enrolled patients</td>
</tr>
</tbody>
</table>

Table 3. PHS Outcomes Improvements for High-Risk CM Program Within Two Years of Program Enrollment
(Source: Health Affairs, May 2017-- http://content.healthaffairs.org/content/36/5/876.abstract)

Keys to Success

- Once high-level business and clinical strategy is developed, it is important to involve clinical, operational, financial, and technical leadership when designing and implementing PHM initiatives. The balance of perspectives ensures that the programs will be effective and efficient.

- Many PHM interventions require clinical teams to perform new work – and it is hard to do new work without streamlining or reducing existing work. Creating operational efficiencies alongside new program implementation is critical for clinician buy-in.
Lessons Learned
Clinical and Business Lessons Learned

> Development Methodology:

> Knowledge management: Create program, analytical, tool, and technology documentation, in order to ensure consistent replication as the program matures.

> Integrate human-centered design principles in program development to ensure consumers and clinicians are always considered in any solutions proposed.

> PHM Model Breadth: If only deploying a subset of PHM approaches, do not expect to find major cost reductions, as costs will simply shift to a different part of the care delivery system. Deploy an end-to-end strategy encompassing all components above to realize optimal gains.

> Provider Engagement: Deploy centrally-guided strategies, but ensure local leadership to increase local engagement.

Technology Lessons Learned

> Cost: Expect to invest in significant management expertise and significant financing (capital and operating).

> Process: Establish business and clinical strategy prior to workflow modeling and IT adoption.

> Vendor Procurement: Don’t rely solely on EHR software for your IT enabling support, as experience indicates additional PHM components (often now available from EHR vendors) are needed to fully understand cost and utilization metrics across a network.

> Populations Managed: Most PHM tools can be utilized for patients regardless of the VBC reimbursement model they are attributed to.

> Change Management: Continuous provider and health system employee training is a key element of change management success.

Partners Healthcare Looking Ahead

Next on the horizon for PHS’s PHM strategy is to enable a broader home hospital strategy, expanding on basic monitoring they do in the home today, moving beyond EKGs, weights, and ultrasounds to advanced telemetry, for example. The goal is to allow even higher-acuity patients to remain in the comfort of their own home and avoid the high cost and clinical risks associated with inpatient care.

When looking to the future, PHS does not see technology as a panacea. Care Managers will be needed for the foreseeable future to assess patients in nuanced human-centered ways not possible with current technology.

“Technology helps us make decisions better, but it won’t make decisions for us.”

– Sree Chaguturu, Vice President for Population Health Management
PHS Healthcare

PHS believes, rather, the PHM vendor market will eventually consolidate to a few platforms with APIs enabling stakeholders to innovate on top of those platforms. This will greatly ease operationalizing many of today’s PHM technology solutions.
Marshfield Clinic Health System (MCHS) has a rich history in the Midwest, delivering care to its communities across various care settings through a robust physician network complimented with both a wholly owned health plan and a purpose-built IT platform. It is one of the few health systems remaining with its own proprietary EHR, as others that started down the path of developing their own EHR with plans for commercialization later abandoned that strategy.

MCHS physicians realized many decades ago that care improvements were stifled by use of siloed paper charts and knew there had to be a better way. MCHS is an example of self-germinating private sector innovation, as it began to digitize its operations (EHR, patient portal) long before any government incentives encouraged the same.

MCHS demonstrates a uniquely strong link between clinical practice and IT enablement. Its IT teams work hand-in-hand with its care teams to listen, co-develop, and drive clinical improvements together as a unified team.

Background
Marshfield Clinic, now an entity of MCHS, celebrated its 100th anniversary in 2016, having been founded in 1916 by six physicians in Marshfield, WI. MCHS was created in 2012 to form a fully integrated health care system, legally structured as a 501(c)(3).

MCHS entities also include MCIS, Inc.; Security Health Plan of Wisconsin, Inc.; Flambeau Hospital, a critical care hospital in Park Falls, WI; Lakeview Medical Center, Rice Lake, WI, a 40-bed facility; and MCHS Foundation, the organization’s fund-raising arm.

MCHS has patient care facilities in rural Wisconsin covering northern, central and western areas of the state. They include more than 50 clinic sites, 10 dental centers in partnership with Family Health Center of Marshfield, Inc., eye care facilities, Marshfield Laboratories and pharmacy services. The Clinic system also has nine urgent care centers and four ambulatory surgery centers in Marshfield, Wausau, Eau Claire and Minocqua.
MCHS has more than 700 physicians across 86 specialties and more than 6,800 employees who provide care for 375,000 unique patients each year, for a total of about 3.7 million patient encounters.

In 1971, the clinic formed a co-ownership of an HMO and took sole ownership of that health plan in 1986. Security Health Plan is a successful provider-sponsored health plan offering individual, group, and Medicare insurance plans, as well as TPA services for commercial and Medicaid business.

Marshfield Clinic Research Institute, a part of Marshfield Clinic, is the clinic’s research arm. The clinic also has a strong education presence with its Division of Education and serves as an academic center for the University of Wisconsin School of Medicine and Public Health.

**Early Beginnings:** The clinic began its PHM journey in 2004 when it volunteered as one of ten sites to participate in the CMS PGP (Physician Group Practice) demonstration project, and subsequently as one of nine sites to participate in the PGP Transition Demonstration project in 2011 and 2012. This CMS project demonstrated improved outcomes while reducing costs, a precursor to the ACO model. Encouraged by its positive results with the PGP project, MCHS later enrolled as a Medicare Shared Savings Program (MSSP) Track 1 ACO participant in 2013, re-contracting in 2016 for a second three-year term. While it operates as a stand alone health system with a separate tax ID, it does collaborate with other regional health care organizations to jointly improve patient quality metrics.

**Clinical and Quality Structure:** MCHS embedded data, analytics, and business intelligence into its culture as a critical early foundational business strategy, designating a department for the purpose of such IT enablement. The Institute for Quality Innovation and Patient Safety (IQIPS) serves as the internal partner linking IT and the healthcare team community, driving continuous quality and clinical improvements. The mission of IQIPS has been to drive improved results by partnering with IT and aligning clinical workflows with technical solutions, such as their evolving EHR.

When IQIPS applies data insights to identify outlier areas ripe for improvement, MCHS then develops new initiatives to address those opportunities by applying the Triple Aim filter. New initiatives must pass through this internal filter — will it impact cost, quality, AND consumer experience in a positive way? Its new PremierCare program is an example where best-practice elements are vetted using a consensus-based process and applied as a standard of care.

PremierCare is MCHS’ structured methodology used to provide quality care and reduce cost for select surgical procedures and select chronic conditions. PremierCare is intended to reduce unwanted variation, while concurrently improving quality and the patient experience. The method incorporates evidence-based best practices to help reduce unwarranted variation in the delivery of the care process or surgical episode. These best practices are strategically embedded in the clinical team workflow to enhance the reliable delivery of each best practice element to every patient, every time. Building reliability into workflows makes doing the right thing the easiest thing to do, and it minimizes the typical reliance on memory.

**Care Management Model**

**Ownership:** MCHS’s PHM efforts extend beyond its PCPs to its 80+ specialty practices. A firm philosophy of the health system is that the management of patients’ conditions is not owned solely by the PCPs, but, rather, is owned by EVERY provider and care team member who touches the patient. For example, blood pressure control is owned by the PCP, the cardiologist, and any other specialists the patient may interact with; all providers must work together as a total system of care.

As an example, when MCHS focused on blood pressure control, it initially worked with PCPs and their quality performance metrics, then eventually broadened its scope and involved providers in specialty care settings. Dashboard metrics allow every provider to view details on all patients attributed to their practice. If a specialist identifies a blood pressure reading out of compliance with target, that specialist workflow includes rechecking...
the blood pressure and referring the patient to its assigned PCP for follow-up if the second blood pressure is elevated. Once MCHS started including specialists in their quality program, they noted a significant percent improvement after plateauing on some measures.

Consistency: While not all patients belong to its Medicare ACO, MCHS has found greatest success by performing a consistent set of PHM and CM initiatives consistently across its entire patient population. MCHS does not treat the 30,000 lives in its ACO contract any differently than those in FFS plans. It uses IT and analytics metrics to look at system-, department-, and provider-level results; it does not even differentiate in its dashboard by payer type.

Opportunity for Impact: MCHS has established various CM focused programs to target areas of greatest opportunity for impact: heart failure, anti-coagulation, bone health/osteoporosis, advanced care planning, and premier care.

The Heart Failure Center program is led by nurse practitioners, with RN and medical assistant support to reach out to patients. There is pharmacy support for all patients entering the program. The pharmacist reviews the patient medication list prior to the patient’s first visit. This review serves as a mechanism to look for contraindications of medications, optimizing heart failure medical management, and patient education.

Caseload: The typical caseload for the providers is approximately 500 patients. Patients have four or five clinic visits within the first two months of entering the program in order to provide patient education, support, and medication optimization.

Venues: Approaches for heart failure interventions include telephone, telehealth, and face-to-face in the clinic. The primary goal is to reach patients by their preferred method, then coordinate care to consolidate the number of visits a patient needs to attend in person for an office appointment. The patients utilize Interactive Voice Response (IVR) in order to monitor heart failure signs and symptoms. The RN reaches out to patients when their responses indicate a sign they may need triage. Based on the RN call, a diuretic medication protocol is used. If patient symptoms indicate a need for IV diuretics, this is provided in the clinic setting.

Engagement: MCHS has seen improvement in engagement in the program over time. Both physician engagement to refer cases to the core HFC team as well as patient engagement to work with their assigned HFC provider and RN have risen, as a function of seeing visible improvements in the historic cases within the program. The HFC program has demonstrated positive patient outcomes, decreasing overall hospital admissions, 30-day readmissions, and ED visits. Additionally, the HFC program has proven cost savings for the health plan, resulting in cost savings for the patient and MCHS. Positive results generate further positive results.

PHM Technology Deployment
MCIS, the technology arm of MCHS, provides a proprietary EHR and PHM system. The MCIS solution allows MCHS providers and the health care team to view the necessary population and individual metrics, risk stratify based on condition, and identify care coordination gaps. The initial dashboard serves as the system's consolidated data view and provides more granular cuts of data for providers and support staff.

The challenge of initially engaging providers to understand and deploy that which is needed to succeed in VBC models was as intense for MCHS as it is elsewhere in the industry. A key success factor was to enable providers to drill from their dashboard population view into their individual patient lists. That ability to recognize their patients and see who contributed to outlier population-level results was, in hindsight, one of the greatest contributions to getting providers engaged in using IT to manage their patient panel.

IQIPS team members act as internal consultants to help providers understand their patient panel from a population health perspective. A member of the geographically dispersed IQIPS team formally meets with each provider at least annually to review available data and mutually identify improvement opportunities. Providers are of-
ten interested in learning more and viewing the individual patient list in order to clearly see the drivers contributing to their population-level metrics as well as visualize just where there may be opportunities for improvement.

**Technology Deployment by PHM Component**

**Electronic Health Record (EHR)**

MCHS has a very long history of building its own EHR, dating as far back as 1960 when initial components of its pioneer longitudinal patient record were constructed based on requests from its own providers. It wasn’t until the 2009 HITECH Act that the federal government began incenting providers to adopt EHRs. MCHS was far ahead of that game and had their own EHR in place by 1985.

MCHS is now in the midst of implementing its next generation EHR, MCIS Clinicals. With MCIS Clinicals, the existing CattailsMD software is being replatformed to better meet MCHS’ needs as it evolve its PHM program. This new platform accomplishes several critical functions:

- **Configurability**: Experience taught the MCIS team exactly how and where providers need system flexibility. The system now allows for end-user configuration as much as possible without the need for the practice to make a request of MCIS, which in turn makes the health system far more agile. Examples include quickly creating a foot exam form, adding a new clinical decision support guideline, or editing a benchmark for the provider to self-elevate his or her own stretch target.

- **Real-time data alignment**: The replatformed system eliminates data discrepancies that often occur with the traditional EDW and data latency approach. It now integrates real-time PHM metrics at the point of care, with data consistency across components including order sets, the patient portal, care reminders, care management assessments, and PHM.

This was achieved via a domain-driven design and messaging system. The constant listener for events, followed by immediate transformation as needed, results in this improved architecture and user experience.

While MCIS has supported over 10,000 users with its legacy-platformed CattailsMD EHR since 2008, it did not commercialize for broader distribution beyond a limited set of customers. The focus for its next-generation product, MCIS Clinicals, is squarely on finalizing development and implementing across the current CattailsMD user base.

**Data Ingestion and Normalization (HIE)**

Over the years, MCHS has established strong working relationships with other HCOs in the region and has developed an extensive data exchange program. This initiative has been key in providing care teams with a comprehensive patient record, enabling quality outcomes despite any patient transitions of care. In addition, administering claims payments through its own health plan enables MCHS to better understand the patient’s continuum of care and costs for each episode of care.

Supporting a data exchange program of this magnitude necessitates development of an interoperability platform that can accept data from multiple sources, match appropriately to a patient record, and transform data as needed by the proprietary EHR. MCHS has an IT team in MCIS dedicated to continue to develop and support this platform and enable increasing bidirectional data exchange.

MCIS Clinicals provides a modern application programming interface (API) similar to consumer-grade software products such as Facebook, Twitter, and Google. This approach makes it easier for MCHS to exchange specific, well-defined pieces of structured data with other specialty-specific applications used across the health system, as well as with other external healthcare organizations in the region.
Analytics and Reporting

Most reporting and dashboard metrics needed for PHM interventions are integrated real time from the EHR and external sources. However, to enable deeper data discovery analysis and inquiries by users as needed, MCHS’ EDW will continue to be a valuable resource.

The EDW is utilized regularly for external healthcare performance reporting. As a member organization, MCHS provides quality performance data to the Wisconsin Collaborative for Healthcare Quality for public reporting. MCIS prepares and submits the requested measures directly to WCHQ. As an ACO, MCHS annually completes quality reporting. ACO quality reporting is led by IQIPS, facilitated by MCIS upload of structured data into the Web Interface.

IQIPS continually reviews literature and the most updated, evidence-based guidelines, utilizing critical inquiry to ensure the needs of the population are being met. The EDW assists in understanding the patients who are served, and where opportunities may exist to improve care. IQIPS works closely with MCIS to pull ad hoc and parameterized reports to seek those answers. As an example, while a key focus for quality improvement in the system has been to improve blood pressure control among patients diagnosed with hypertension, the question of the care and follow-up of patients with undiagnosed hypertension arose. A report generated from the EDW assisted in identifying that population of patients.

Care Management

As mentioned, PHM components are built into the EHR as one integrated platform. Care management is not an exception, with preventive and condition-based reminders readily available in the EHR at the point of care. Point-of-care prompts are in place for early detection services as well as management of patients with chronic conditions.

The Population Health Management Dashboard (PHMD) allows the healthcare team to monitor quality performance and manage lists of patients attributed to a primary care provider. PHMD includes wellness/screening measures (cancer screening measures, osteoporosis, chlamydia, and fall risk screening, and influenza and pneumococcal vaccine), pediatric measures (well child visits, developmental and autism screening, tobacco counseling, secondhand smoke assessment, BP tested), care plan measures, and chronic condition measures for hypertension, diabetes, CAD, COPD, CKD and heart failure. PHMD enables the healthcare team, as an example, to identify real-time the percentage of its attributed patients who have A1c at goal and furthermore generate and ‘work’ the list of patients that are not at goal.

The EHR also prompts care plans based on patient diagnosis or risk assessments and screenings completed during the patients visit. Patients screening positive for tobacco use, depression, elevated blood pressure, and out-of-range body mass index will have a care plan prompted for the provider to complete during the patient interaction. Additionally, patients with current diagnosis of diabetes or hypertension will also have a care plan prompted to identify patient self-management and treatment goals.

Patient Engagement

With a mission centered on the patient, MCHS has built several tools that enable the patient and caregivers to function as integral members of the care team. Building on a long tradition of using technology to deliver health care, Marshfield Clinic focused on engaging patients online in the early 2000s.

> My Marshfield Clinic (Patient Portal)

> The proprietary patient portal, branded as My Marshfield Clinic, was initially piloted in 2001 (far in advance of Meaningful Use legislation). To lower the barrier for adoption and to improve access to health information, My Marshfield Clinic offers consumers the ability to register for
a portal account completely online, without requiring any assistance from staff. Caregivers who may need access to the patient’s health information, details on upcoming appointments, or the ability to message the rest of the care team are also able get their own My Marshfield Clinic account. Approximately 28% of active patients or their caregivers today access My Marshfield Clinic.

- My Marshfield Clinic makes information needed to manage health conditions – such as care plans, medications, lab results, and health measures with trending graphs – available to users in a format that’s easy to interpret at an 8th grade reading level. Care teams share specific patient education material online, based on the patient’s knowledge and readiness for self-management, making it a more relevant and personal experience for the consumer. To truly engage patients in their health, MCHS has learned that the patient portal needs to be actionable and sticky. For example, it lets users easily request an appointment from their preventive care reminder and send their care team a message while reviewing their lab result.

- One of the key contributors to the success of My Marshfield Clinic has been the cross-disciplinary operational effort over the years to promote its adoption and utilization, all under the guidance of a physician leader. This support has led to 68% of registered users logging into My Marshfield Clinic at least once per year, with the average registered user logging on six times per year.

- **Mobile Applications**

- Currently, the design of MCHC’s web-based patient portal optimizes it for display on mobile devices with varying screen sizes. However, mobile apps would allow MCHS to prompt consumers to engage in their care and overall wellness by pushing notifications, reminders and relevant, location-specific health information to their mobile device. Mobile apps for both iOS and Android smartphones are under development with the new EHR.

- While MCHS has not yet implemented patient texting of care management alerts, this also is planned for future development.

- **Telemedicine**

- Marshfield Clinic has been offering telehealth visits for over 20 years, providing patients access to specialty providers throughout the system from multiple locations within the MCHS geography. Telehealth access points for patients include Marshfield Clinic locations, nursing home locations, schools and daycares. Most recently, Marshfield Clinic began to offer virtual care access to nurse practitioner in the Care My Way program for acute care needs. Patients have the ability to connect virtually either using the Care My Way phone application or the web. Due to the rural geographic spread of its patients, telemedicine has made it much easier for patients with transportation challenges to receive care.

**Outcomes**

MCHS has experienced noticeable improvements from 2004 to 2017 as it developed additional service and IT components of its PHM program over the years (see Table 4).

To facilitate understanding of how new initiatives affect outcomes, MCIS has developed control charts within the dashboard that indicate when initiatives have been implemented and when results begin to change. This allows the user to more readily correlate potential cause and effect.
Keys to Success

- Leveraging its 35 years of EHR IT experience to replatform its existing EHR that modernizes its solution and enables integrated PHM interventions.

- Implementing the IQIPS team that serves as the guiding capability that then enables other positive developments, including:
  - Driving system-wide changes by identifying at a system level what is needed to improve care and results; utilizing research to identify how to better prevent complications through PHM interventions;
  - Expanding care coordination in a smart way, using the right data to identify areas of highest potential for impact.

Lessons Learned

Clinical and Business Lessons Learned

- Teamwork: Through years of experience and data insights, MCHS came to a realization that it takes the entire health system working as a team to affect outcomes. While it experienced improved results by focusing on primary care (all PCP sites have achieved Level 3 recognition as NCQA Patient Centered Medical Homes since 2011), it also came to realize that the point of entry for many patients is through ancillary and specialist services.

- Care Coordination: Patient satisfaction also improved as MCHS incorporated a team-based approach to patient care. When patients come in for a visit such as dental or eye appointment, they have their multiple clinical needs addressed in a single, coordinated encounter.

Technology Lessons Learned

- Point of Care: Push your IT vendor (or internal department) to bring all expected processes into the clinical workflow as closely as possible. MCHS is working to improve provider engagement by implementing the clinical care dashboard into point of care in its EHR. Don't expect providers to go outside their workflow.

- Data Transparency: Enable providers to drill from their dashboard population view to their individual patient lists, to create the ability for providers to recognize their patients and see which were the outliers and thus contributing to outlier population-level results. This may be the single greatest contribution to utilize these tools.

- Data Management: Take care of your data and manage your content well. Typically, the EDW is needed to normalize and standardize data. MCHS has learned how to save money and time by identifying those needs up front. Managing content as an enterprise solution in the EHR platform

<table>
<thead>
<tr>
<th>Measure</th>
<th>2004</th>
<th>2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>HTN Blood Pressure Control</td>
<td>49.8%</td>
<td>83.9%</td>
</tr>
<tr>
<td>Pneumococcal Vaccination</td>
<td>57.4%</td>
<td>83.6%</td>
</tr>
<tr>
<td>Tobacco Use Asked</td>
<td>11.7%</td>
<td>96.2%</td>
</tr>
<tr>
<td>Diabetic LDL Control</td>
<td>37.1%</td>
<td>63.9%</td>
</tr>
<tr>
<td>Diabetic Foot Exam</td>
<td>N/A</td>
<td>78.0%</td>
</tr>
<tr>
<td>Breast Cancer Screening</td>
<td>60.8%</td>
<td>72.4%</td>
</tr>
<tr>
<td>Colorectal Cancer Screening</td>
<td>49%</td>
<td>70.1%</td>
</tr>
</tbody>
</table>

Table 4. MCHS Clinical and Quality Outcomes Improvements
allows consistent representation of the patient encounter, eliminating the need for mapping behind the scenes and avoids loss of context. As they have learned from interacting with other collegial health systems in the industry, MCHS has been well positioned with their data initiatives.

**Marshfield Clinic Health System Looking Ahead**

This forward-thinking health system will focus on implementing its next generation EHR/PHM platform, MCIS Clinicals™, throughout 2017. MCHS will monitor results and revise as needed to optimize the system during 2017 and 2018. Results to be tracked include operational and cost metrics, clinical outcomes, and, importantly, clinician and patient engagement and satisfaction.

The wholly-owned subsidiary MCIS, Inc. is concurrently engaged in a project to understand whether there is a valid way to bring the value of MCIS Clinicals to a larger customer base.

MCHS has to-date been focused on the provider community from early beginnings and throughout their 100-year history. The health system’s expansion within the acute hospital space in 2017 will bring new challenges and opportunities. MCHS will now be faced with the integrated health system quandary of balancing the pursuit of value-based outcomes in parallel with operating what is yet a predominantly facility FFS environment. It views its expansion into the acute inpatient arena as yet another opportunity to better manage clinical and cost outcomes.
CONCLUSIONS AND RECOMMENDATIONS

HCOs take widely variant approaches to implement their PHM strategies. However, all can benefit from common best practices that can serve as a baseline of sorts. Each HCO can then modify from baseline to reflect its particular starting point and the variables within its ecosystem.

Based on these case studies and additional primary and secondary research, we have identified myriad factors that affect an HCO’s ecosystem and its subsequent VBC and PHM speed to value (see Table 5). By looking more closely at these factors, we can then evaluate which of these are within HCO control and can be reasonably mitigated, as with any gating factor in a project plan.

<table>
<thead>
<tr>
<th>Influencing Factors</th>
<th>Examples</th>
<th>Suggested Mitigation Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>External Factors Typically Not in HCO’s Control</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Populations Served</td>
<td>Health status</td>
<td>Work with broader community to effect public health improvements over time.</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Personal tech adoption</td>
<td></td>
<td></td>
</tr>
<tr>
<td>In-Market Payer Readiness</td>
<td>Offer VBC contracts</td>
<td>Establish formal venues for provider-payer collaborative business planning and development.</td>
</tr>
<tr>
<td>Collaboration culture</td>
<td></td>
<td></td>
</tr>
<tr>
<td>State Medicaid Readiness</td>
<td>Program statutory flexibility</td>
<td>Establish formal venues for provider-payer-state Medicaid collaborative business planning and development.</td>
</tr>
<tr>
<td>Leadership culture</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employer Market Influence</td>
<td>Presence of dominant employers</td>
<td>Establish formal venues for provider-payer-employer collaborative business planning and development.</td>
</tr>
<tr>
<td>PHM deployed by employers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Community Readiness</td>
<td>Shifting risk dynamics</td>
<td>Establish formal venues for provider-community stakeholder collaborative business planning and development.</td>
</tr>
<tr>
<td>Degree of social support systems</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Collaboration culture</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Changing Federal Regulations</td>
<td>CMMI new models</td>
<td>Participate in trade and industry associations and contribute to related working groups.</td>
</tr>
<tr>
<td>New regs and notices</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Internal Factors That HCOs Can More Readily Control</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Provider Readiness</td>
<td>Culture and leadership strength</td>
<td>Develop formal adoption plan; complete formal awareness sessions in advance of implementations; create pilot success stories; take advantage of conferences (webinars and in-person); leverage regional investments in staff and IT; outsource consulting expertise.</td>
</tr>
<tr>
<td>Financial capacity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Visionary interest</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Resource capacity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Resource expertise</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Provider Network Type</td>
<td>CIN vs IDN vs ACO</td>
<td>Formally plan for network structure nuances in PHM model design, project impact to processes and results and develop proactive risk mitigation plans.</td>
</tr>
<tr>
<td>Rural vs urban</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hospital vs provider-led</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Size of VBC Organization</td>
<td>Too small and not enough financial incentive to justify implementing PHM changes; too large too quick and may have challenges scaling</td>
<td>Seek scale with formal program design and supporting HIT to drive consistency in results (University of Texas March 2017 study of 2013-2015 CMS data concluded that HIT has a positive moderating effect on the relative performance of ACOs).</td>
</tr>
</tbody>
</table>

Table 5. Factors Influencing PHM Speed to Value (cont’d next page)
### Table 5. Factors Influencing PHM Speed to Value

<table>
<thead>
<tr>
<th>VBC Contract Type</th>
<th>Transition Risk (From FFS to VBC Models)</th>
<th>Prioritization of PHM Focus Areas</th>
<th>HIT Vendor Performance</th>
<th>VBC Performance Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medical home primary care</td>
<td>Data aggregation</td>
<td>Data aggregation</td>
<td>Statistical methodology</td>
<td></td>
</tr>
<tr>
<td>ACO</td>
<td>Patient engagement</td>
<td>Patient engagement</td>
<td>Peer review</td>
<td></td>
</tr>
<tr>
<td>Bundled payments</td>
<td>Cost and quality management</td>
<td>Cost and quality management</td>
<td>Appropriate revisions and updates</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>Care coordination and network management</td>
<td>Care coordination and network management</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Business and data governance</td>
<td>Business and data governance</td>
<td></td>
<td></td>
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<td></td>
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</tr>
</tbody>
</table>

While many factors are external and outside the HCO's power to influence, there are steps an HCO can take to effect to drive speed to value in VBC deployments. HCO recommendations are consolidated here around two general themes:

- **Develop Enterprise-Level Thinking**
- **Become a Methodology-Driven Organization**

#### Develop Enterprise-Level Thinking

It is generally observed that organizations such as ACOs, health systems, and community collaboratives, that demonstrate greater success in VBC operate at the enterprise level, with commitment and active engagement from CEO level through senior team. Those that half-heartedly commit by pushing accountabilities for VBC to business line managers often demonstrate slower speed to value. Enterprise-level thinking enables HCOs to develop and utilize a wider breadth of capabilities to reduce variations, thereby improving quality and cost structure.

#### Clinical and Business Recommendations

- **People**: Focus on all points of entry into your organization and hold PCPs, specialists, and ancillary services all equally accountable for patient results.

  - **Design**:
    - Coordinate care for patients to ensure minimal disruption and need for multiple office visits; work as a care team to address all open gaps possible during any patient encounter.
Deploy an end-to-end strategy encompassing all PHM components to realize optimal gains. If only deploying a subset of PHM approaches across primary, specialty, inpatient, and ancillary care, do not expect to find major cost reductions—costs will simply shift to a different part of the care delivery system.

Deploy centrally guided strategies, but ensure local input and leadership to reduce local variation.

Definitions and lexicon are everything. Define terms, concepts, tools, and data fields, even basic ones, to ensure productive execution against common goals.

Technology Recommendations

Process: Establish business and clinical strategy prior to workflow modeling and IT adoption.

Vendor Procurement:

- Expect to find an immature market state of PHM technology and realize one vendor is highly unlikely to possess every capability you may currently need.
- Collaborate with others to shave cost and time from vendor procurement, implementation, and optimization processes, so you do not reinvent the wheel but instead benefit from existing progress.

Data Transparency: Increase provider engagement in PHM by enabling easy ability to drill from population-level results to the individual patient list for providers to see their outlier cases.

Cost: Expect to invest in significant management expertise and financing (capital and operating).

Populations Managed: Ensure investment in PHM tools can be utilized regardless of the payment model.

Change Management: Be diligent to training pre- and post-HIT implementations as a key element of change management success.

Become a Methodology-Driven Organization

Running a VBC model is truly running a business, there is no getting around it. It is critical for HCOs to develop a robust business culture and mindset in order to increase certainty of success, or else seek outsourced support for key business functions. Clinicians are highly intelligent by nature; through trial and error with VBC, they often realize early mistakes and evolve toward a better way to get the job done. However, we find that by then, much time and money has been spent stumbling first with means, methods, and technologies that did not work efficiently due to proceeding forward without a program design framework and associated plan of action.

Classic development methodology includes completion of a baseline assessment, articulate desired state, document the gaps and a measurement plan to monitor as the gaps are filled. Follow well-known project methodology to close your organization’s capability gaps. PHM model development should not be a massive, sophisticated model planned out in excruciating detail. However, value delivery features and functions do have to be carefully prioritized. A formal cost-benefit analysis will ensure the HCO is taking best advantage of in-market processes and technology solutions already developed by other HCOs as well as by payers.

Implementing that newly documented PHM model in incremental phases and revising it dynamically as needed is a very solid business strategy; just do not begin unless you first have some semblance of a model designed and key clinical and technology components prioritized. This agile programming approach or Scrum framework works not only for software development; it equally benefits PHM model development efforts.
Executing with formal project management processes and tools drives additional financial and operating discipline, ensures solid documentation and risk mitigation, brings together what can otherwise be siloed HCO functions under one comprehensive strategy and governance structure, and enables HCOs to be more nimble and innovative in responding to a changing environment. It ensures proactive planning across all impacted functions, including but not limited to financial, operational, legal, consumer experience, pilot/launch details, and measurement.

Clinical and Business Recommendations

- **Cost Management:** Establish cost accounting principles and tactics to understand and better address the true cost of providing care.

- **Design:**
  - Integrate human-centered design principles in your program development, to ensure consumers and clinicians are always considered in any solutions proposed.
  - Look to the payer community in a new light, as a partnership to co-develop PHM programs and enabling platforms. Leverage existing regional resources for increased speed to value.
  - Similarly, leverage colleagues, vendors, and other research means to develop your program interventions and measurement methodology. There is no need to figure out PHM strategies from scratch.

- **Process:**
  - Establish detailed processes for CM programs, to ensure clear scope of role, as well as reporting to measure compliance to process. This ensures scalability, efficiency, and effectiveness with these expensive human resources.
  - Document your PHM product model and processes via formal artifacts in order to establish program goals, a common baseline of knowledge management, a measurement framework, and risk mitigation plans. This will not only increase likelihood of success, but also ensure consistent replication as the program matures and staff come and go.

Technology Recommendations

- **Data Management:**
  - Clinical, operational, and cost data is the foundation for effective PHM. Develop or acquire the skills to successfully aggregate such data, ask the right questions, and deliver insights dynamically to providers and care managers.
  - Manage your data and clinical content well with the most efficient HIT tool; do not overcomplicate your IT solutions (eg. use real-time API rather than EDW to pull metrics for dashboards where possible).

- **Point of Care:** Push your IT vendor (or internal department) to bring all expected processes into the clinical workflow as closely as possible.

- **Vendor Procurement and Management:**
  - Vet vendors carefully; it’s much easier to add them than to terminate agreements. Ensure you have competence and experience on your end to meaningfully vet that vendor; engage a consultant or peer if you need support. It requires a unique level of technical/clinical stratégic expertise to delve beyond a vendor’s sales story.
  - Have clear definitions of success metrics and priorities prior to beginning any vendor procurement. A good vendor should ask you for those from the beginning to ensure you are in strategic and tactical alignment.
Don’t rely solely on EHR software for your IT enabling support, as experience indicates additional PHM components (often now available from EHR vendors) are needed to fully understand cost and utilization metrics across a network. Be on guard for vendors masking technology inadequacies with elaborate-sounding project plans.

Expect your optimal relationship with a vendor to be an iterative process. You will make requests and a strong vendor will be transparent about which solutions they can and cannot bring to bear as well as timeline for each.

Decision Timing: Make a needed vendor or technology architecture change prior to sinking even more money into a solution you know is obsolete. The cost of change will not subside the longer you wait.

<table>
<thead>
<tr>
<th>Source</th>
<th>Description</th>
<th>Link</th>
</tr>
</thead>
<tbody>
<tr>
<td>Harvard Business School</td>
<td>Value-based care resources</td>
<td><a href="http://www.isc.hbs.edu/health-care/vbhcdd/Pages/default.aspx">http://www.isc.hbs.edu/health-care/vbhcdd/Pages/default.aspx</a></td>
</tr>
<tr>
<td>HIMSS</td>
<td>ACO resource library</td>
<td><a href="http://www.himss.org/library/accountability-for-provision-care/resources">http://www.himss.org/library/accountability-for-provision-care/resources</a></td>
</tr>
<tr>
<td>Leavitt Partners</td>
<td>ACO case studies</td>
<td><a href="https://www.accountablecarelc.org/CSB">https://www.accountablecarelc.org/CSB</a></td>
</tr>
</tbody>
</table>

Table 6. No-cost Resources for PHM and VBC Best Practices

Additional sources of industry best practices are becoming more readily available, and we expect this documented body of knowledge to rapidly increase over the next year – a few of these are listed in Table 6. In addition, HIT and consulting vendors also offer their own proprietary resource libraries.

While these recommendations are targeted for HCOs, vendors and payers can also learn from them and offer a more formal methodology-driven support model to ensure greater success with PHM IT deployments. As an industry, we can increase the socialization of toolkits and case studies so that HCOs can more clearly define all aspects of PHM model design. This will in turn enable HCOs to optimally deploy IT and ultimately increase PHM speed to value.
ABOUT THE AUTHOR

Jennifer brings comprehensive Population Health and managed healthcare experience to her role as Senior Analyst with Chilmark Research. Chilmark Research is a global research and advisory firm whose focus is the market for healthcare IT solutions that drive the greatest impact; Jennifer’s research domains are Population Health (Lead Analyst), Care Management, and Provider-Payer Convergence (evolving collaborative business and clinical models). Immediately prior to this role, Jennifer was National Senior Director, Clinical Quality and Stars for Optum/UnitedHealthGroup.

Throughout her career, Jennifer performed at an “Exceeds” level in various key functions of population health and care management, including Operations, Account Management, Sales, Reporting, Market Management, and Product Development/Management.

She started her career as an RN in surgical intensive care and has worked the past twenty-five years across the continuum of clinical care management including leveraging Population Health strategies to ensure appropriate interventions in Utilization and Case Management, Chronic and Complex Condition Management, Consumer Engagement and Incentives, Stars and RAF, Nurseline and Advocacy, Behavioral Health, Wellness, Reporting and Analysis.

Jennifer has a Bachelor’s degree in Nursing (BSN) from The Pennsylvania State University and a Master’s degree in Public Policy & Management (MPM), with a concentration in Information Systems, from Carnegie Mellon. She is certified as a Managed Health Professional (MHP) through what is now America’s Health Insurance Plans (AHIP) and completed additional coursework in Legal/Governance of Healthplans. Both education and experience have provided Jennifer with strong foundational knowledge of the insurance industry, health policy, and healthplan operations, including value-based care and Commercial, Medicare, and Medicaid regulatory challenges. She also has achieved 2015 Certification from PMI for Associate Project Management (CAPM).