INTRODUCTION: WHAT IS POPULATION HEALTH MANAGEMENT?

Articles on population health management—and population health analytics—are showing up everywhere. It seems there is a lot of curiosity and concern about implementing a population health management strategy and getting solid population health analytics in place. But what do those two terms really mean?

A quick review of the literature shows that there are a lot of different definitions for population health management. And there are different ideas about how population health analytics can help. For example: Is population health management managing the health outcomes of a population of patients with a similar condition? Does it mean going at risk with payers for the outcomes of a population of patients (fee-for-value)? Is it using care management to improve outcomes for high-risk, high-cost patients? Or is population health management simply engaging patients and communities for better health outcomes?

Common Thread in the Definitions: Outcomes

There is a common thread running among these disparate definitions, though. And that thread is outcomes. Put simply, population health management’s objective is to provide the highest quality care (quality outcomes) with an
optimal care experience for a population of patients (experience outcomes) at the lowest appropriate cost (cost outcomes).

The key question for population health management is this: How do we systematically improve outcomes for a population of patients, one patient at a time?

GETTING STARTED IN POPULATION HEALTH MANAGEMENT: THREE INGREDIENTS OF FIRE

To get started, an analogy is useful. Just as it takes three things to create fire (oxygen, fuel, and heat), it takes three things to ignite outcomes improvement in populations (these will be covered in depth later, but as a high-level summary: it takes best practices, analytics, and adoption).

So to reiterate and continue the analogy, fire and combustion take oxygen, heat, and fuel. If any one of these three elements is missing, the fire doesn’t work, and there is less efficient combustion.

All three elements are needed for outcomes improvement too; not just technology; not just population health analytics.

And the Three Ingredients of Outcomes Improvement

The goal is to create a combustion-like outcomes improvement engine. This can only be accomplished by systematically asking and finding solutions for the following questions:

- What should the organization and individual clinicians do to provide optimal care? What are the evidence-based guidelines? (This is best practices.)

- How are the organization and individuals within the organization performing? What is the compliance rate with a given guideline? Is care being provided to patients in the most effective and safest way? (This is analytics.)
Finally, how does the organization transform? How are innovations diffused across the organization? How are improvements deployed at every facility and with every clinician? (This is adoption.)

In summary, there are three essential questions in this approach: What should be done? How well is it being done? And how to get better and transform? Again, if one of these is missing—if one of these questions is not being asked—the outcome improvement effort suffers, and there is no outcomes improvement engine.

**Redesign for Improvement**

Paul Batalden, M.D., Emeritus Professor at the Geisel School of Medicine at Dartmouth, said, “Every system is perfectly designed to get the results it gets.” So, why doesn’t an organization redesign its systems to get better results and better outcomes?

Returning briefly to the fire analogy, leaders should ask if the organization rubbing two sticks together to get a fire. If so, that is a labor-intensive, inefficient approach—if it works at all. Does the organization have a machine that systematically produces combustion like an engine? One where it can produce outcomes improvements time after time, efficiently and sustainably?
WHAT SHOULD BE DONE TO PROVIDE OPTIMAL CARE?: BEST PRACTICES

Best practices describe what the organization and its clinicians should be doing to provide optimal care to patients. They provide a repeatable method for integrating new medical knowledge into evidence-based guidelines. Best practices clearly articulate the knowledge that should be applied to improve outcomes and shorten the time from when new medical knowledge is discovered to when it becomes the everyday practice of frontline clinicians.

Map of the Process: Care Continuum Map

To start considering what should be happening to provide the best care, a health system needs to look carefully at the entire continuum of care using a care improvement map.

Figure 4 is a care improvement map for sepsis showing the major processes included in delivering safe care for sepsis patients. Also identified are potential problem areas (storm clouds) and the metrics that are important to understand for a particular step in the process. The care improvement map shows components across the continuum of care that will be important to understand for clinical improvement. It also shows places where a clinical team and a technical team can collaborate.

Figure 4: Care Improvement Map for Sepsis and Septic Shock

(click to enlarge)
Identify Common Problems and Potential Improvements

Organizational leaders can use the map to identify which of those problem areas (or storm clouds) will be most important to work on first. They can look to historical data for variation as an indication of opportunity for improvement. Having a list of common problems that are often not fully effective saves time and allows the team to come to a consensus around what to work on first.

For example, with heart failure, having a list of potential process aim statements can help expedite discussion on choosing an area to focus on first. If a team considers heart failure readmissions as the primary improvement area, the team could look at three aim statements: 1. Improve medication reconciliation; 2. Improve follow-up visit scheduling; and 3. Improve follow-up phone call within 48 hours of discharge. The team will come up with specific percentage improvements and target dates based on their own data, but these starter sets can really help accelerate the discussion. As an organization writes—and achieves—aim statement after aim statement, it will see an effect on the outcome improvement goal. The specific numbers will be determined by the team, but these are sample aim statements to help the team get started.

To paraphrase W. Edwards Deming, PhD, the great process improvement consultant, “aim defines a system.” Deciding what part of the care to improve is a critical step.

Scope the Problem and Define Precise Patient Registries

Next, an organization needs to scope the problem and define the precise patient registry for a given aim statement. The process can start with a standard registry from administrative codes, but quickly will need to move beyond that. This will mean specific clinical inclusion and exclusion criteria for the sub-cohort of patients.

For example, a children’s hospital decided to focus on improving care for an asthma patient population, and it wanted to define “acute exacerbation of asthma in the inpatient setting.” It started by finding patients with the ICD9 code for asthma, 493.xx who had two steroids or beta-agonists administered within eight house of admission and found about 29,000 patients. To create a precise registry, the hospital looked beyond the ICD9 code to patient problem lists and found an additional 22,955 patients. Next, the organization pulled supplemental ICD9 codes listed on patient encounters (such as 786.07 for wheezing and two steroids or beta-agonists administered within eight house of admission) and identified 38,250 patients. Finally, it looked at medication lists for associated prescriptions such as albuterol and gathered 72,581 patients. All of these elements and many others were evaluated, which expanded the final cohort in some ways and condensed it substantially in other ways. In the end, the hospital had a precise asthma patient population registry to focus
on for its improvement efforts that comprised around 8,000 patients.

Adopt Standardization Aids

Then, the health system needs to adopt standardization aids. These can include checklists, order sets, or protocols. Sometimes these aids are called knowledge assets. These will make it easy for clinicians to choose the best action.

There are three major types of standardization aids (shown in figure 6):

- **Utilization knowledge assets**, which describes which patients should receive care. This would include triage criteria indicating if a patient should be admitted to the hospital or cared for by his primary care physician. It also includes intervention criteria such as specifying if a patient should get an invasive procedure versus physical therapy. Referral criteria is another

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<thead>
<tr>
<th>Knowledge Asset Type</th>
<th>Question to ask</th>
<th>Examples</th>
<th>Possible Measures</th>
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<tbody>
<tr>
<td><strong>Utilization</strong></td>
<td>Who should get the care?</td>
<td>Health Maintenance and Preventive Guidelines, Treatment and Monitoring Algorithms, Indications for Referral</td>
<td>Diagnostic algorithms, Triage Criteria, Indications for Intervention</td>
</tr>
<tr>
<td><strong>Order Sets</strong></td>
<td>What care should be included?</td>
<td>Substance Selection, Admission Order Sets, Pre-Procedure Order Sets, Post-procedure Order Sets</td>
<td>Clinical Supply Chain Management, Supplementary Order Sets, Post-acute care order sets, IP (SNF, IRF), Home health, Hospice</td>
</tr>
<tr>
<td><strong>Workflow</strong></td>
<td>How can care be delivered efficiently?</td>
<td>Transfer Checklist, Discharge Checklist, Risk Assessment</td>
<td>Cost/case, Cost/procedure, OR minutes, L&amp;D minutes, Other LOS</td>
</tr>
</tbody>
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Figure 5: An Example of Creating a Precise Asthma Patient Registry

Figure 6: The Three Types of Assets, including Questions to Ask, Examples, and Possible Measures for Each
example of a utilization knowledge asset; showing whether a patient should be referred to a specialist or stay with her primary care physician for care. Typically, decisions such as these are not standardized and are often based on the treating physician’s prior experience and training, which may not always be the latest evidence or medical knowledge.

Order sets come into play after a provider decides that a patient should receive care. Order sets dictate what should be included in that care. This includes admission order sets, pre-procedure order sets, and supplementary order sets. It also includes guidelines for which medications or substances should be selected and what supply chain components will be a part of this patient’s care.

Workflow standardization aids help deliver the care in the most efficient way. These include checklists (transfer checklists, discharge checklists, etc.), risk assessments, standard work, and actions performed by providers and support staff, over and over again.

When organizations consider these three standardization aids, metrics can be used to fully understand the use of these aids in the care delivery process and how to manage each one effectively throughout the continuum of care. For example, when looking at utilization knowledge assets, a hospital can

![Figure 7: The Anatomy of Healthcare Delivery, colors correspond with figure 6, the Three Types of Assets. Orange denotes a utilization asset, blue is an order set asset, and green indicates a workflow asset](Click to enlarge)
consider metrics such as: Admits/1000 members, IP days/1000 members, Readmissions/1000 members, etc. For order sets, a health system can use cost per case/procedure or Operating Room minutes as metrics. And for workflow metrics, a hospital can measure nursing hours by unit or cost per ancillary test.

In figure 7, the anatomy of healthcare delivery is shown, which places the different types of knowledge assets in their logical location within the continuum of care delivery. Different standardization aids are used in the clinic and the ambulatory setting, for example, than in the acute medical unit or the invasive setting.

Payment Structure Considerations

As shown in figure 8, payment structures can really impact improvement work. Sometimes doing the right thing for the patient can have a negative financial impact on the care delivery organization as a whole. For example, a hospital in a discounted fee-for-service payment arrangement that makes a change to an intervention indication, resulting in fewer patients receiving a particular intervention, can see negative impacts in its bottom line. Whereas, if that hospital were in a full capitation or a condition capitation arrangement, the bottom-line impact would be positive.

The implications, of course, are that care delivery systems should consider the type of standardization change (seen as knowledge asset types in the right hand column of figure 8) in relation to its payment arrangements and consider approaching payers with a full capitation or condition capitation model. This way, hospitals, clinics, payers, and the patient community can all benefit from improving outcomes through utilizing the system appropriately, including the right components as the care is ordered, and decreasing waste and wait times through efficiency improvements.
Produce Actionable Visualizations

The final component of best practices is actionable visualizations. It is just not enough for a health system to know that, on the whole, it’s managing its diabetic patients or heart failure patients in a good manner. The organization needs to know exactly what actions or steps should be taken with specific patients.

A good example of this type of actionable visualization is shown in figure 9. Here, recently discharged heart failure patients are listed by whether or not there is a follow-up visit scheduled. The list is sorted by risk of readmission. So, care managers could make phone calls to schedule follow-up visits with those patients who have the highest risk scores (the highest on this example is 81) and move down the list. Since follow-up visits are part of best practice protocol for heart failure patients, ensuring high-risk patients are prioritized for follow-ups should help decrease readmission rates.

**Patient Flight Path**

Another example of an actionable visualization is the Health Catalyst Patient Flight Path (shown in figure 10). With this tool, a physician could sit down with an individual patient and talk about changes or actions the patient should take in his day-to-day life, whether it be trying to get his BMI to a better place or reducing LDL. The physician can
actually create a simulation based on similar patients with similar conditions and demographics and see how to move from a high-risk category down to a lower-risk category. The physician can also show the patient the impact improving (or not improving) his condition will have on his out-of-pocket costs. This is an actionable visualization that can help promote positive activities by both clinicians and patients.

**HOW ARE THE ORGANIZATION AND INDIVIDUALS WITHIN THE ORGANIZATION DOING?: ANALYTICS**

Analytics give the ability to measure how the organization and the individuals providing care within that organization are performing. Good analytics will consider compliance with best practices and whether care is being provided in the most effective and safest way. If an organization is unable to measure these actions, it proves really hard to actually improve.

An organization also needs to be able to find patterns in the data to show correlation and causation. This means integrating clinical data, financial data, and patient experience data. Eventually, clinicians should be able to use this integrated data to predict outcomes and prescribe actions that would be most appropriate for an individual patient.

The biggest issue organizational leaders must address is the amount of time it takes to get information. Strong analytics will limit the amount of time data analysts and data architects spend hunting down and compiling data. The majority of their time should be spent interpreting the data and answering questions.

**How to Start Building Analytics: Establish an Infrastructure to Bring Data Together**

The first step to building a strong analytics is establishing an infrastructure that is capable of securely bringing all the data from EMRs, billing systems, etc. together. Every hospital has multiple source systems and data is typically
siloed in different areas. An **enterprise data warehouse** can combine that data into a single source of truth.

There are three data modeling approaches often seen in healthcare.

*The Enterprise Data Model*

Technology vendors porting products from other industries and healthcare systems who have hired data modelers from other industries often adopt the enterprise data modeling technique. The model works well when data rarely changes, which is why it has worked in other industries like manufacturing and retail. Using this approach, data is organized and defined, and once it’s in the model, applications can use the data easily.

But enterprise data modeling has real challenges and limitations in healthcare. All data must be bound early and tightly to the predefined model. Changes in requirements, such as a regulatory definition modification, require a complete redesign or remapping of the model. Plus, developing the data model in the first place is time consuming. Using this method, it is difficult to model complex healthcare concepts.

*Dimensional Data Modeling*

Another common approach is the dimensional data model. EMR vendors and healthcare point solutions tend to favor this approach. It is quick to get started and to add value using this model. Only data to be used for the given analysis is extracted. Many traditional visualization tools prefer this type of model.

However, it carries some flaws. As additional data is needed, many redundant data feeds must be created. Changes to the underlying source systems cause a maintenance nightmare. Additionally, comprehensive atomic-level detail is not stored in the model meaning deeper questions can’t be answered without pulling more data. Dimensional data modeling is difficult to use in the healthcare environment.

*Adaptive Data Modeling*

One approach that has gained real traction at many successful health systems is the adaptive data model. The organization does not need to predetermine how all the data will be used because data is bound to definitions late in the process. Data is pulled from transactional systems into source marts with very little transformation (thus, it is a quick and simple process). This model can grow incrementally and adapts easily to changing healthcare requirements. In addition, adaptive data modeling contains both atomic- and summary-level detail and can successfully support complex healthcare quality improvement initiatives.
However, the model is unfamiliar to many IT professionals because it’s been most commonly used in healthcare settings and military logistics; a lot of IT professionals come from data warehousing in retail, manufacturing, or finance environments. IT professionals evaluating data models can’t review the data model in this approach because it is always changing. Using an adaptive data model requires a mindset shift.

Information Management: Reoccurring Data Tasks

In addition to specific use cases, there are common tasks that hospitals will repeatedly do with data. For example, defining patient cohorts and registries, attributing patients to providers, and understanding the severity of the illnesses and comorbidities. To create the most effective system, the organization will need to have three distinct components working with its Late-Binding Data Warehouse.

The first is data capture. Here, application administrators acquire key data elements, assure that data’s quality, and ensure that data capture is integrated into the operational workflow. The second task involves data provisioning. Data architects and analysts move data from the transactional systems into the data warehouse, then build visualizations and generate external reports. The third component is data analysis. Data analysts and subject matter experts interpret

![Diagram of Information Management Cycle]

Figure 12: The Information Management Cycle
the data, discover new information in the data, and evaluate the data’s quality (relaying that final point to the application administrators).

It is a cyclical process, as seen in figure 12, with capture leading to provisioning, leading to analysis, which naturally circles back to capture.

What to Do with the Data

There are several ways an organization can decide what to do with the data—that is, which area to focus on for improvement and how to go about bringing that improvement.

One method involves setting a minimum standard of quality and then focusing the improvement effort on those not meeting that minimum standard. This might be called the “rank and spank” or “punish the outliers” approach. While those physicians who were below the minimum standard will rise to the challenge and improve their performance, the rest of the providers who were already above that standard will not have changed.

A better approach—and one that will produce improvement throughout the organization for all providers—will focus on reducing variation rather than just dictating a minimum standard. Organizational leaders share best practices and establish a “shared baseline” for typical cases then encourage physicians to be consistent about using those best practice guidelines when it clinically makes sense and deviating from that shared baseline when a patient requires it (yet records their reason for the deviation so that the shared baseline can be improved over time). Even the best performing physicians often improve using this approach.
Improvement Prioritization

To be successful and make a visible impact as soon as possible, an organization needs to prioritize its improvement projects. One way to do this is to consider resource consumption and potential to reduce variability. As seen in figure 15, the best place to start is on projects that will address care consuming large amounts of resources with high variability.

This method to prioritization follows the Pareto principle or 80/20 Rule, where a very small number of projects account for a majority of the opportunity for improvement.

HOW DOES THE ORGANIZATION TRANSFORM?: ADOPTION

Adoption means understanding an organization's capacity for change, implementing excellent governance principles, standardizing improvement methodology, and providing great training. Adoption is all about how an organization transforms. This means getting an innovation or improvement deployed broadly through the health system, including every clinician providing care.

Improvement Capacity Assessment

First, the organization and its leaders need to understand the current capacity for improvement by evaluating the organization’s current capabilities, challenges, and gaps. This involves a self-assessment of an organization’s performance for best practices, analytics, and adoption. Organizational leaders answer 70+ questions in one of three ways: 1. Just Starting; 2. Mid-Journey; or 3. Mature.

For example, an assessment criterion for best practices evaluates the standard protocols for population management in the organization by asking, “What types of standardized content have you implemented to support Population Health Management?” Organizations respond one of three ways: Just Starting (We have not standardized content to support Population Health Management. Our clinicians use their best judgement based on their individual
training.); Mid-Journey (We have begun to standardize some content [e.g., CPOE to implement standardized order sets provided by our EMR vendor]. We have not yet created standard content for both workflow and clinical domains across the continuum of care.); or Mature (We have implemented standardized content to manage ambulatory and inpatient care management [e.g., ambulatory treatment algorithms, order sets, bedside care protocols] and utilization criteria [e.g., diagnostic algorithms, triage criteria, indications for referral and intervention] regardless of what unit or facility a patient enters the same workflow and care delivery content is followed and measured.)

For adoption, one of the elements the assessment considers is **data governance** and data quality process by asking, “Who manages the quality of data?” Again, organizations can respond one of three ways: Just Starting (No team owns data quality); Mid-Journey (Quality is managed at the report level. Individual analysts scrub data before reports are distributed); or Mature (Data governance has been established by giving clinical and business owners the role of data stewards to identify source system errors and correct problems at the source).

These are just two questions from the comprehensive assessment organizations can undertake to see if they are set-up for sustainable success—and to show the areas where they might need to do some work. Figure 16 is a visualization showing a health system’s assessment results. This system has the greatest amount of work to do in its analytics. However, it got a bulls-eye in the best practices element, standardized protocols for population health.

**Governance Teams**

Next, the organization needs to tackle one of the most challenging elements of the improvement process: establishing a good governance model that allows for both data governance and data stewardship, as well as advanced organizational governance and prioritization. Getting the governance structure right will accelerate the improvement with population health.
Getting it wrong will stall all efforts. Figure 17 shows the set up of teams that will result in success.

First, an executive leadership team must sponsor any kind of outcomes improvement effort. This group will oversee the permanent guidance teams, approve board-level outcomes goals, review progress, and remove road blocks. The leadership team will also determine and create guidance teams to tackle prioritization efforts based on the opportunities for greatest improvement, as discussed above.

<table>
<thead>
<tr>
<th>Executive Leadership Team</th>
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<tr>
<td>- Prioritizes sequence of formation of Guidance Teams</td>
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<tr>
<td>- Approves Board Level Outcomes Goals</td>
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<tr>
<td>- Reviews progress and removes road blocks</td>
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<tr>
<th>Guidance Team (Prioritizes Innovations)</th>
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<tr>
<td>- Meet quarterly to prioritize allocation of technical staff</td>
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<tr>
<td>- Approves improvement AIMs</td>
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<tr>
<td>- Reviews progress and removes road blocks</td>
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<tr>
<th>Small Teams (Designs Innovation)</th>
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<tbody>
<tr>
<td>- Meet weekly in iteration planning meeting</td>
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<tr>
<td>- Build DRAFT processes, metrics, interventions</td>
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<tr>
<td>- Present DRAFT work to Broader Teams</td>
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<table>
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<tr>
<th>Broad Teams (Implements Innovation)</th>
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<tr>
<td>- Broad RN and MD representation across system</td>
</tr>
<tr>
<td>- Meet monthly to review, adjust and approve DRAFTs</td>
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<tr>
<td>- Lead rollout of new process and measurement</td>
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The guidance teams will prioritize innovations and can be formed around a clinical support service or a clinical program. The team should have expert and clinicians that will meet quarterly to determine aim statements, guide the small teams that are drafting the changes, and review progress.

Small, integrated, working teams of physicians, nurses, technical staff, and analysts will actually design the innovation (implementation team). These teams meet weekly and share those changes with the larger, broad team, which provides guidance. These small teams can find way to drive adoption for those who will need to change their behavior.
Improvement Types

There are three types of improvements that range from easier to difficult to achieve.

Opportunity identification improvements involve looking at variation and calculating how much might be saved by standardizing care. Process improvements address the root causes of improvement opportunities and take next steps to improving outcomes. Finally, outcomes improvements measure the project’s overall goals such as an improvement in health function, a reduction in mortality, or actual dollar savings.

Figure 18 follows a skiing metaphor, with green (easy runs) being the opportunity identification improvement, blue (intermediate runs) covering process improvements, and black (expert runs) denoting outcomes improvements.

Improvement Methodology

The organization needs to implement the right tools at the right time, meaning incorporating an improvement methodology that incorporates LEAN and PDSA, as well as Agile software development principles. Figure 19 shows how to systematically approach the real work of identifying the content and best practices, defining patient cohorts, choosing a goal with aim statements, selecting the metrics, and then redesigning the entire process to get closer to the goal.
Traditional “Waterfall” Approach vs. Agile Approach

The agile approach to software development is critical to successfully driving improvement. The traditional way, the waterfall method, requires a lot of documentation upfront about what the IT team will build. First, the project plan, estimates, and requirements are gathered—creating documentation. Then, the possible use cases and functional specifications are hammered out—resulting in more documentation. Next, design specifications are created—causing even more documentation. Then, some coding actually starts, and finally the customer sees the product. The customer then tests the software resulting in more—documentation. Developers take the test results and may fix the code—this is all documented, of course. Finally, once all the bugs are worked out, the customer can actually use the software and realize some value from it. This waterfall process produces significant documentation about a system that doesn’t really work.

A more effective way—the agile approach seen in figure 20—lets the clinicians who will be using the system see it in development on a weekly basis. It relies on flexible tools so the developers can make adjustments and provide information while the kinks are being worked out. Each release results in value for the customer. This approach is about working software, not comprehensive documentation. Technical staff using agile principles can provide value from the very beginning and help keep momentum around improvement efforts.

Accelerated Practices Training

Finally, clinicians, technical team members, and organizational leaders will need advanced training to add skills and capabilities to accelerate outcomes improvements. Three types of training are particularly important.

The first type of training an organization should do is an immersive quality training program. This program, targeted at those who will be training others, can be taught two to three days a month for multiple months. It should cover quality improvement theory and include an actual project with a two to four person team.
Next, executive training will teach the executive team how hard it is to improve outcomes—and how important it is—if they do not already know. This program should cover high-level principles and give executives knowledge about the tools needed to drive long-term success.

Finally, just-in-time training programs are 10 to 15-minute modules used with an individual team working on a specific problem. These programs should be available to clinical, technical, and operational team members.

**CONCLUSION: LIGHT THE OUTCOMES IMPROVEMENT FIRE WITH A SYSTEMATIC APPROACH TO POPULATION HEALTH MANAGEMENT**

To drive scalable and sustainable outcomes improvement in population health, a healthcare organization needs to address all three questions with systematic approaches: What to do (best practices)? How is the organization performing (analytics)? And, how does the organization transform (adoption)?

As shown in figure 21, without all three, an organization has no chance at real, enterprise-wide improvement. For example, an organization that only has best practices is essentially an academic repository with no real practical application of those improvements. With only adoption, the organization falls victim to the dreaded “flavor of the month” syndrome, where clinicians (who see no evidence about best practices and have no way to measure progress) quickly disengage. If it has only the analytics and best practices, the organization is really good at one-off, siloed departments of excellence (science projects), but cannot spread that excellence across the entire organization. And as a final example, an organization with only adoption and best practices is missing the ability to automatically measure and track progress. Sustainable improvement becomes impossible.

To re-visit the fire analogy, all three—fire, oxygen, and fuel—can create an improvement fire to ignite scalable, sustainable change in an organization working on improving its population health management.

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Figure 21: What Happens When Any One of the Three Ingredients Is Missing in an Improvement Effort
Thomas D. Burton, Co-Founder and Senior Vice President of Product Development

Mr. Burton is a co-founder and Executive Vice President of Health Catalyst. His leadership and decades of experience in business intelligence, analytics, and process improvement have helped many care delivery systems significantly improve clinical, operational, and financial outcomes.

Mr. Burton was a member of the team that led Intermountain Healthcare’s nationally recognized improvements in quality of care delivery and reductions in cost. He has taught courses on the Toyota Production System, Agile Software Development, value-based care, and data system design at various institutes including Intermountain Healthcare’s Institute for Health Care Delivery Research and Stanford’s Clinical Effectiveness Leadership Training. He has also given presentations at the Healthcare Analytics Summit and HIMSS. Mr. Burton holds an MBA and a BS in Computer Science from BYU.
ABOUT HEALTH CATALYST

Health Catalyst is a mission-driven data warehousing and analytics company that helps healthcare organizations of all sizes perform the clinical, financial, and operational reporting and analysis needed for population health and accountable care. Our proven enterprise data warehouse (EDW) and analytics platform helps improve quality, add efficiency and lower costs in support of more than 50 million patients for organizations ranging from the largest US health system to forward-thinking physician practices.

For more information, visit www.healthcatalyst.com, and follow us on Twitter, LinkedIn, and Facebook.