Adaptive Technology: The Engine Driving Performance

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No one wants to go to the hospital. As if illness or injury isn't enough, we have to deal with one frustrating experience after another. Long wait times, delays, medical errors and other preventable irritants add up to a distrust and distaste for our community hospitals.

Results from patient satisfaction surveys conducted within the past five years suggest a slow, but steady decline in public trust and confidence in hospitals. The majority of patient satisfaction initiatives are implemented to "clean up" after a patient and their family have been inconvenienced and irritated.

Sadly, it is within this confusion and chaos that delays, mistakes and miscommunication occur. The consequences of these inefficient activities are far-reaching:

- Healthcare costs and utilization are driven up
- Quality and patient outcomes are inconsistent
- Service delivery across the nation is highly variable
- Patient, physician and hospital staff satisfaction is negatively impacted

However, these are merely symptoms of a much larger, systemic problem in our hospitals, one that is driven by three interconnected elements:

- **Lack of coordination:** There is no hospital-wide, interdepartmental coordination within most hospitals. Typically, a hospital is department-centric, acting more like a shopping mall, than a single enterprise.

- **Lack of visibility:** There is no hospital-wide view of where throughput issues are occurring across the hospital in real time. This leads to speculation and opinion instead of fact-based understanding of how to identify and eliminate all throughput issues.

- **Lack of aim:** There is no hospital-wide initiative, also called system aim, to achieve the needed visibility and interdepartmental coordination to improve patient throughput. Plus, there is no senior level executive responsible for its realization.

As Mark Graban pointed out in his 2007 eBook, *How Toyota Can Save Your Life…at the hospital*, "What we hear in the media are isolated, and

sometimes sensationalized, stories of individuals who screw up. What we don't hear about is the systemic nature of these injuries and deaths."

Graban points out that as much as we would like to think of these incidences as the result of incompetent caregivers, errors can occur at any time, in any hospital because of the failure of our existing systems.

The root problem lies in how hospitals move patients through their system. Hospitals essentially operate as a collection of independent departments that compete for the hospital's limited resources: patient beds, wheelchairs, medications, IV pumps and other essential diagnostic and treatment resources. The solutions currently being offered and practiced in most hospitals attempt to treat this systemic problem by repairing its parts.

Unfortunately, today's modern hospital is too complex, with too many simultaneous transactions occurring to effectively sustain process improvements through human effort alone. Yet that's what most hospitals are doing. They are applying state-of-the-art process improvement methodologies, but attempting to sustain improved performance through human effort.

This approach is fraught with problems. Let's explore why.

Peak Performance is Unsustainable without Adaptive Technology

To address the challenges of cost, quality, safety and utilization, hospitals have turned to other industries to study how they have successfully solved similar operational throughput challenges, including: automotive (Toyota), retail (Walmart) and shipping (UPS and FedEx). While these industries have achieved lowered costs, improved quality and decreased variability across their entire enterprise, hospitals have not sustained the same success using identical process improvement tools.

Why? Because hospitals, being dynamic environments like airports, have not utilized technology to interconnect all its processes and adopted a system-wide aim that makes patient flow the primary focus.

When hospitals craft optimized processes that are based on static systems, these processes degrade over time because of the nature of hospitals' dynamic environment. In other words, hospitals attempt to apply linear processes to a non-linear environment, which results in increased human intervention to manage the inevitable discrepancies. It is within this human intervention that unproductive, wasteful activities occur, bottlenecking the system.

Like airport operations, the goal of hospital peak performance is to flow all patients simultaneously at their best possible rates with respect to length of stay, service times, quality, safety and resource consumption. While the healthcare industry has spent a lot of time developing individual patient care paths, the notion of optimizing *simultaneous* patient throughput gets less attention and is inherently more challenging from an operations standpoint.

Quite frankly, seeing and controlling simultaneous throughput is not possible without an adaptive technology. By adaptive technology, we mean one that has three primary capabilities:

- It is flexible enough to allow for and adapt to the evolving best practices of process improvement methodology, instead of forcing breakthrough practices to conform to the technology's capabilities.

- It is capable of steering performance activities toward the organization's overall throughput goal.

- It provides feedback loops in real time that allow for adjustments to be made within the dynamic environment.

Let's return to an airport analogy to illustrate this concept. Airline reservations and schedules do not translate into smooth logistics on any given day because of constantly changing conditions. Airports manage this chaos with adaptive technology in the form of a centralized air traffic control center and connected operational control centers whose algorithms make decisions within these changing conditions.

Most hospitals do not use adaptive technology systems like airports to manage this daily chaos. However, these technologies exist and have been proven to sustain the impact of process improvement methodologies within the dynamic environment of hospitals.

Despite this need for adaptive technology in hospitals, it is important to note that technology alone will not sustain performance. Eliminating wasteful activities and confusion throughout the hospital requires a senior-level commitment toward an attainable goal and the appropriate methodology (i.e. performance improvement practices) to optimize the necessary processes.

Peak Performance Begins with a System-wide Aim

While a simple concept, the power of a system aim to optimize performance cannot be underestimated. Particularly given the gravitational pull of the

department-centric operational bias that characterizes today's healthcare systems.

In department-centric operations, the lack of a system aim leads to disconnected islands of excellence, which impact system flow in three key ways:

1. **Cross-vertical handoffs do not occur seamlessly.** Ideally, the movement of patients from admission to diagnostics, nursing units, treatment and finally through discharge occurs without significant delays. In the department-centric hospital, however, one department's needs are not necessarily compatible with another department's priorities. Consequently, there are vacant beds that could be occupied by revenue-generating patients who are kept waiting somewhere else.

2. **Inputs and outputs are controlled at a departmental, not system, level.** Unless the hospital is on diversion, the usual patient entry points (i.e. admissions and the Emergency Department) have little or no control over their inputs. In other words, they are expected to accommodate all patients who show up. Problems arise when other departments, such as nursing units, limit their inputs, causing a backlog of patients and making it difficult to deliver patient care according to prescribed protocols.

3. **Efficiencies gained in one department do not necessarily contribute to system-wide patient flow.** Frequently when departmental flow is optimized at the department level (i.e. sub-optimized) as opposed to system-wide, poor system throughput performance is the result. For example, if the emergency department boosts its efficiency, but it is not coordinated with a similar endeavor on the nursing units, particularly the critical care units, the number of emergency department boarder patients will increase. This sub-optimization process often occurs to the detriment of the organization's overall throughput.

Eliminating Activities That Waste Time and Resources

The greatest potential for improving hospital performance is in identifying and eliminating wasteful, non-value added activities and use of resources, also known as white space. Waste, or white space, includes activities such as resource overuse, unnecessary transportation, unused inventory, staffing miscommunication, duplication of services and patient waiting.

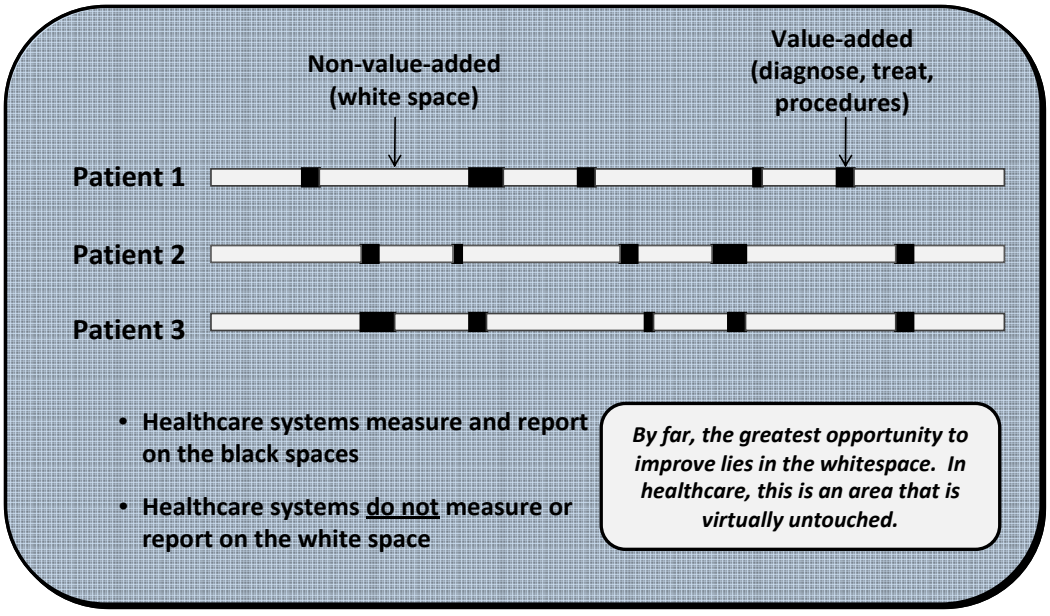
In a hospital, these white space opportunities typically are found where important handoffs and coordination are taking place. They occur when

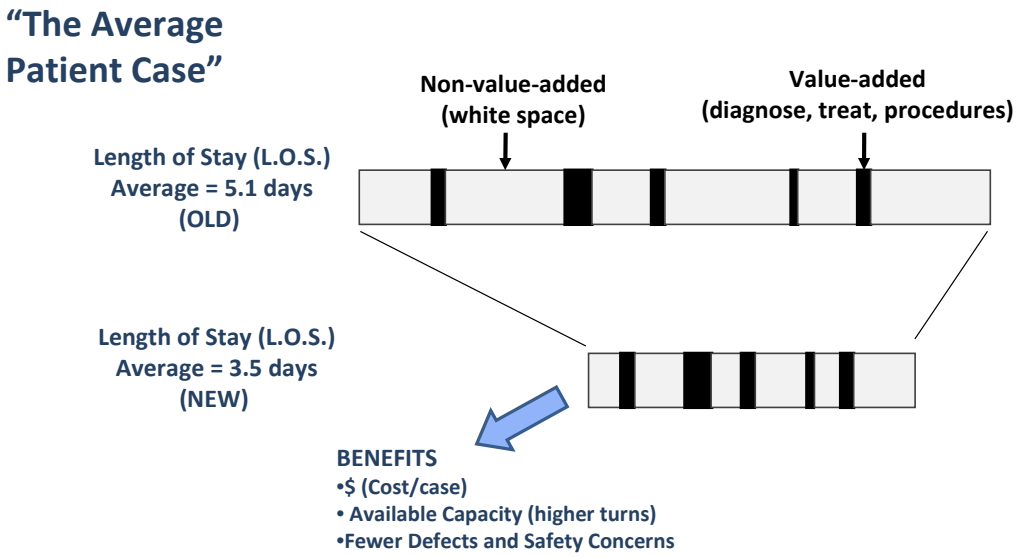
nurses are coordinating diagnostics, procedures and services for patients, but patients are not receiving direct attention and care.

For example, in a unit transfer, a case manager or nurse will call bed management to request a bed. Once a bed is identified, the patient has to be transported to the room. Waste occurs where unnecessary phone calls, voice messages and staff activity are occurring that have nothing to do with caring for the patient or moving the patient through the system.

Adaptive technology provides the organization-wide view of where every patient is, their current status and what remains to be done. It allows hospital managers to identify areas of white space and implement processes to eliminate it. In the case of a transport order in the example above, an adaptive system can assign and notify the nearest transporter responsible for the task.

The diagrams below explain the process of identifying white space, then reducing or eliminating it.





Case Study: Mercy St. Vincent Medical Center

Mercy St. Vincent Medical Center illustrates how a reputable hospital, at the forefront of performance improvement practices, implemented an adaptive system and achieved significant improvements. They demonstrate that methodology alone will not achieve sustainable process improvements. Process improvement methodology requires centralized leadership control, system aim and adaptive technology.

Mercy St. Vincent began with a system-wide operational audit, which mapped their current processes, including wasteful activities. From there, they defined their system-wide throughput goal and realigned their operations to achieve it. Finally, they assessed their system-wide process interconnectivity (and daily chaos) and implemented adaptive technology capable of identifying and solving throughput problems in real time.

Mercy St. Vincent Medical Center, a more than 400-bed teaching hospital in Northern Ohio, is the critical care regional referral center within the Mercy Health Partners (MHP) system. By all external standards, Mercy St. Vincent has been a high performing hospital for many years, winning a top 100 hospital designation, earning a JD Powers & Associates top performer award, and rating equally well on other standards of performance like patient satisfaction scores, regulatory compliance and core measure outcomes.

Like many high achievement hospitals they had already initiated a Lean and Six Sigma department in 2006, a DRG assurance program, employee retention and training programs, a top-ranked patient satisfaction improvement program and a CPOE/EMR system. However, patient

throughput problems persisted, which negatively impacted organizational performance measures.

The downturn in the economy hit the northern Ohio market particularly hard, causing the unemployment rate to climb to 15 percent, and exacerbating the challenges Mercy St. Vincent already faced. As expected, non-pay cases increased and elective procedures dropped.

Mercy St. Vincent's operational audit revealed that it was not functioning as an integrated system. As is typical with hospitals, it was an assemblage of disconnected islands of excellence. That helped explain why many of their previous performance efforts, which had been layered one on top of another, had not yet resulted in breakthrough system-wide performance.

Key findings of the audit included:

- System-wide patient flow lacked leadership and a senior executive who owned it
- There were no clear system-level throughput or capacity-related key performance indicators
- Department level performance improvement efforts were underway, however those efforts did not roll up to a system level
- Competition existed between departments for internal resources
- Responses to patient and resource flow challenges were reactionary

Once the root challenges were understood and prioritized, Mercy St. Vincent's senior team defined a clear system aim for their patient throughput efforts which they called, "Patient first, journey to zero," meaning zero errors, zero defects and zero rework. This new perspective helped them make important changes that they would not have otherwise initiated.

Once Mercy St. Vincent defined their system aim, it became the lens through which they evaluated every current-state flow process, role and function. The realignment of their operation to that particular system aim gave them the framework by which to make trade-off decisions as they selected their future state.

First they launched a centralized care coordination center hub to manage system-wide operations. Second, they moved case management into the forefront of operations and patient flow logistics. Third, they designated Care Coordinators in each operational unit to be closely aligned with the hub. In essence, they adopted a similar hub and spoke model used at airports.

In order to sustain its improvements, Mercy St. Vincent's future state processes were hardwired into their existing system in order to adapt to the dynamic interconnectedness of the daily chaos. Operational analytics from their adaptive system were aligned with critical path milestones and designed to keep Mercy St. Vincent up-to-date on their progress, and to alert them when adjustments were necessary. Mercy St. Vincent realized their patient throughput potential and achieved remarkable results in one year.

Within the first year of initiating this integrated approach and in spite of a depressed economic market, which included a regional unemployment rate of 15 percent, Mercy St. Vincent was able to:

1. Reduce their ALOS by 14.3 percent
2. Lower the direct costs by $8.6 million
3. Increase their admission volume by 11.2 percent
4. Improve quality and safety performance outcomes
5. Achieve total financial impact in one year of $10.3 million

According to the Georgia Institute of Technology's *Health Systems Institute*, who provided a third party validation of these first year results, Mercy St. Vincent will continue to achieve year-to-year improvements of $13 to $17 million as they continue to transform their operations in this fashion.

As the awards and recognition achieved by Mercy St. Vincent prior to beginning their operational transformation demonstrates, many hospitals achieve recognition for comparative performance, and yet still have not reached their full operational potential. As long as hospitals are constrained by the gravitational pull of department-centric operations, benchmarking is flawed and real throughput breakthroughs will remain elusive.

Adaptive Technology: Working on the Business While Working the Business

Throughout Mercy St. Vincent's transformation process, patient flows from admission through discharge were simultaneously evaluated, and new designs were implemented which reflected interconnected flow processes. Major milestones for all critical goal processes were identified and linked to the respective supporting processes, so that Mercy St. Vincent could work on their business, while they were working their business. In preparation for go-live, all ideal patient flow processes were translated into standard operating procedures enabling a comprehensive training program for front-line staff.

The key to eliminating waste and optimizing patient throughput processes is the visibility and control an adaptive technology system offers. By aligning the organization's focus around "Journey to Zero," and building simultaneous patient flow processes on top of an adaptive technology, Mercy St. Vincent was able to transform their operations through the implementation of a hospital operating system developed by StatCom.

To sustain peak performance, operational data and analytics must be readily available to hospital leaders. Three sources of information are available through adaptive technology:

1. Open data base compliant (ODBC) access to raw data for manipulation within tools such as Excel and Crystal Reports
2. Standardized reports
3. Real-time operational dashboards

Operational dashboards can be made available to all of the various operational areas requiring real-time information in support of system flow.

Transforming How Hospitals Achieve Peak Performance

It's time for process initiatives in healthcare to achieve the same level of respect and impact it has afforded other industries. However, like other industries it must be adapted and customized to the unique and ever-changing environment of the hospitals that can benefit from it.

Hospitals are too complicated for human effort alone to sustain improvements. If they continue their current efforts to optimize patient throughput without the foundation of an adaptive technology, they will continue to encounter the same frustrations that currently exist. Staff will burn out and change roles. Improvement gains will continue to degrade over time. Preventable errors will continue to occur. Patients will continue to stay in hospitals too long, driving up the cost of their care.

Could you image an airport that operated solely on radio communications and human-calculated algorithms? Could you imagine NASA launching a rocket relying solely on human intuition and effort?

It's time for hospital operations to be built on the back of adaptive technology instead of human performance alone. As other industry transformations have demonstrated, adaptive technology can become the engine driving sustainable performance over time.

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