INTRODUCTION

Healthcare in the United States is and always has been a complex system. This complexity is ever increasing as value-based purchasing and population health management transform our hospital-centric industry into one focused on the continuum of care.

Additionally, healthcare organizations are being asked to deliver better, more efficient care with fewer resources. This task wouldn’t have been simple in an acute care-centric industry, and it is even more difficult now. So how can an organization drive cost and quality improvement in the evolving environment?

The answer is to systematize care delivery one step at a time. We refer to the way we deliver healthcare as a system; however, in reality, it’s surprisingly unsystematic.

This paper introduces the Anatomy of Healthcare Delivery, a framework that outlines how the healthcare delivery system operates and pinpoints opportunities for improvement. Understanding and following this framework will enable healthcare organizations to reduce variation in clinical and operational processes to drive sustainable, enterprise-wide cost and quality gains.
HOW HEALTHCARE ISN’T REALLY A SYSTEM

For the purposes of this paper, we will consider the term “healthcare system” to be a misnomer. You could argue that healthcare is indeed set up as a system. It is, after all, a set of parts that connect to form a complex whole.

But when it comes to care delivery — how decisions about care are actually made — this idea of a system breaks down. Healthcare reveals itself to be largely a collection of individual clinicians making care decisions based on their unique apprenticeships. There is no great evidence of “systemness” in healthcare delivery.

To illustrate this lack of systemness, consider the difference between the healthcare industry and the airline industry. You’ve likely seen ads in airline magazines that tout the “Best Doctors in America” or the “Best Surgeons in New York.” But why do we not see ads for “The Best Pilots in America” while thumbing through the magazines in our doctor’s office? Don’t we care about the qualifications of the person responsible for taking us 40,000 feet above the ground at 600 miles per hour? Pilots, after all, are likely to hold our life in their hands more often than our physicians.

The answer lies in the fact that, unlike healthcare, the airline industry has continually routinized its approach to travel delivery. Individuals in charge of transporting some 1.73 million people a day in the U.S. are following standardized, well-understood routines with the aid of useful information available at their fingertips, such as cockpit checklists.

When it comes to managing decision-making processes, the difference between the airline industry and healthcare is that the airlines have moved towards a system of production. Healthcare, in contrast, is a system of craftsmanship where successful outcomes largely depend on the native intelligence and memory capacity of an individual provider.¹

![Process Management Evolution](Figure 1 – The Evolution of Process Management from Craftsmanship to a System of Production)

One hundred years ago, a pilot didn’t have much technology or information support in the cockpit. His ability to fly the plane depended on his own skill. However, if you look at the cockpit of an airplane today, you see hundreds of data points coming at the
pilot in real time, providing continuous feedback. Pilots are well-trained on standard, routine methods of doing things. When the aircraft is landing, they have a system of checks to make sure the landing gear is down. Because of these systems, we have confidence that one pilot will get us from point A to point B as well as the next pilot.

The same can't be said of healthcare. Positive outcomes really do depend on which doctor you see. As noted by the *Dartmouth Atlas of Health Care*, this lack of systemization in healthcare results in:

- Unwarranted variation in the practice of medicine and in the use of medical resources
- Underuse of effective care
- Misuse of care
- Overuse of care provided to specific patient populations
- Quality of care still often depends on geography and where a patient receives the care

A call for systematization in clinical decision making isn’t about eliminating critical thinking. It’s about introducing a standardized, evidence-based approach to care delivery that brings all care up to the same, high standard. It’s about giving clinicians support to make the most clinically sound, safest, cost-effective decisions. Even the most dedicated and brilliant doctors don’t have time to keep up with all the latest medical literature. In today’s industry, it takes years for best practices to become common practice. By better systematizing care delivery, we can significantly reduce that time lag.

**THE ANATOMY OF HEALTHCARE DELIVERY: VISUALIZING OUR HEALTHCARE SYSTEM**

The key to applying better systematization is to first understand the flow of care delivery. We have developed the Anatomy of Healthcare Delivery for that purpose.

The Anatomy of Healthcare Delivery is essentially a conceptual model of how care delivery works. It takes the complexity of healthcare and distills it into a simple, actionable framework. It breaks healthcare into a small number of domains and subdomains and shows how care flows through them.

Modeling the care delivery process in this way makes it easier to see how and where to improve it.

As Figure 2 shows, care delivery begins with symptoms (a chief complaint) or positive findings from a screening. This in turn leads to a diagnostic workup, out of which flows a provisional diagnosis.
At this point, providers have to make the important decision about which treatment venue is appropriate for the patient. There are three major domains of clinical management to which a patient may be triaged:

- **Clinic Care Management**
- **Acute Medical Management**
- **Invasive Management**

These domains are depicted as three vertical columns, or streams, in the diagram. As you can see, each domain is also broken into subdomains. For example, clinic care management includes chronic and non-recurrent subdomains, and invasive management includes interventional medical and surgical subdomains.

The following brief examples illustrate how care flows down these vertical streams:

- **Acute Medical Management Stream** — A patient is triaged to either a general medical/surgical bed or an ICU. Generally, patients in the hospital need substances, such as antibiotics, pain medication, fluids, electrolytes, and/or blood. Treatment therefore includes substance selection, preparation, and then administration as a part of bedside care.

- **Invasive Management Stream** — A patient with an ST elevated myocardial infarction is triaged either to invasive medical or invasive surgical. At that point, substances, such as sedatives, anesthetics, and analgesics are prepared and administered. The procedure is performed. The patient receives post-procedure care in the post-anesthesia care unit and is then discharged home or admitted to the hospital.

- **Clinic Care Stream** — A child presents to a clinic with a middle ear infection (acute otitis media). If this is the first ear infection, she/he is treated with the expectation that the illness will resolve and not recur and sent home; however, if the ear infection recurs frequently and/or turns into serous otitis media, she/he becomes a patient with a chronic condition who is monitored to determine
whether referral to an ENT specialist for evaluation of possible intervention may be indicated.

That is the basic construct. This framework facilitates identification and discussion of potential improvement opportunities to enhance quality, reduce cost, and improve patient satisfaction.

**APPLYING KNOWLEDGE ASSETS TO THE ANATOMY OF HEALTHCARE DELIVERY**

The Anatomy of Healthcare Delivery illustrates key decision points in the care delivery process. It is at these decision points that we can better systematize processes by introducing evidence-based knowledge assets.

Such knowledge assets are represented as blue and orange boxes in the Anatomy of Healthcare Delivery diagram in Figure 3.

The blue boxes represent per case utilization management knowledge assets. These assets have to do with order sets for management of individual patients in inpatient and outpatient settings, with indications for utilization of substances and supplies, and with protocols to implement the care ordered in the standardized order sets and in routine bedside and invasive care.

The orange boxes represent population utilization management knowledge assets. These assets have to do with algorithms and criteria for ordering the right tests and care for patients and the frequency of care.

Applying knowledge assets at key points in the care delivery process is the key to transforming healthcare into a system where decision-making is based on standardized, evidence-based medicine. Developing and implementing these systematic clinical strategies — both blue and orange — is the key to improving clinical effectiveness, cost effectiveness, and the safety of patient care.
Blue Box Examples: Per Case Utilization Management Knowledge Assets

Screening and Preventive Guidelines

The first orange box in the diagram deals with screening and preventive guidelines. Criteria for screening and immunization schedules live in this orange box, such as age and sex criteria for cancer screening including mammography and colonoscopy. Screening and preventive guidelines should follow the best available evidence for clinical and cost effectiveness. They help clinicians provide effective care in the clinic care environment and help them answer questions like:

- Who should be screened for breast cancer, at what age, and how often?
- Who should be screened for colon cancer, at what age, and how often?
- What immunizations should a child, an adolescent, or an adult have and at what age?

Treatment and Monitoring Algorithms

Treatment and monitoring algorithms guide clinicians or other chronic disease subspecialists in the clinic care environment, so they can provide effective and efficient care to ambulatory patients; it works like this: A patient is diagnosed with type 2 diabetes. This diagnosis sets off a treatment cascade beginning with diet and exercise. If this intervention fails to bring the patient to the treatment goal (an acceptable hemoglobin A1c level), we move to a single oral hypoglycemic agent (usually metformin). If we still don’t reach our treatment goal, we add a second oral agent (such as a sulfonfonylurea) and so on down through basic insulin therapy. If, after a period of time, the patient still fails to achieve the goal, we refer the patient to an endocrinologist or other diabetes chronic disease subspecialist.

Analogous algorithms, which we call “order sets,” apply to the acute medical and the invasive streams of the Anatomy of Healthcare Delivery. Once it is determined that some form of inpatient or outpatient care (acute medical or invasive) is indicated for a given patient, per case treatment algorithms come into play. Treatment algorithms include order sets, indications for the use of substances and supplies, and implementation protocols. These types of knowledge assets apply to the acute medical and invasive streams of the Anatomy of Healthcare Delivery. Both of these streams utilize admissions order sets. In the acute stream, supplementary order sets apply once the patient has been admitted and clinicians begin making rounds. In the invasive stream, there are pre-procedure order sets that include clinical supply chain management, such as selecting prosthetics, stents, grafts, or heart rhythm devices. Substance preparation protocols and procedures apply to both streams. And, eventually, in both streams, the process cascades to the implementation of the ordered care. This implementation is followed by additional knowledge assets, which take the form of bedside care practice guidelines, risk assessments, patient injury prevention protocols, bedside care procedures, and transfer and discharge protocols.

Orange Box Examples: Population Utilization Management Knowledge Assets

Knowledge assets represented by orange boxes are designed to standardize a population’s use of the healthcare delivery system. These boxes help ensure that patients who belong to a given disease cohort (patient registry) receive standardized care for their clinical condition.
Diagnostic Algorithms and Triage Criteria

The first orange box in the diagram represents diagnostic algorithms. Patients with abnormal results on screening exams and those with clinical symptoms enter the delivery system through diagnostic algorithms. Such algorithms include identifying a chief complaint, taking a history, performing a physical exam, formulating a differential diagnosis, and obtaining appropriate diagnostic tests. The purpose of these algorithms is to arrive at a provisional diagnosis as accurately and efficiently as possible.

The next orange box represents triaging the patient for clinical management based on risk of morbidity or mortality. One of the best-studied examples of a triage criteria knowledge asset is the CURB-65 criteria for community-acquired pneumonia. Documenting how many risk factors are present helps clinicians decide whether it’s safe to treat the patient in the clinic care environment, whether the patient needs to be admitted to a general acute care (med/surg) unit, or whether the patient is sick enough to be admitted to intensive care.

Indications for Referral

The next orange box in the clinic care management stream represents indications for referral. These criteria signal the point at which a primary care physician should consider referring a patient who fails to achieve clinical management targets to a chronic disease sub-specialty clinic (e.g., endocrinologist for a diabetic patient) or an invasive specialist (e.g., an ENT specialist for a child with frequently recurrent otitis media/serous otitis media). An indication for referral would be if the child with serous otitis media begins to show signs of hearing impairment or speech retardation. Such findings are indications to refer the child to an ENT specialist for evaluation and possible tympanostomy and placement of tubes.

Indications for Intervention

Patients who are referred from either the clinic care or acute medical streams to the invasive stream should be evaluated by the invasive specialist to determine whether they meet indications for intervention — the last of the orange boxes in the Anatomy of Healthcare Delivery. Indications for intervention consist of standardized criteria that should be fulfilled before a clinician embarks on an intervention. They essentially ask whether the appropriate medical options have been considered before performing an expensive procedure that carries with it a certain level of risk of complication.

The clinical knowledge assets described above are the building blocks of value-based care process models. Such models define the standardized steps in the diagnosis and management of a given clinical condition.

PRAGMATIC SYSTEMATIZATION OF HEALTHCARE IMPROVEMENT

Healthcare is complex. Practical application of value-based care delivery following this construct can still seem like an insurmountable challenge.

Healthcare organizations can address this challenge successfully by focusing on the following:

- Implementing the three systems approach
Breaking the system of care delivery into digestible pieces

Prioritizing strategically

THE THREE SYSTEMS APPROACH

Being systematic in care delivery — and implementing that system consistently across the enterprise — involves three critical dimensions:

1. Systematically integrating data and measurement
2. Systematically applying evidence and standardization
3. Systematically changing processes and behavior

These three dimensions bring people, clinical content, and technology assets together in the right mix to drive measurable, sustainable improvement. A healthcare organization must incorporate all three areas to systematize high-quality, low-cost, safe care delivery.

1. The Analytics System: Systematically Integrating Data and Measurement

The analytics system includes the technology and the expertise to gather data, integrate it in a data warehouse, use the integrated data to turn the data into information, and standardize measurement of process, outcome, and balance metrics. The digitization of health information over the last decade has created a wealth of data that can help organizations understand their clinical and financial performance — both retrospectively and in real time — in ways that weren’t possible before.

Aggregating clinical, financial, patient satisfaction, and other data from across the organization into a healthcare enterprise data warehouse (EDW) is the foundational piece of this system. Extracting transactional system data into an EDW is the first step in unlocking its potential, allowing an organization to reduce manual data gathering and to automate distribution of information. Analysts can then devote the vast majority of their time to analyzing the data, including discovering patterns in the data that can be used to understand where changes need to be made and to develop predictive models.

For example, using an EDW at one hospital, analysts found a subset of patients were being kept in the hospital for two days after a certain procedure when evidence showed they could be released after a 12-hour stay. Before implementing the new standard, the hospital performed an analysis to ensure the lower length of stay would not have an adverse effect on clinical outcomes or patient satisfaction. They predicted the annual savings for just one hospital would be well over $150,000 per year.

The EDW is just the first step on a road of increasing analytic utility as described in the Healthcare Analytics Adoption Model. This model provides a systematic roadmap to increasing analytics capabilities that will engage clinicians in significant ways.

2. The Content System: Systematically Applying Evidence and Standardization

The content system involves standardizing knowledge work — systematically applying evidence-based best practices to care delivery. This is the system where knowledge assets, the blue and orange boxes, come into play.
Researchers make significant findings each year about clinical best practices, but it takes years for these findings to become the everyday practice of most physicians. A strong content system enables organizations to put the latest medical evidence into practice more quickly. By standardizing evidence-based practices at the key decision points along the streams of the Anatomy of Healthcare Delivery, healthcare organizations can offer high-quality care more consistently.

From a clinical perspective, a content system should consist of standardized knowledge assets, which include evidence-based practice guidelines, treatment cascade models, indications for intervention, indications for referral, standardized order sets, and implementation protocols. The goal is to systematize how providers decide, for example, when to do surgery and when to order physical therapy.

From an operational perspective, the content system should include standard work, operational checklists, and standardized process flows. As teams develop systematic methods of accomplishing specific tasks, each key process step can be measured using the analytic system to improve efficiency and measure variation from the standard.

3. The Deployment System: Systematically Changing Processes and Behavior

The deployment system involves standardizing organizational work by implementing team structures that will enable consistent, enterprise-wide deployment of best practices. Some organizations are very successful at using analytics and evidence-based content to drive quality improvement at a flagship clinic or hospital. But this represents only two legs of a three-legged stool. The seminal question is: can the organization replicate the success achieved in the flagship clinic or hospital across the rest of the enterprise?

Many healthcare organizations labor under the illusion that, if they implement an electronic medical record (EMR) and an EDW, clinicians will automatically change their behavior. Instead, organizations must view these important technology elements as enablers that provide important support to clinicians as they develop and implement value-based care.

Only by achieving enterprise-wide adoption of value-based care knowledge assets can an organization impact the clinical effectiveness, cost, and safety of care broadly enough to succeed in a shared accountability environment. Success in deployment requires that the healthcare delivery system:

- Organize permanent, interdisciplinary teams of clinicians and technical infrastructure personnel to prioritize and implement improvement initiatives
- Recruit personnel to fill analytic infrastructure roles to capture, provision, and analyze data
- Implement a systematic, replicable process by which teams fingerprint and refine recommended process improvements and then lead implementation among their peers
By creating such teams that involve frontline clinicians from the outset, you can use data to systematically change processes and behavior in your organization. Teams should work together to continuously understand what evidence-based standards already exist, refine the standard, and systematize its practice. They should also interact with the analytics system to measure the adoption of standards and ensure that change occurs.

**BREAKING THE SYSTEM INTO DIGESTIBLE PIECES**

Implementing these three systems throughout the enterprise is still a significant task. By breaking healthcare into the right manageable pieces, you can successfully deploy these systems to drive clinical and financial improvement.

Most hospitals still organize their staff around traditional departments (surgery, nursing, etc.), but this kind of organization does not represent how care is really delivered. Departments do not operate as islands unto themselves. Rather, care is delivered to patients through care processes that span many departments.

**ORGANIZE AROUND PROCESSES**

One of the fundamental ideas of quality improvement theory is to identify key work processes and then organize around these processes rather than around departments. Healthcare is a complex business consisting of thousands of work processes. Each of the clinical management domains illustrated in the Anatomy of Healthcare Delivery — clinic care, acute medical, and invasive — consists of a finite number of these clinical work processes.

We have developed a clinical integration hierarchy that captures and classifies these care processes. Starting at the most general and moving to the most granular level, this hierarchy is as follows:

1. **Clinical program**: Twelve clinical programs make up a comprehensive healthcare delivery system. Primary Care, Cardiovascular, and Mental Health are examples of clinical programs.

2. **Care process family**: Each clinical program consists of multiple care process families. For example, the Cardiovascular clinical program includes the following care process families:
   - Ischemic Heart Disease
   - Vascular Disorders
Heart Failure
Heart Rhythm Disorders

Care process: Care processes represent the most granular level of the hierarchy and may exist anywhere along the continuum of care. Care processes that are linked by a common disease condition belong to the same care process family. For example, the following care processes are part of the Ischemic Heart Disease care process family:

- Coronary Artery Disease
- Acute Myocardial Infarction
- Percutaneous Intervention (PCI)
- Coronary Artery Bypass Graft (CABG)
- Chronic Ischemic Heart Disease

Effective clinical program improvement initiatives begin by seeking to standardize care at the level of a particular care process or care process family. Which level the initiative focuses on depends on its specific objective. If the objective is based in an intervention associated with a unique care process, then the care process level is used. If the objective focuses on decisions between alternatives within a care process family, then the focus is at the care process family level of the hierarchy.

Here are examples of care process and care process family improvement initiatives that follow the Anatomy of Healthcare Delivery construct:

- **Care Process Initiative:** Clinical program improvement teams consisting of single specialty physicians and bedside care givers are organized to develop care process improvement strategies represented by the blue boxes. For example, a team of interventional cardiologists, cath lab nurses, and technologists is organized to develop standardized strategies for the management of percutaneous interventions, such as coronary artery stent placement.

- **Care Process Family Initiative:** Interdisciplinary teams consisting of physician specialists from within the care process family are organized to develop improvement strategies pertaining to the orange boxes. For example, interventional cardiologists, cardiac surgeons, emergency care physicians, and cardiac nurses participate in the development of criteria to triage patients with cardiac chest pain between PCI, CABG, and medical management. Similarly, interdisciplinary teams of cardiologists, primary care physicians, medical assistants, and nurse care managers participate in the development of criteria for referral of those patients to the heart failure sub-specialty clinic for patients not responding to the basic ambulatory treatment and monitoring algorithm for chronic heart failure.

**STRATEGIC PRIORITIZATION**

The next thing an organization must focus on is which clinical program, care process, or care process family to target first for improvement. You will not be able to apply the
three systems approach to all clinical programs at once, nor will you be able to work on all the care processes or care process families in any given clinical program at the same time. You will need to prioritize and plan your investment of time and resources.

As noted above, though healthcare consists of hundreds or even thousands of clinical processes, only a limited number of these processes make up the vast majority of services you provide to patients. This aligns with the Pareto principle — also known as the 80/20 rule — which states that 20 percent of your processes account for 80 percent of resources consumed.

With an EDW in place, you can run applications that help you analyze your data to identify the 20 percent of the processes with the greatest opportunities for quality and cost improvement. Specifically, we have developed an analytics application that classifies patients that belong to a given data set into cohorts based on definitions linked to the clinical integration hierarchy. This Key Process Analysis application analyzes patient data to determine which clinical programs, care process families, and care processes present the highest resource consumption and largest variation based on an integrated analysis of clinical and financial data (including costing data, if available).

This Pareto analysis of clinical work processes delivers invaluable insights that help you prioritize. By focusing on even just the top 10 work processes identified by the application, you can significantly affect quality and cost.

However, when choosing your first project, in addition to size and variability, you will also want to consider important factors, such as:

- Environmental (e.g., competitive) imperatives
- Budget
- Organizational readiness (e.g., availability of a physician leader applicable to the project to be chosen)
- Availability of data
Priorities of strategic partners (e.g., managed care plans, major employers, business health coalitions)

These additional factors can help you determine which of the top identified care processes represents the best opportunity for a successful initial project.

3 PHASES: REAL-WORLD APPLICATION OF THE ANATOMY OF HEALTHCARE DELIVERY

An organization’s ability to systematize processes and drive real improvement across the Anatomy of Healthcare Delivery will evolve over time. As we have helped health systems implement an analytics system, a content system, and a deployment system, we have found the following sequence is most effective:

Phase 1: Prioritize improvement initiatives. Perform enough analysis to steer the organization in the right direction. Set up care process teams. Develop a care process model.

Phase 2: Implement the blue boxes. Standardize order sets and indications for use of substances, supplies, and implementation protocols.

Phase 3: Implement the orange boxes. Standardize screening and prevention guidelines, diagnostic algorithms, triage criteria, clinic care treatment and monitoring algorithms, indications for referral, and indications for intervention.

These phases are designed to help interdisciplinary teams become more systematic in their approach to process improvement. Successfully navigating these phases transforms a healthcare organization from a cottage-industry operation dominated by "craftsmanship" to a system of production that can improve quality while reducing costs.

Phase 1: Prioritize Improvement Initiatives

The goal of this first phase is simply to create a foundation for future success and generate a quick win. It includes:

- Implementing the EDW to create the platform for analytics.
- Using analytics applications to organize the patient population into cohorts (patient registries) according to the clinical integration hierarchy (i.e., care processes, care process families, and clinical programs)
- Performing Pareto analyses to identify the care process families and care processes with the highest resource consumption and greatest variation. This step focuses your improvement priorities.
- Deciding which of the identified processes represents the best opportunity for a quick win. Both data-driven strategy and pragmatism come into play here. Politics, data availability, and other factors might make it wiser to tackle one care process over another. Don’t pick something too difficult or controversial
for your first project. A quick win is essential at this stage, particularly to gain buy-in from clinicians.

- Forming an interdisciplinary care process team — frontline clinicians, analysts, operations personnel — to drive the improvement initiative. It is this team that will look at the care process, determine how best to improve it, and set improvement objectives.

- Developing a written, measurable, and time-sensitive description of the goal(s) the team expects to achieve (Aim statement).

Ideally, phase 1 will include developing a model for the care process you are targeting. A care process model is a conceptual flow diagram that outlines the care management strategy based on the Anatomy of Healthcare Delivery template. These models combine workflow (a value stream map approach) with the scientific or clinical flow of care. Figure 6 shows an example of a care process model for pregnancy. The black font represents major elements for each step in the continuum care process. The red font represents metrics pertinent to the care process elements:

The goal of phase 1 is to put the pieces in place to develop a data-driven culture of improvement. Particularly important is creating a basic deployment system: organizing clinicians in such a way that they interact with data and participate in clinical improvement. If an interdisciplinary team successfully improves this first care process, the team can then leverage that expertise to drive improvement in other care processes in that care process family and serve as a prototype for other initiatives.

**Phase 2: Implement the Blue Boxes**

The second phase involves implementing the blue boxes discussed above. The blue boxes represent opportunities to standardize care processes based on the best scientific evidence. The team organized in phase 1 will drive standardization of these processes.
Blue-box implementation deals in familiar territory for clinicians. For example, order sets are something a physician works with every day. Phase 2 simply aims to standardize the content and usage of such order sets. In many organizations, a dozen different order sets are available for a single diagnosis or procedure, each representing a different physician’s version learned during apprenticeship and customized since. Applying a blue-box strategy means establishing best practice default orders for use by all clinicians who manage the particular cohort of patients or perform the procedure. The process of defining which line item orders should be included, and which of those included should be set as defaults, is important to engaging clinicians and getting their buy-in.

An important point about Phase 2 is that its care process models, order sets, indications for utilization of substances and supplies, and implementation protocols are subject to continuous improvement, even if an organization has made sufficient progress to tackle phase 3.

**Phase 3: Implement the Orange Boxes**

Phase 3 deals with standardizing population health management by applying the orange boxes introduced in the Anatomy of Healthcare Delivery. It moves beyond the individual streams of clinical management — clinic care, acute medical, and invasive — and asks clinicians to think strategically across the continuum about what care should be delivered to patients and what is the safest, most cost-effective venue in which it should be delivered. Implementing the orange boxes involves asking questions such as:

- Who should be screened for what conditions and how often? What immunizations should be given to whom?
- What are the evidence-based tests (e.g., lab, imaging) that should ordered to establish the diagnosis?
- Am I triaging correctly on the first pass to the most appropriate venue based on the best objective criteria available?
- In clinic care, how frequently should patients in a given cohort be seen? What tests should be ordered to monitor treatment and how often?
- If I’ve exhausted the community care best-practice treatment cascade and the patient has not reached the targets, to what sub-specialist/clinic should the patient be referred?
- Have we considered all of the medical treatment options before embarking on an intervention?
- Have we considered alternative forms of intervention (e.g., medical intervention versus surgical)?

Other examples of potential blue-box implementations include:

- In the clinical care stream: evidence-based health maintenance and screening protocols; algorithms for treating different conditions (particularly chronic disease conditions)
In the invasive stream: admission and pre-procedure order sets; discharge processes

In the acute medical stream: admission order sets; clinical operations protocols pertaining to various assessments; protocols for implementing physician orders, such as urinary catheter placement

Historically, these decisions have depended on the judgment of each individual physician. Physicians believe that they know when to refer and to whom or when a patient should have a procedure. In reality, however, even the best physicians aren’t aware of every evidence-based best practice. Furthermore, there are many things about which physicians don’t make objective decisions. The orange boxes standardize such decisions to the extent possible (usually about 80 percent of the time) based on objective, evidence-based criteria.

Implementing the orange boxes represents less familiar territory for physicians and provider organizations because addressing such questions has typically been the purview of payers. In fact, physicians have often encountered this kind of improvement project in an adversarial environment as something imposed by a payer. For phase 3 to succeed, therefore, implementation of the orange boxes must be owned by physicians and advanced practice clinicians as an integral part of their clinical workflow.

The interdisciplinary teams established in phase 1 and refined in phase 2 are in an ideal position to understand the value of expanding their improvement initiatives beyond their own care management stream and applying better processes to the overall management of populations of patients with common conditions. Led by physicians and nurses who have seen the benefits of standardizing blue boxes within their own streams, these teams can build indications and guidelines into their clinical workflow. The analytics system will reveal to clinicians how financial incentives align with the orange boxes. Combined clinical, financial, and costing data can show them how every task and procedure they perform represents a cost against a prospective payment in a value-based environment.

CONCLUSION

Transforming U.S. healthcare is a daunting task. If we are to succeed, the task must be broken down into manageable chunks. This requires a simple, memorable framework like the Anatomy of Healthcare Delivery. The clinical integration hierarchy of clinical programs, care process families, and care processes provides additional structure within the framework for organization of the three dimensions of successful improvement initiatives – analytics, content, and deployment. The transformation will not be easy or fast, but if successful, it will save the best healthcare system in the world and make it affordable in the right way.
Resources

1. Consider that pilot training involves hundreds of hours with increasingly sophisticated flight simulators while medical school and residency continue to be based on an apprentice-master relationship that dates back to at least the 17th century.


ABOUT THE AUTHOR

Dr. David A. Burton is executive chairman of Health Catalyst, which provides hospitals and health systems with Late-Binding™ data warehousing and healthcare analytics to transform clinical, financial and patient safety outcomes. A former Senior Vice President at Intermountain Healthcare where he served a variety of executive positions over a period of 26 years, Dr. Burton spent the last 13 years of his career co-developing Intermountain’s Clinical Integration Strategy, which relied heavily on the enterprise data warehouse developed there. Dr. Burton was also the founding Executive Vice President of Intermountain’s managed care plans (known as SelectHealth), which currently provide insurance coverage to approximately 500,000 members.
ABOUT HEALTH CATALYST

Based in Salt Lake City, Health Catalyst delivers a proven, Late-Binding™ Data Warehouse platform and analytic applications that actually work in today’s transforming healthcare environment. Health Catalyst data warehouse platforms aggregate and harness large amounts of data utilized in population health and ACO projects supporting over 30 million unique patients. Health Catalyst platform clients operate over 135 hospitals and 1,700 clinics that account for over $130 billion in care delivered annually. Health Catalyst maintains a current KLAS customer satisfaction score of 90/100, received the highest vendor rating in Chilmark’s 2013 Clinical Analytics Market Trends Report, and was selected as a 2013 Gartner Cool Vendor. Health Catalyst was also recognized in 2013 as one of the best places to work by both Modern Healthcare magazine and Utah Business magazine.

Health Catalyst’s platform and applications are being utilized at leading health systems including Allina Health, Children’s Hospital of Wisconsin, Crystal Run Healthcare, Indiana University Health, Kaiser Permanente, Memorial Hospital at Gulfport, MultiCare Health System, North Memorial Health Care, Partners HealthCare, Providence Health & Services, Stanford Hospital & Clinics, and Texas Children’s Hospital. Health Catalyst investors include CHV Capital (an Indiana University Health Company), Kaiser Permanente Ventures, Norwest Venture Partners, Partners HealthCare, Sequoia Capital, and Sorenson Capital. Visit healthcatalyst.com, and follow us on Twitter, LinkedIn, Google+ and Facebook.