

# Fast-Tracking Improvements in Emergency Department Operations with Lean Principles and Practice

**Jody Crane, MD, MBA** Chief Clinical Officer, TeamHealth Emergency Medicine

**Chuck Noon, PhD** X32 of TeamHealth

Lean Healthcare principles have proven to be an invaluable tool for hospitals and health systems seeking innovative approaches to accommodate volume growth, reduce waste, enhance value, and improve overall patient experience.

The key tenets of Lean Healthcare include:

- Focus on processes that create value
- Eliminate waste
- Promote efficient flow
- Continuously improve processes and people

An operations management approach, Lean Healthcare evolves Lean applications from other industries into healthcare processes with the result being an intuitive, complete framework that incorporates toolsets, mindsets, and organizational commitment to a totally Lean operation.<sup>1</sup>

Lean came to life from an intense study of Toyota's success during the past 50 years after implementing an entirely new way of managing auto manufacturing. This customer-centric method focused on processes and skills development for their employees. Lean Healthcare modifies and disseminates Lean applications from other industries (and in some instances, de novo innovations) into healthcare.<sup>2</sup>

More than any other area of healthcare, emergency departments (EDs) have led the way in the adoption of



Lean Healthcare. Ripe with opportunities for process improvement, mid-sized to large EDs struggle with a myriad of issues (e.g., waste, uncontrolled patient arrival time variations, and a wide scope of corresponding service demands) that result in long delays, poor patient flow, poor communication between ED staff and with other departments, process variations, poor space design, and much more. The results are patient dissatisfaction, high numbers of patients who leave without being seen, staff burnout, overutilization of resources, along with work duplication— all leading to increased costs and reduced reimbursement from payers who closely monitor the value received for the dollars they pay.

## CREATING VALUE

To enhance patients' sense of value received, which correlates with satisfaction and improved outcomes, healthcare organizations must know and understand

their patient population. This can be accomplished by identifying patient value streams, defined by similar activities in their care pathways. In the ED, the most general value streams are low, mid, and high acuity patients. Acute ST elevation myocardial infarction (STEMI), stroke and sepsis are other, more specific patient value streams. This segmentation into established classifications enables the creation of care pathways and the standardization of care processes for each patient group or type of patient.

### ELIMINATING WASTE

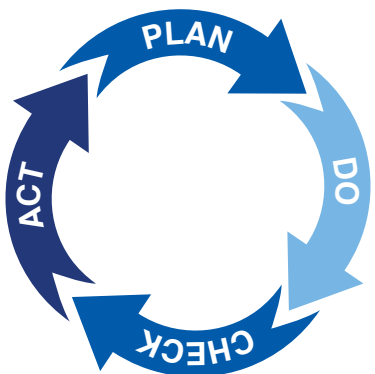
Waste reduction begins with identifying activities that fail to provide value to the patient or that the patient does not want. Lean Healthcare divides “waste” into eight categories: transportation, movement, inventory, waiting, over-processing, overproduction, defects, and human creativity. The health organization strives to eliminate waste by increasing the amount of value-added activity and reducing the amount of non-value-added activity.

### PROMOTING FLOW

Flow management is critical to healthcare organizations that experience high variations in patient arrival and service times. Queuing theory, the mathematical study of waiting lines, is central to Lean Healthcare’s approach to flow improvement. Metrics used in queuing theory include patient arrivals per hour, service rate and related variation, and the manner in which arriving patients are prioritized (also known as “queue discipline”). Queuing theory utilization suggests wait times increase exponentially with increases in variation or server utilization.<sup>3</sup>

### DEVELOPING PEOPLE AND CONTINUOUS IMPROVEMENT

Founded on an endless pursuit of perfection, Lean Healthcare provides a framework of philosophies and corresponding tools that help front-line workers take action to realize their Lean “vision.” Management supports front-line staff’s improvement efforts by removing obstacles and providing needed resources. The Plan-Do-Check-Act (PDCA) serves as a wheel of continuous improvement.<sup>4</sup>



### TEAMHEALTH’S LEAN FLOW WORKSHOP — A RAPID IMPROVEMENT FRAMEWORK

ED staffing and operational improvement have been cornerstones of TeamHealth’s services since 1979. TeamHealth provides stable, high-performing teams of highly qualified physicians and advanced practice clinicians to its hospital clients. The organization delivers critical insight on operations improvement through a Lean workshop that provides on-site, hands-on ED simulations in a rapid improvement framework.

Jody Crane, MD, MBA, TeamHealth’s chief clinical officer for emergency medicine, and Chuck Noon, PhD, consultant for TeamHealth and professor in the Haslam College of Business at the University of Tennessee, originally collaborated to develop a workshop on new proven methods for improving healthcare delivery systems. Built around Lean Healthcare concepts, the workshop was first offered to physician EMBA students at the University of Tennessee and later offered within executive programs in a variety of healthcare settings.

**We have conducted hundreds of workshops with health organizations around the globe, and that experience has taught us that skilled leaders are crucial to facilitating the improvement process. Everyone involved in process improvement needs to recognize that a better performing future state is attainable. Solutions must be properly harvested from those who most truly know the work. Only then can smart implementation occur. To achieve sustainability, it is critical to usher in a culture of adherence for the common good in order to adopt and maintain high-performing processes.**

*-Jody Crane, MD, MBA, Chief Clinical Officer,  
TeamHealth Emergency Medicine*

The Lean Healthcare workshop combines real-world ED scenarios with classroom learning about Lean Healthcare philosophies and tools. The course is highly interactive, and participants work within the Lean Healthcare framework and achieve many “ah-ha” moments through action, brainstorming, and thoughtful analysis.

### LEAN HEALTHCARE CASE STUDY: BAPTIST HEALTH, MONTGOMERY, ALABAMA

A not-for-profit, faith-based, integrated delivery system serving Montgomery and central Alabama, Baptist Health is comprised of three primary acute care hospitals: 454-bed Baptist South, 150-bed Baptist East, and 85-bed Prattville Baptist.

Some of the challenges faced in Baptist Health's EDs included working in silos, inconsistent communication within the ED and across other departments, inefficient processes, and care variation. In collaboration with emergency medicine and hospital medicine leadership, Baptist leadership called in TeamHealth's Lean work team, which was led by Dr. Crane, Dr. Noon, and TeamHealth's Performance and Innovation Consultants (PIC) team. The Lean work team conducted a three-day education and focusing event to improve operations and outcomes and reduce expenses in a rapid improvement environment. Approximately 75 participants consisting of physicians from emergency and hospital medicine, advanced practice clinicians, nurses, med techs, respiratory therapists, imaging techs, admitting and billing representatives, and senior management staff came together for the three-day program. Prior to the event, each participant completed several online courses related to Lean Healthcare concepts.

### DAY 1: SIMULATION PHASE 1 AND EDUCATION

When participants arrived on the first morning of the event, they found two sets of tables arranged in a square, table tents identifying different areas in the ED (e.g., exam rooms, lab, registration, x-ray, supply closets, and other areas) and various colors of scrubs. The group was quickly split into two teams with each team member being assigned a specific role—physician, nurse, lab tech, med tech, x-ray tech, and registration. While participants donned their color-coded scrubs, Drs. Crane and Noon explained the rules for the simulation.

- A sequence of numbered forms represented patients and listed the patient's presenting complaint. The "paper" patient also had designated areas where participants could document the time when each step of the ED patient's journey was completed.
- Key members of the team received timers to keep track of and document completion of their part of the encounter.
- As patients moved to treatment rooms, new patients continued to arrive. When the number of patients in the waiting room exceeded a threshold, any new arriving patients would be considered "left without being seen" and lost from the system.
- A screen at the front of the room displayed a digital time clock.

After the exercise, Drs. Crane and Noon led a discussion about Lean Healthcare and how those methods could improve team performance in future simulations and in the live ED setting. This information reinforced the attendees' education prior to the workshop. Participants generally agreed that both verbal and non-verbal communication is critical to improved performance by alerting staff to patient's current status, the location of supplies, and ensuring that all steps of the encounter have been completed successfully and documented in the patient's chart. Dr. Noon summarized the session with this observation, "Lean Healthcare is about serving a greater volume of patients with improved quality (clinical and patient satisfaction), more satisfied staff, and the same or fewer resources."



With insight gained from the first simulation and new perspectives about Lean Healthcare methods, the two teams each split into four sub-teams to brainstorm action plans for improving performance for Phase 2 of the simulation. Dr. Noon encouraged teams to design a workspace that supported their team's work. He suggested that discussion during the brainstorming session should include all designated areas and clearly defined responsibility assignments for physicians, nurses, technicians, and lab/radiology.

## DAY 2: SIMULATION PHASE 2 AND CONTINUOUS IMPROVEMENT

Day two began with the eight sub-teams appointing one representative to meet with the other sub-team representatives to share their ideas about each component of the simulation and agree upon one approach. Teams A and B then each reconvened to hear the ideas their representatives had agreed upon to improve performance in Phase 2.

**"I think the simulation was very productive. It helped me solidify how things could be done better and how to identify what needs to be done in a prioritized manner. This applies across the ED, from stocking less inventory to better management of patients going through the system."**

*– Nicolas Manzari, Jr., MD, ED physician at Baptist South, Baptist East, and Prattville Baptist*

After a quick lunch, the teams ran through a rapid mini simulation to test their improvement ideas. While each team developed its own unique approach during the second simulation, both teams tackled almost identical issues—setup of the tables and space, better organization around supplies, clear visual cues to indicate when a room was occupied, and the status of the patient in that room. Better delineation of roles and responsibilities resulted in less repetition and greater efficiency.

## PERFORMANCE IMPROVEMENT

Despite being constrained to operate with fewer beds and fewer nursing hours, both teams were able to successfully treat approximately 40% more patients compared to Phase 1. In addition, the amount of staff overtime was reduced and the variation in patient experience was improved. Improvements such as these (whether in a simulation or in the real-world) are possible when Lean tools are skillfully applied with a focus on flow. Both teams reduced average patient length-of-stay significantly, while preserving the same amount of value-added direct patient care. It's also worth noting

that there's a compelling financial benefit when greater throughput is achieved without a commensurate increase in resources. The high-energy day ended with feedback from participants and "high fives" all around.

**"I was hoping this exercise would help get us out of silos and help different service lines and departments work together to achieve our primary goal, which is to care for patients more efficiently. It has been absolutely fantastic. The comradery has been great. People are thinking outside of their own little box. They are being open with others, and I think we are developing deeper trust. We also have significant representation from the C-suite, and this is going to help build trust between the staff, the front line, and the C-suite. The really tough time is coming as we try to sustain this effort."**

*–Vivian Hamlett, MD, system medical director of Integrated Services for TeamHealth*

## DAY 3: REFLECTION AND MOTIVATION

The final day of the workshop focused on reviewing lessons learned, developing best practices for improvement, committing to taking action, and sustaining improvement. Participants split into brainstorming groups according to job category: ED physicians and advanced practice clinicians, hospital medicine physicians and advanced practice clinicians, ED nurses and techs, hospital medicine nurses and techs, senior leadership, and ancillary support services (e.g., registration, lab, x-ray, respiratory, and others).

Each group's task was to identify the most important problems they face every day—things that impair their ability to care for patients and that hinder quality. They were also asked to discuss problems that exist within their department as well as problems that span departments. After the brainstorming group sessions concluded, the entire group came together to hear reports from all areas. Participants then split into individual hospital work groups. They examined the top problems identified in the previous exercise and discussed how they were manifested in their hospitals and work areas. The final session brought the entire group back together again to share what each hospital group had identified and to begin to develop an overall action plan for improvement and incorporated the Lean Healthcare methodologies they had learned over the course of the workshop.

At the end of the morning, Baptist Health's areas of concern for improvement efforts became clearer, and the following "go-forward" actions were identified.

- Focus on ED triage and developing quick orders
- Tackle supply issues including locations, amounts and replenishments
- Strive to standardize work processes
- Streamline handoffs
- Use queuing theory to address flow and staffing issues
- Involve front-line staff in identifying solutions and implementing improvements

## CLOSING COMMENTS

“The workshop provides motivation for improvement, knowledge of how to make it happen, and a shared experience to foster teamwork in achieving profound improvements through a focus on integrated processes that span organizations. Such processes don’t normally improve on their own, and any missing piece can be a showstopper in joint improvement. The fact that TeamHealth motivates their physicians to learn and be active partners in improvement is remarkable.

“We experience the same levels of excitement as the students when we see the team-generated improvements come to life in the simulation. We are especially thrilled when they later bring such improvements to life in the real world. We’re truly invested in this. We plan to continue to stay close to the Baptist Health organization, and we’re committed to helping them succeed. We will carefully follow any initiatives that were generated in the workshop or honed during the focusing sessions conducted on the third day.”

*-Chuck Noon, PhD*

“I came into this having no idea what to expect from it. Over the course of these three days, I have learned so much regarding flow from start to finish. I have also learned how to reduce waste in terms of time, effort, and supplies. Going forward, I hope to work with people in my department as well as the rest of the hospital on improving processes from beginning to end—from the moment the patient enters the building until he or she leaves. What can we do to improve care, improve flow, be more safe and effective, reduce waste, and create a better overall experience for everyone involved?”

*-Josh Kretzschmar, RN, Baptist Medical Center South ED*

**“We have an incredibly collaborative relationship with TeamHealth. We look at this as a partnership that helps us drive all of the things that are important to us, to our patients, and to our communities—which are optimal clinical outcomes. A number of these initiatives that we’ve been focused on during this event are around patient throughput, which to us is not just a measure of efficiency, but truly a patient quality and safety metric. We’ve been extremely impressed with Dr. Crane and Dr. Noon and their team and the talent, the commitment, their communication style, their initiatives and aspirational approach to what we are trying to do. The work now just begins. We have to overcome the inertia of status quo, of going back and getting back into our old routines. We are pushing a large boulder up the hill, and it’s going to take a complete team effort. The key is for us as senior leaders to make sure we communicate the ‘why’ to our front line staff to tie this back to patient-centered care.”**

*– Peter Selman, Chief Executive Officer, Baptist Medical Center South*

If you would like more information, please contact our Business Development team today at **800.818.1498** or [\*\*business\\_development@teamhealth.com\*\*](mailto:business_development@teamhealth.com) for more information.

## Sources

<sup>1</sup>New Directions in Emergency Service Operations and Planning, Journal of Ambulatory Care Management, Vol. 33 No. 4, pp 296-306.

<sup>2</sup>Ibid.

<sup>3</sup>Ibid.

<sup>4</sup>Ibid.



white paper

**TEAMHealth®**

800.818.1498 | [teamhealth.com](http://teamhealth.com)