

Lean Service Lines in Healthcare

by Er Ralston

Challenges in the healthcare industry are immense. Hospitals and other healthcare providers are faced with growing demand, shortages of staff, and immense pressure to reduce costs while improving patient satisfaction and outcomes. Many healthcare providers have turned to the concepts of Lean thinking to facilitate in improving performance. While decent results have been demonstrated, bigger opportunities remain untouched. By focusing on Lean and other improvement efforts through an infrastructure based on clinical service lines, greater levels of performance can be attained.

Highlights

1. Effective improvement used in other industries can also be applied to the field of healthcare, enabling breakthrough levels of improved performance.
2. Process management in healthcare is a relatively new way of thinking. Three components of process management are required to achieve high-performing processes.
3. Service line infrastructures are an effective approach to managing highly complex and cross-functional healthcare processes.
4. The application of Lean thinking to clinical service lines will advance the level of improvement that can be achieved in bundled patient outcomes and healthcare costs.
5. Organizations should apply a transformation model and roadmap to guide the integration of Lean thinking into clinical service lines.

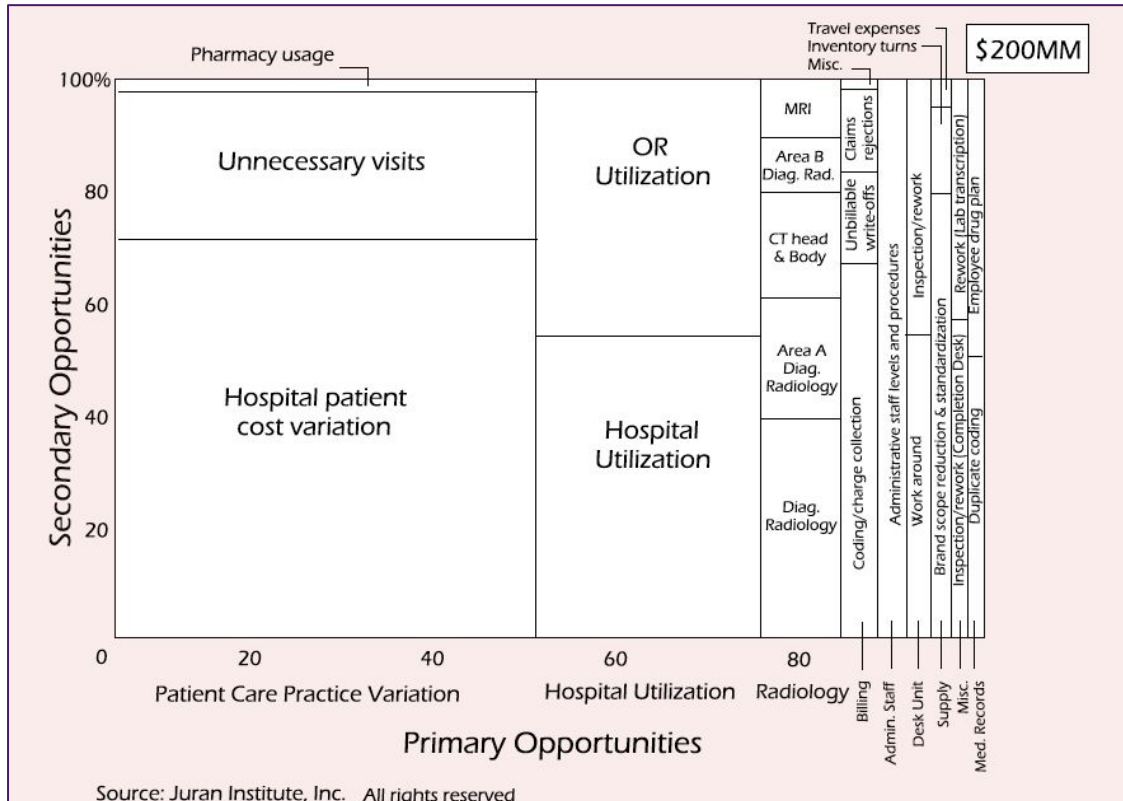
Healthcare Challenges

Healthcare reform predominantly appears as a subject of interest in today's media. Challenges to the U.S. healthcare system highlighted in a 2009 report from the Organization for Economic Co-operation and Development were as follows (Pearson 2009):

- Health expenditure in the United States is far higher than in other developed countries.
- The government spends more on health than nearly anywhere else; this level of spending has nothing to do with aging and health status.
- For all its spending, the US has lower life expectancy than most OECD countries, and is below average on a wide range of other measures.

A study conducted in 2003 by the Midwest Business Group on Health in collaboration with Juran Institute, Inc., determined that 30% of all direct healthcare outlays are the result of poor-quality care. With health expenditures of \$2.5 trillion in 2009, 30% translates to \$750 billion spent on poor quality. Costs of poor-quality (COPQ)

care are the costs that would be eliminated if healthcare systems do the right things, and do them correctly. These costs were mostly because of overuse, misuse, waste, and inefficiency (MBGH 2003).



The opportunity to reduce COPQ was echoed in a recent and widely referenced article in *The New Yorker*. In the article, Gwande stated that “contrary to popular belief, more is not better, and may actually be worse. In cases where science was unclear, some physicians pursued the maximum possible amount of testing and procedures; some pursued the minimum” (Gwande 2009). Gwande promotes rewarding doctors and hospitals if they band together to form accountable-care organizations; increase prevention and quality of care, while discouraging overtreatment, under-treatment, and sheer profiteering.

In 2001, the Institute of Medicine (IOM) published *Crossing the Quality Chasm: A New Health System for the 21st Century*. This book has been read and studied by most healthcare leaders. It changed vocabulary and perspective in looking at Quality as part of the management system with six aims for improvement. Many hospital boards readily adopted the six aims and health systems built their strategic and business plans with the aims as their foundation. Still, many healthcare organizations lacked an

IOM’s Six Overarching "Aims for Improvement" for healthcare:

1. **Safe:** Avoid injuries to patients from the care that is intended to help them.
2. **Effective:** Match care to science; avoid overuse of ineffective care and underuse of effective care.
3. **Patient-Centered:** Honor the individual and respect choice.
4. **Timely:** Reduce waiting for both patients and those who give care.
5. **Efficient:** Reduce waste.
6. **Equitable:** Close racial and ethnic gaps in health status.

Cite reference: IOM 2001

infrastructure or approach for addressing these aims for improvement.

IHI, an independent not-for-profit organization helping to lead the improvement of healthcare, has established strategies for reducing waste and enhancing value in healthcare based on the following assumptions (www.IHI.org):

- Better care does not always mean high-cost care.
- Providers face steadily increasing pressure to take cost out of the system (i.e., reduce waste) while maintaining or increasing the quality of care.
- Healthcare organizations with fundamentally redesigned systems remain financially viable and maintain an acceptable margin when revenues fall.

In 1990, the National Coalition on Healthcare was founded in the United States to help promote the need and the belief in achieving more affordable healthcare for all Americans. This non-profit, non-partisan group supports the following principles as a framework for improving healthcare in the U.S. (www.nchc.org):

1. Healthcare coverage for all
2. Cost management
3. Improvement of healthcare quality and safety
4. Equitable financing
5. Simplified administration

Further challenges have been identified in the area of clinical quality outcomes and patient safety. In 2002, The Joint Commission established its National Patient Safety Goals (NPSGs) program with the first set of NPSGs effective January 1, 2003. The NPSGs were established to help accredited organizations address specific areas of concern in regards to patient safety. Each year, the Patient Safety Advisory Group works with Joint Commission staff to identify potential new NPSGs and, following field review, determines the highest priority NPSGs to recommend to The Joint Commission.

Healthcare Response

The National Demonstration Project (NDP) on Quality Improvement in Healthcare was launched in 1987 to explore the application of modern quality improvement methods to healthcare. Twenty-one improvement projects were launched with industrial experts and healthcare organizations working together to solve internal quality problems. At least fifteen of twenty-one projects were counted successful, leading to the conclusion that quality improvement tools work in healthcare (Berwick et al. 1990).

While healthcare organizations were learning how to use systematic approaches to improve quality and performance, other industries were expanding their use of Lean and Six Sigma tools and methodologies. As these industries began to see increased success, the healthcare sector took notice of these methods. Six Sigma is used to reduce variation or reduce the frequency of process defects. Lean is used to increase process throughput, or to remove non-value adding activities from a process.

Lean in Healthcare

The term “Lean” has been a part of process improvement vocabularies since James Womack and Daniel Jones published *Lean Thinking: Banish Waste and Create Wealth in Your Corporation*. The authors summarized Lean thinking in five principles (Jones and Womack 2003):

1. Precisely specify value by specific **product**
2. Identify the value stream for each **product**
3. Make value flow without interruptions
4. Let the customer pull value from the producer
5. Pursue perfection

Recently, many healthcare organizations have undertaken Lean initiatives. Numerous case studies describing how hospitals have instituted Lean techniques in their operating rooms, emergency departments, labs, pharmacies and other areas of importance exist. Some of the improvements are impressive, resulting in significant reductions in patient wait times, OR utilization, etc. In 2005, IHI published a white paper entitled, “Going Lean in Healthcare.” In this paper, the authors describe the wide-spread deployment of Lean at Virginia Mason Medical Center in Seattle, Washington, and at ThedaCare, Inc., a 3 hospital system in northeast Wisconsin. Both of these organizations have executed Lean improvements in numerous areas of their hospital operations resulting in improved performance and reductions in cost (IHI 2005).

Most documented examples of Lean in healthcare focus on removal of waste or “lean-out” work processes. While these efforts may lead to significant financial savings, they have not fundamentally transformed the business into a Lean Enterprise. Womack’s *Lean Thinking*, lays out an action plan for successful transformation into what he describes as a Lean Enterprise. Womack defines “the purpose of a business organization is to identify and channel the value stream for a family of products so that value flows smoothly to the customer” (Jones and Womack 2003). The Lean Enterprise is organized by product family with dedicated teams whose mission is to precisely specify value in the eyes of the customer and remove anything that does not add value. Womack recommends the creation of a dedicated team who owns the value stream from end-to-end. One of the first critical tasks of the team is to understand, in great detail, the customer requirements and how the organization’s products and processes deliver value to the customer. The methodology he suggests was described by J.M. Juran as Quality Planning. In his book, *Juran on Quality by Design*, Dr. Juran provides guidance for identifying customers and determining customer needs before beginning to design or redesign the product, service, or process.

There is an immense opportunity to utilize Lean thinking in a big way to better address many of the current and future challenges faced by healthcare.

Process Management

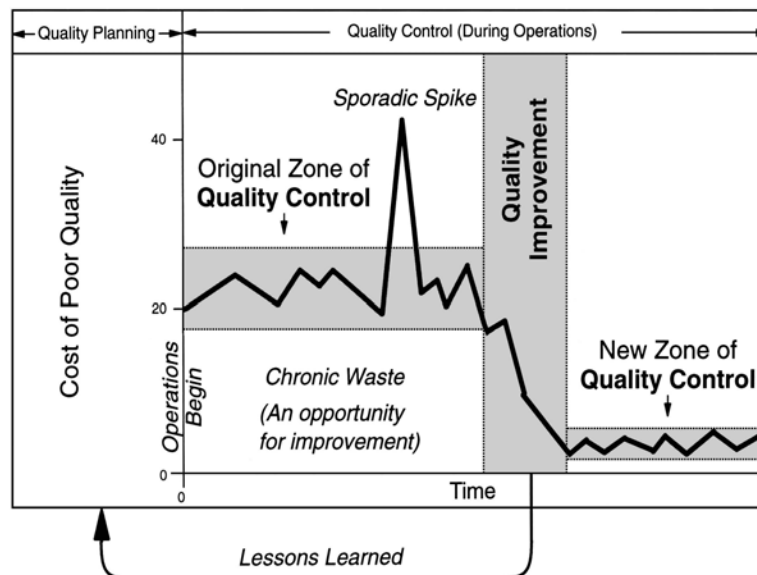
Many healthcare organizations additionally have been learning and implementing concepts of Business Process Management to drive improved performance results. Hospitals and healthcare systems have put these methods in place to better understand and manage key healthcare processes such as:

- In-patient care
- Emergency care
- Out-patient care
- Financial management
- Human resource management
- Patient relationship management

Patient care processes may be further dissected into sub-processes such as:

- Admit patient
- Assess the patient
- Diagnose patient
- Develop plan of care
- Executive plan of care

The essentials of process management, defined by Joseph M. Juran many years ago, are described in the Juran Trilogy[®]. Effective process management systems include techniques for planning, control, and improvement of processes.



While the origins of business process management are over 40 years old, successful healthcare practice models are still emerging. The introduction of the Healthcare Baldrige Performance Excellence Criteria, in 1999, spurred the evolution of process management in healthcare. These criteria supply guidance for many hospitals and healthcare systems, but are still relatively new. Healthcare Baldrige Award Recipients provide some insight into models that have worked well. There seems to be good evidence that healthcare systems, creating infrastructures for managing key processes, have enhanced patient care and resource utilization.

Although improvement methodologies and process management have found a home in today's hospital systems, healthcare challenges remain vast. There are many reasons why the challenges are difficult to overcome including:

Continuum of care: While improvements have been made in parts of healthcare processes, the full continuum of care overlaps many of the commonly defined process scopes. For example, a patient with a chronic condition such as CHF may have multiple encounters which involve out-patient care, emergency care, and in-patient care. The handoffs and linkages between these multiple encounters may not be effectively addressed with existing process management infrastructures.

Process Size: In a large hospital or healthcare system, a process such as in-patient care can encompass a tremendous level of resources. Even when broken it down to a sub-process such as patient admission or discharge, the scope is large and difficult to manage in a meaningful way.

System complexity: Because most hospitals and systems provide services to a wide array of patient conditions and needs, the systems become complex in trying to serve the varying needs of each type of patient.

Physician and staff engagement: The language of business process management has not been readily adopted by many healthcare workers. Healthcare providers do not easily see the potential benefits to patients and healthcare workers.

In order to face the mounting challenges faced by healthcare, new approaches are needed.

Service Line Management

Service lines are a way of organizing clinical services around the patient pathways for specific conditions or episodes. Service lines may cross over many traditional boundaries of care providers, departments, facilities, and organizations. Organizing around service lines provides coordination of care and information flow across the full continuum of care providers.

Service lines may be referred to by other names or labels, including clinical programs, centers of excellence, etc. There does not seem to be a standard model from system to system. Service lines can be defined around three categories of services:

1. Diseases such as cancer, heart disease, etc.
2. Populations such as women, children, etc.
3. Interventions such as radiology, surgery, etc.

Key defining characteristics of clinical service lines are that they are multidisciplinary, require a clinical care mission, and provide a mechanism for integrating personnel and services across disciplines.

Service Lines should have a balanced focus in multiple areas including (ECG 2009):

- Patient care protocols
 - e.g. evidence-based medicine order sets
- Clinical outcome measures
 - e.g. mortality, readmissions, infection rates
- Enhanced patient experience
 - e.g. time to be seen, provider satisfaction, overall satisfaction with services
- Process efficiency
 - e.g. cost of care, resource utilization

Patients typically experience services from multiple service lines over the span of a lifetime. Patients may receive services from multiple service lines in a single episode of care. Service lines do not “own the patients.” Patient flow sometimes blends between service lines.

There are many good examples of healthcare organizations that have implemented successful service line models. Intermountain Healthcare in Salt Lake City is often referenced as pioneer in implementing successful service lines. Not coincidentally, Intermountain has been described by President Obama and many others as a model for health reform (Leonhardt 2009). VA Hospitals have been implementing service line infrastructures for more than 10 years. VA services line guidelines were first developed by a national workgroup. The purpose of the guidelines is to provide guidance and consistency in use of service line terminology throughout VHA. The guidelines were distributed in draft form to all Veterans Integrated Service Networks (VISNs) in 1998 (VA 2001).

A review of the applicant summaries for the HC Baldrige Award shows that most healthcare systems make some reference to the use of service lines as a part of their organizational makeup. One of the best pieces of evidence of the integration of service lines as part of performance excellence planning comes from North Mississippi Medical Center, a 2006 Baldrige Award Recipient.

Extracts from the North Mississippi Medical Center Baldrige Application Summary (www.baldrige.nist.gov):

- “NMMC coordinates clinical services through five SERVICE LINES (SLs): Cardiovascular, Emergency & Surgery, Medicine, Oncology & Behavioral Health, Women & Children. We study our patient population and develop services specifically targeted to their needs.”
- “Our processes—both healthcare and support—are designed to meet our Mission of improving health and maintaining efficiency. To do so, we organize our services by SLs and provide services in multiple

settings: outpatient, ESD, hospital, home, rehabilitation, LTC, and community. The SL model, focused on the patient/customer, eliminates departmental silos, involves the specific SL medical staff, and manages processes in order to provide value and improve outcomes.”

- “We have selected results from each SL that tell the full story of NMMC’s performance.”

Resource identification and alignment act as a key part of service line management. Many different leadership models exist for service line leadership. Typical models include at least one of the following: administrative leader, medical staff leader, or nursing leader. Some models use dyad leaders (e.g. an administrative director and medical director) and others use triads (including a nursing leader). Leader roles may be full-time assignments for major service lines, or part-time assignments for smaller service lines. This depends upon the organization and what works best for them. Often, service lines do not have dedicated facility space; they may have shared space with multiple areas. To be effective, a well-defined systematic approach must be aligned and integrated with other areas of support displaying linkage within the organization.

In a service line infrastructure, new measurements will begin to evolve around episodes of care. Episodes of care are the set of services required to manage a specific medical condition of a patient over a defined period of time. Healthcare insurers are already looking at this approach to determine reimbursements to healthcare providers. Some healthcare providers are beginning to recognize the value of measuring performance for episodes of care, including clinical outcomes, resource utilization, and total costs.

Examples of how episodes of care may be determined:

- Hip Procedure: pre-surgical evaluation, actual surgery, post-operative recovery, rehabilitation, and follow-up visits
- Diabetic Care: primary care visits and consults with specialists

Service lines can find benefit in using an episode of care approach to measurement because it takes into consideration the full continuum of patient care, and not just individual encounters.

Blended Approach of Process and Service Line Management

Because of the size and complexity of most healthcare systems it is difficult, if not impossible, to design a single patient care process to meet the needs of all patients. How do you design a robust process, incorporating standard practice and minimal variation, while meeting the many and varying needs of patients? Process mapping of the patient care process can become incredibly complex given the multiple options for providing care. Training personnel to follow complex processes is difficult and error prone. The answer appears in the integration of process management and service line management—greater benefit can be achieved. In this model, process managers work to remove unwarranted variation across the enterprise process continuum and service line managers adapt the standards of care for the specialized needs of the patient, including the use of evidence-based medicine and professional practice.

Service line management and process managers must collaborate to ensure appropriate balance of enterprise-wide standardization and service line customization. Often, formal infrastructures are developed to facilitate this collaboration. In the early stages, service lines seek collaboration with the enterprise patient care processes. They may work on standard processes for admitting patients, developing/documenting plans of care, etc. As the infrastructure matures, service lines begin to collaborate with other enterprise process managers including customer listening and engagement processes, workforce engagement processes, strategic planning processes, financial processes, etc.

There are many benefits to this blended approach:

- **Standard Practice:** An approach for removing unwarranted system-wide variation
- **Flexibility:** Processes have flexibility to meet the many and varied specialized needs of patients
- **Individualization:** Patient care processes designed to meet individual patient care needs and requirements
- **Best Science:** Service line owns the adoption of standards of care and standards of practice
- **Optimization:** High patient value with the most efficient use of system resources

The Service Line Value Stream

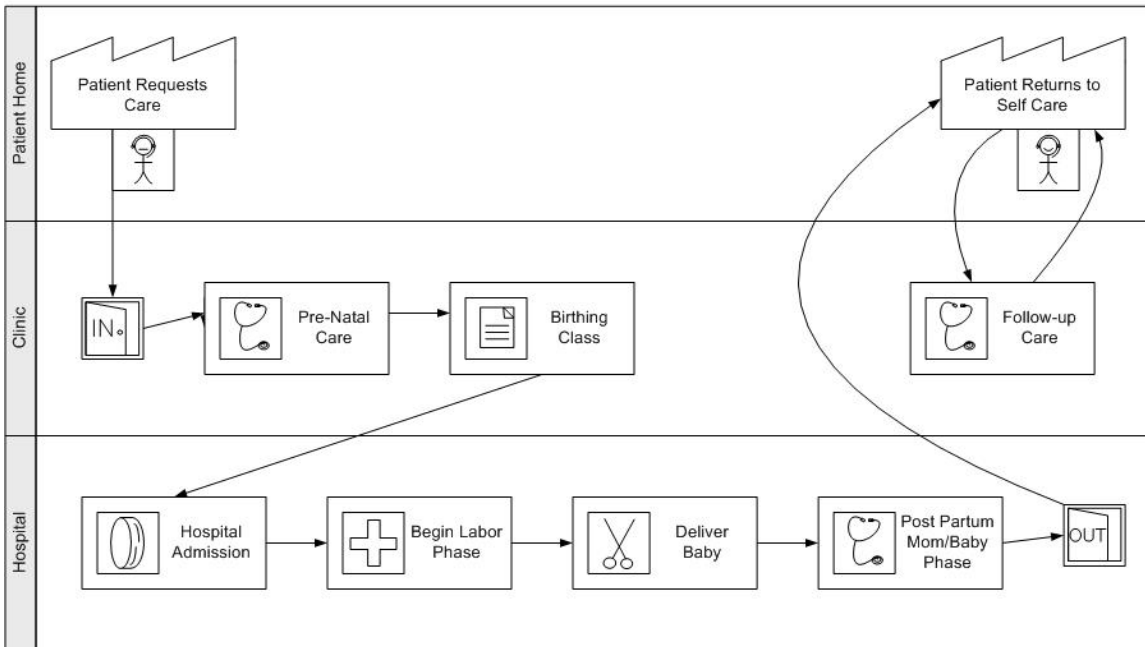
This brings us back to the topic of Lean, mentioned earlier as a means to identify and deliver value for the products and services that customers need or want. **Lean enterprise is best attained in healthcare by applying value stream concepts and improvements to clinical programs and services as defined by the organizations' service lines.** Patients experience the full continuum of care, which may include multiple encounters with multiple providers and facilities for a single condition. Service lines provide a means for planning, controlling, and improving the value stream as experienced by the patient.

As organizations begin to implement service lines, they need to define the families of services that are provided by the service line. Each service family represents a value stream to which Lean methodologies can be applied to improve value to the patient, and to remove non-value adding activities that contribute to poor access, long wait times, poor handoffs, high costs, poor outcomes, and patient safety risks.

Value stream mapping is the Lean tool is used to understand and define how value is provided in the delivery of a product or service. One of the early steps in value stream mapping is to define value in the eyes of the customer. Using tools that gather the information about customer needs and wants helps in translating the information into measurable terms for customer value. These measurable terms are called critical-to-quality requirements (CTQs), and are used to determine the level of value provided and means to compare to customer needs and requirements.

Subsequent steps include drawing a value stream map of how a patient flows through the patient care process. Shown below is an example of the steps that may be shown in the flow of a maternity patient. A complete value stream map would also show key information about each major step in the value stream, the flow of information, and data that distinguish value-adding from non-value adding time.

VALUE STREAM FOR LABOR AND DELIVERY



Below is a more complete list of steps for value stream mapping:

1. Define your product (or service) families
2. Identify customers and customer needs
3. Create a high-level process map (typically a SIPOC – Supplier, Inputs, Process, Outputs, Customer)
4. Create a detailed current state value stream map
5. Define baseline performance of the current state value stream
6. Analyze the current state value stream map to determine opportunities to improve flow and remove non-value adding activities
7. Develop a vision of the future state process with reduced waste and improved flow, and document it in a future state value stream map
8. Create an improvement plan to move the process from the current state to the future state
9. Implement the changes and document standard work
10. Refine the changes and standard work
11. Develop process and outcome measures for future state value stream
12. Put controls in place to sustain the changes

People often ask what the difference is between process maps and value stream maps. Process maps are used to provide a graphical representation of the steps of a process. Process maps focus on “how” we perform our work, whereas value stream maps focus on the patient experience as they flow through the value stream. They both provide useful, but different, pieces of information.

Be wary of the one-size-fits-all solutions that are not adaptable to meeting the specific needs of different product families. Taiichi Ohno, one of the first Lean Sensei’s, stated that you must view your production system as several humble streams instead of one mighty river. The admissions process for a labor and delivery patient needs to be different than the admissions process for an orthopedic surgery patient. However, a standard process or standard work within your humble streams is still required. Within the service lines, each of the services would represent a “humble stream” that can be specifically designed and managed to deliver value to the patients of that service. For instance, within a Heart Service Line, a value stream would be managed to meet the specific needs of CHF patients that are customers of that service line. A different value stream would be managed for AMI patients, also served by a Heart Service Line.

Levels of Flow

Lean concepts can be applied at multiple levels of the organization. Many healthcare organizations are not applying Lean concepts enterprise-wide across their major product families. Instead they are using Lean as a technique to remove non-value added activity from their departmental work processes. Thus, they tend to focus most of their activity on process level improvements with a series of Rapid Improvement Events (RIEs) sometimes referred to as Kaizen Events, involving managers and front staff. While this approach can be effective at gaining some efficiencies in work, more strategic gains can be obtained at a higher level. Senior Leaders and Directors should focus on transforming into a Lean enterprise through fundamentally rethinking how patients, information, and supplies flow through the value stream. This is service level flow. For example, you could improve the batch and queue push referral process from primary care to diagnostic testing to specialist to more diagnostic testing to even more consults – or you could transform into a true multi-specialty group practice where the patient gets all diagnostic testing and consults in one trip and leaves with a diagnosis and treatment plan of care. Application of Lean to enterprise service lines will be the most effective focus for addressing the major healthcare challenges of today.

Service Level Flow

- Focus is on Patient and Information Flow
- Strategic Improvements to Value Stream
- Driven by Senior Leaders

Process Level Flow

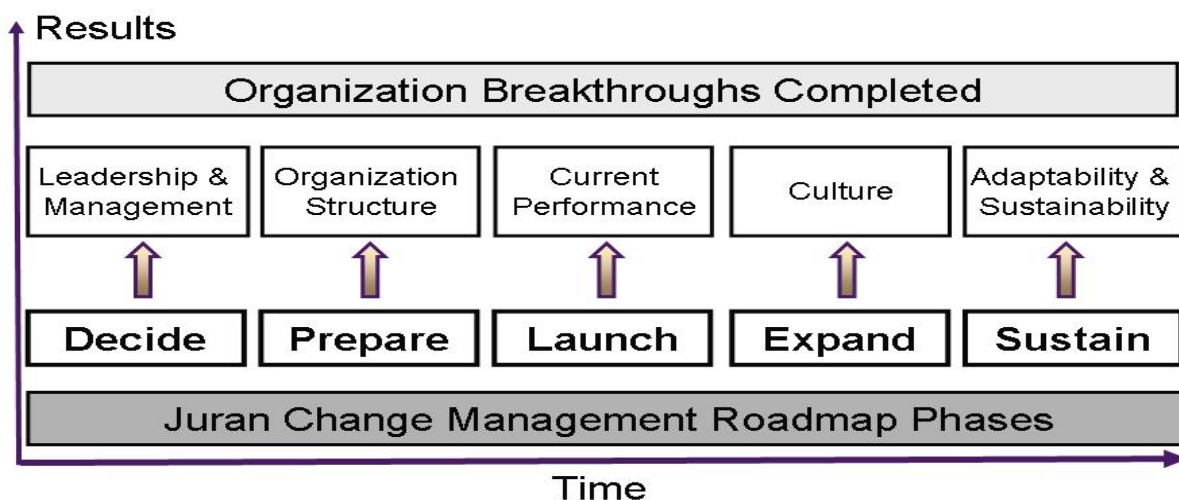
- Focus is on People and Process Flow
- Tactical Improvements to Value Stream
- Driven by Front Line Staff

Roadmap for Getting There

Successful application of Lean to enterprise service lines is a major initiative, and requires a roadmap that will enable the organizational change. A systematic roadmap can bring about positive change, not just technological change in the way work is completed. Completing one improvement project will not change a culture; many projects, continuing over time, that are managed effectively will sustain long-term gains.

The Juran Roadmap has five phases each corresponding to breakthroughs. Each phase is independent, but the beginning and end of each phase are not clearly delineated. Each organization reacts differently to changes. This means that one part of an organization may remain in one phase longer than another. These phases are a managerial guide to change, not a prescription.

The road starts at the Decide Phase. This phase begins when someone on the executive team decides that something must be done because the organization will not meet shareholder expectations or meet its strategic plan, etc. It ends with a clear plan for change.



The Juran Roadmap can be applied to Lean service lines as follows:

Decide – Reaching a point where the service is ready to begin improvement projects

Prepare – Exploring gaps and opportunities for improvement; chartering projects to launch improvement teams

Launch – Executing first wave projects to achieve breakthrough improvements in specific areas of performance

Expand – Continuing to launch and execute improvement projects; exploring more advanced levels of innovation and breakthrough performance

Sustain – Maintaining and adapting standard work across the service line value streams, consistent with forward-looking strategic objectives and vision.

To facilitate the Decide Phase, adopt a set of criteria for service line readiness for Lean improvement activity.

- Service Line leadership and infrastructure in place (all levels)
- Complete organization chart
- Map programs/services to service lines (may include DRGs, ICD 9 codes, etc.)
- Measure performance scorecard metrics
- Document baseline performance for scorecard metrics
- Set service Line annual goals
- Benchmark data
- Collect voice of the customer data

In the Prepare Phase, the activities may be as follows:

a) Define and Prioritize Product Families

Conduct Pareto Analysis by volume for key services and treatment conditions. Key services may be grouped by similar pathways to determine synergistic opportunities in improvement planning. Using this analysis, prioritize the services to begin with.

b) High Level Value Stream Map(s)

Current state value stream maps should be developed for the top priority product families (service groups). These will be high-level value stream maps intended to show the basic flow of the services from a patient perspective.

c) Opportunity Analysis

Detailed data analysis should be conducted to determine opportunities for breakthrough improvement. Use a data-collection plan to guide this activity. Analysis may consider the following:

- (1) Cost variation/gaps
- (2) Non-value added activities
- (3) Customer satisfaction gaps
- (4) Quality/safety performance gaps
- (5) Capacity gaps (looking at future demand)
- (6) Market share gaps
- (7) Alignment gaps (with other SLs and providers)

d) Identify and Prioritize Potential Projects

Opportunities identified in the gap analysis will be converted to potential projects. Projects should be prioritized using a criterion decision matrix.

e) Resource Planning for Potential Projects

The highest ranked projects should be evaluated for resource needs. Consideration should be given for other projects and activities that consume potential project resources. Based upon the prioritization and resource planning, projects will be scheduled for launch.

f) Training

Project Champions and team members will need to be trained to charter and support the improvement projects. There may also be a need for team member and process owner training.

g) Charter Improvement Projects

Improvement projects will be chartered and must include the six elements of a good project charter (problem statement, goal statement, scope, time frame, team resources, business case.) Projects should use systematic improvement methodologies and tools, such as Lean or Six Sigma, to achieve the project objectives. Advanced tools may be used as appropriate such as simulation modeling.

In the Launch Phase, service line improvement projects should be monitored and tracked closely, addressing any barriers that occur in a timely manner. Gate Reviews should be conducted by project Champions at each project phase. As each project is completed and results are attained, leaders can then evaluate lessons learned and expand by launching more projects.

Expansion can take years depending upon the size of the organization and the service line. Note that positive results will occur long before cultural change takes place. Staying in the Expand Phase is not a bad thing.

The final phase is the Sustain Phase which lasts as long as the organization is meeting its strategic and financial goals. Deviations from expected results, possibly because of macro-economic events outside the organization, require a review of the scorecard to determine what has changed. When this is determined, the organization makes the changes, continues, and sustains itself at the current level.

Summary

The challenges in healthcare are daunting and expanding. However, improvement methods which have proven effective in other industries can also be applied to the field of healthcare, enabling breakthrough levels of improved performance. The application of Lean thinking to clinical service lines will advance the level of improvement in bundled patient outcomes and healthcare costs. Organizations that apply a transformation model and roadmap to guide improvement will increase their opportunity for success.

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