Ops Series: Lean Six Sigma

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This is the first installment of a two-part series on lean six sigma, a performance improvement methodology that combines two schools of thought: lean and six sigma. Performance improvement (PI) is crucial to operations management in an emergency department (ED), but can be more widely applied. This introductory series aims to provide an overview of the basics of lean six sigma and some PI tools.

What is lean thinking?

Lean thinking is a philosophy that is focused on continuous improvement and eliminating waste. With its roots in the Toyota Production system, lean thinking is traditionally thought of as being a business philosophy, but is also very applicable to health care. In fact, lean thinking has been implemented successfully in EDs worldwide, and studies have shown that using lean methodologies has led to improved efficiency, higher quality patient care, and improved patient satisfaction.

What is waste?

To get lean, one must get rid of waste. Waste, according to lean thinking, is anything and everything that does not add value. Value, in medicine, is determined by our patients, who are seeking the service we provide, which is patient care. Value-added activities affect or change the service in demand. Non-value-added activities, in contrast, do not forward progress towards the ultimate goal. Non-value activities, according to lean thinking, are waste, and should be removed from a process. While completely eradicating waste from any system, including an ED, is impossible, waste can be reduced.

Where is the waste?

Although some wastes can easily be identified, others are less obvious. In traditional lean thinking, there are seven different types of wastes: defects, waiting, inventory, transport, motion, overproduction, and overprocessing. In more recent years, an eighth waste, skill, has been identified. Each type of waste is unique, and each can be found in an ED.

1. Defects – Quite simply, defects are products that do not meet quality standards. To correct defects, additional resources, which can be time, money, personnel, or equipment, are required. In the ED, defects are synonymous with low-quality patient care, and include incorrect diagnoses, iatrogenic injuries, and poor patient satisfaction.
2. Waiting – Waiting is the time that passes while a previous step in a process is being completed, or before the next step in a process has begun. It is typically indicative of flawed design processes. Waiting is perhaps the most common and well-understood waste in an ED. Patients can experience waiting at any point in their care process: arrival, triage, provider evaluation, diagnostic evaluation, treatment, and disposition. But, in addition to patients, providers can wait, too, for results, or other personnel. Furthermore, equipment can also wait, as it sits idle while patients are undergoing other parts of their care.

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3. Inventory – Inventory waste results when supply exceeds demand. While it can seem that excess supply is beneficial, it actually leads to misallocated capital and space, and can contribute to increased damage to necessary inventory and delayed discovery of defects. In the ED, one form of inventory waste is excessive medical supplies, which create crowded supply rooms, overflowing room carts, and jam-packed cabinets, and make it difficult to find necessary equipment in a timely manner. As another example, when more medications are ordered and stocked than used, some expire, and are no longer of use to patients.
4. Transport – Transport waste is unnecessary movement of tools, inventory, equipment, or products. It often reflects poorly designed systems, and can lead to damaged products and increased costs. In an ED setting, excess transport can be seen in medications needing to be moved from one area of the department to another, and in the need to send equipment to other areas of a hospital to be sterilized.
5. Motion – Like transport waste, motion waste is unnecessary movement, but in contrast, motion waste involves unnecessary movement of people. Motion waste results from a disorganized workplace and poor ergonomics. The most common form of waste in the ED is excess walking done by personnel, who must take a circuitous path to complete a task. This can lead to damage to people, aka exhaustion.
6. Overproduction – When a product is produced before it is required, it is considered overproduced. Overproduction leads to high storage costs, hidden defects, and a non-linear process. It can occur in any workflow in which there is a bottleneck, and tends to happen behind a bottleneck step. An example in the ED would be mismatched staffing models. Employing peak staffing during non-peak volume hours is a waste of provider supply.
7. Overprocessing – The most effective processes are those that are linear and able to be done with minimal variation. Processes that have more steps than necessary, or for which there are multiple versions, are overprocessing waste. In the ED, this is very commonly seen in the electronic medical record, in which there are often multiple ways to order the same medication or document the same findings.
8. Skill – This most recently identified waste represents under-utilized talent. Everyone in the ED has a skillset, and if those skills are not optimized, then waste is generated. This waste can be the result of assigning tasks to the wrong people, a lack of teamwork, or a lack of communication.

Each of the different types of waste can be identified using a tool known as a value stream map. A value stream map is a visual display of all steps in a specific process and how they relate to the final product. For each step in the process, time, materials, and information are quantified. Value-added steps are then identified, and value-added time is totaled. The same is done for non-value-added steps and time. Actions can then be taken to reduce waste and increase the percentage of value-added time in each process. As more processes are modified to have higher percent of value-added steps, the ED becomes leaner.

Up Next

In the next issue, look for Part II of this series, which will dive into six sigma, and other tools for continuous improvement. ●

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