A Practical Guide to Applying Lean Tools and Management Principles to Health Care Improvement Projects

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ABSTRACT

Manufacturing organizations have used Lean management principles for years to help eliminate waste, streamline processes, and cut costs. This pragmatic approach to structured problem solving can be applied to health care process improvement projects. Health care leaders can use a step-by-step approach to document processes and then identify problems and opportunities for improvement using a value stream process map. Leaders can help a team identify problems and root causes and consider additional problems associated with methods, materials, manpower, machinery, and the environment by using a cause-and-effect diagram. The team then can organize the problems identified into logical groups and prioritize the groups by impact and difficulty. Leaders must manage action items carefully to instill a sense of accountability in those tasked to complete the work. Finally, the team leaders must ensure that a plan is in place to hold the gains.

A research team headed by James Womack, PhD, at the Massachusetts Institute of Technology International Motor Vehicle Program coined the term “Lean” to describe Toyota’s business processes during the late 1980s. The core idea of Lean is to maximize value for customers while using fewer resources and minimizing waste. A Lean organization focuses its key processes on continuous improvement.

Applying Lean management principles improves workflow by reducing waste-related delays, workarounds, and rework. Lean improvement focuses on increasing value for customers, both internal and external, across the entire value chain as viewed from the customers’
Perspective. Value is enhanced by eliminating waste (ie, any activity that does not add value) in the process; thus, quality, cost, and timeliness of delivered services can be improved and time made available to focus efforts on true value-added activities.

Patients are key external customers to health care organizations. The patient’s value chain begins when the patient enters the surgeon’s office. Internal customers are also important in the process. For example, the OR is an internal customer of the central processing department (CPD) because the CPD is an internal supplier of instruments, supplies, and equipment to the OR. Conversely, the OR is an internal supplier to the CPD when the OR returns bioburden-laden instruments coated with an enzymatic spray to facilitate cleaning. Therefore, departments can be both internal customers and suppliers. Truly Lean organizations strive to supply all customers, both external and internal, with exceptional service.

The core values of Lean management theory include

- respect for people (eg, patients, staff members, managers, physicians),
- continuous improvement (eg, easier, better, faster, cheaper), and
- human development.²

For the Lean approach to work, leaders must create a favorable environment in which problems are recognized as opportunities for improvement. People are not problems, they are problem solvers, and emphasis is placed on finding solutions to problems rather than assigning blame.

Lean principles help perioperative leaders improve processes with a set of management techniques that define how they can identify and reduce waste. A Lean project we called Going to Gemba with the Hip Breakdown Team was conducted at Beth Israel Deaconess Medical Center, Boston, Massachusetts, from January 2009 to July 2010. Gemba is a Japanese word meaning workplace or where the work occurs. Direct observation of the work where it occurs is a key element of Lean problem solving and process improvement. We had the opportunity to improve the OR breakdown process for hip procedures. Inappropriate breakdown procedures were resulting in increased costs, and we realized that we could potentially improve patient, surgeon, and staff satisfaction by addressing such problems as

- lost instrumentation,
- improperly cleaned instruments,
- ineffective use of resources,
- work arounds (eg, immediate-use sterilization),
- sharps hazards, and
- holes in wrappers.

In this article, we provide the steps for conducting a Lean process improvement project, from defining a project through maintaining the gains achieved. Facilitation tools and techniques are provided to help ensure that improvement team meetings are focused and productive.

APPLYING LEAN MANAGEMENT TO HEALTH CARE

Lean management theory has a long history of success in manufacturing. The same Lean principles and tools that are applied in manufacturing plants are directly applicable to the health care setting. The root cause for failures is often the same for manufacturing and health care—breakdowns in communication and misunderstanding the needs of customers.

In reviewing the literature in preparation for our project, we found many articles on using Lean management techniques in health care that gave general descriptions of Lean theories and tools but provided little explanation of how they are applied and at what phase of the improvement project. Few articles described a practical approach for solving complex problems, especially in opportunities that require an interdisciplinary effort. Jargon is often used in these articles, most
commonly Japanese production-line terms such as *jidoka* (ie, the ability to stop production lines in the event of problems such as equipment malfunction or quality issues), *poka-yoke* (ie, mistake proofing), and *hoshin kanri* (ie, a strategic planning process), which adds a layer of confusion rather than enhancing understanding. In our project, we limited the use of Japanese terms (eg, Gemba, kaizen) to minimize confusion, although we did not eliminate them completely.

Dr W. Edwards Deming provided a foundation for Lean management theory in his “14 Points” published in his book *Out of the Crisis* in 1982.³ The points that are most applicable to health care include
- leading the organization (ie, not just supervising people),
- driving out fear,
- breaking down barriers between departments, and
- transforming the organization, which is everyone’s job, not just that of managers.

Lean theory is rooted in the scientific method and the Plan-Do-Check-Act (PDCA) cycle,⁴ originally developed by Walter A. Shewhart, a Bell Laboratories scientist who was Deming’s friend and mentor. The PDCA cycle is a four-step model for carrying out change:
- Plan—recognize an opportunity, plan a change, and estimate the impact of the planned change.
- Do—test the change; carry out a small-scale study.
- Check—review the test results and identify what you have learned.
- Act—take action based on what is learned in the study; if the change did not work, repeat the cycle with a different plan; if the change is successful, incorporate what is learned from the test into the work process used in the area.

The PDCA cycle is repeated over and over to continuously improve a process.

Lean thinking helps define both what has to be done to solve a problem and how work is performed. Lean approaches help managers recognize and reduce the waste in processes. Wastes are activities that add no value from a customer perspective, including
- Waiting—waiting for the next event to occur or next work activity
- Motion—unnecessary movement by employees in the system
- Transportation—unnecessary movement of the product in a system (patient, specimens, materials)
- Defects—time spent doing something incorrectly, inspecting for errors, or correcting errors
- Overprocessing—doing work that is not valued by the customer or caused by definitions of quality that are not aligned with patient needs
- Overproduction—doing more than what is needed by the customer or doing it sooner than needed.⁵

Understanding waste is critical to improvement because wastes add cost but add no value; they are typically viewed to be “part of the way we work here.” Building awareness in team members that much of their routine work is actually “waste” from a customer perspective can be motivating, because wasteful activities are often activities staff members already struggle with every day but rarely have the ability to change. Reducing waste in a process increases the capacity to do more value-adding work, such as providing patient care.

When drafting the project charter, henceforth referred to as the scope statement, involving individuals who have knowledge of the problem or opportunity and also have a stake in its solution helps ensure that there is a clear understanding of all aspects of the issue. These individuals also can add suggested approaches to the scope statement, which can help the team get off to a brisk and successful start rather than wasting time at the first few
meetings identifying what the first steps of the project should be.

Getting the right team members involved is critical to success. Department managers involved with drafting the scope statement can quickly identify those who have the knowledge and experience necessary to solve the problem. Gaining approval from supervisors to permit their staff members to serve on the team is facilitated by having managers participate in developing the scope statement.

After brainstorming to identify all problems and possible solutions, the improvement team implements corrective actions and responds according to the results. As defined in the PDCA cycle, the results attained after corrective actions are implemented may not be what were originally anticipated. “Checking” the results often leads to additional corrective actions to achieve desired outcomes. Lean theory is focused on achieving process perfection over time, not necessarily on the first attempt. Lean improvements are intended to make a process better but not perfect. There is nothing wrong with an initial failed attempt as long as team members learn from their failures and adjust accordingly.

Very few problems exist that are too complex for a team of the right individuals to solve when the team uses structured problem-solving techniques and has strong management support. Lean is not “another job” to be performed in addition to normal work; it is the way people work. Lean is about making the right work easier to do. Deciding when to use Lean principles and tools is not always easy, however, and there is no one approach to solving all problems.

**THE IMPROVEMENT TEAM PROCESS**

Every team needs a sponsor, a leader, and a facilitator. If the team encounters roadblocks that prevent progress, the sponsor is responsible for removing those roadblocks. The sponsor is the go-to person if the team cannot move forward.

The team leader is responsible for keeping the team focused and productive and ultimately is responsible for the success of the project. If additional resources are needed, the leader obtains them. If team members do not volunteer to complete tasks, the leader assigns the work. The leader is also responsible for reporting progress to those charged with managing and supporting the Lean process in the organization. The leader is focused on strategy and resources and deals with questions such as

- What should the team do next?
- Who can help us with this part of the project?

The facilitator is concerned with how the team works and ensuring that progress is made at each team meeting. Using the right tool or technique at the right time is part of the facilitator’s responsibility. Table 1 describes some key facilitation techniques that help improvement teams stay focused and productive.

A dictatorial leader can deflate morale so that members want to abandon the project; a good leader energizes the team. Likewise, the team can flounder when the facilitator does not arm team members with the right tool at the appropriate time. The leader and facilitator work as a team sharing in strategic planning from one meeting to the next. For example, on the Surgical Hip Kit Breakdown Process Team, the leader and facilitator met before one meeting and developed a plan to ask the team whether every instrument in a pan of instruments was needed. The team subsequently decided to create a subteam to review the contents of the instrument pans (ie, hip kits). The subteam ultimately removed 14 lb of unnecessary instruments from a hip kit. By doing so, we reduced an ergonomic hazard and decreased unnecessary work and related expenses in the CPD and the OR.

Having a standard problem-solving process is essential. This process includes eight steps:
1. defining the scope statement,
2. identifying the current process and associated problems using a value stream process map,
3. transferring the identified problems to a cause-and-effect diagram,
4. organizing the problems into logical groupings in an affinity diagram,
5. prioritizing problems in an impact difficulty grid,
6. managing action items with an activity scorecard,
7. monitoring progress of key action items during implementation, and
8. putting a plan in place to hold the gains and spread the learning after project goals have been accomplished and the team has been disbanded.

Scope Statement
Any project can fail if the goal is not clearly defined, understood, and accepted. Step 1 of the improvement process requires that the management team clearly define the details of the project with measurable and challenging yet achievable goals. A scope statement (Figure 1) that contains a clear definition of the problem to be solved and the measurable goals to be achieved is essential. Whenever possible, the voice of the patient should be an element of the project. The way in which this document is drafted can strongly influence the success or failure of a team’s project. The scope statement should not be developed by one individual. This could be considered “cubical engineering”—one person attempts to define and resolve a problem in isolation with no input from the people involved. The scope statement should be drafted by those who

- have key knowledge of the problem/opportunity,
- are supervisors or department managers of the likely project team members, and
- have a stake in solving the problem.

Key elements of the scope statement include the following:
- background justification;
- quantifiable goals;
- a target completion date;
- suggested approach;
- membership including the sponsor, leader, facilitator, core members who are expected
**Scope Statement**

<table>
<thead>
<tr>
<th>Problem/opportunity:</th>
<th>Project name: Surgical Hip Kit Breakdown Process</th>
<th>Subject:</th>
<th>Project lead(s):</th>
</tr>
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The OR hip breakdown process is inefficient, has inappropriate breakdown procedures that increase costs, all of which needs to be improved. This potentially could improve patient, surgeon and staff satisfaction. Problems that will be addressed include:

- lost instrumentation,
- improperly cleaned instrumentation,
- ineffective use of resources,
- work-arounds (e.g., use of flash sterilization),
- sharps hazards, and
- holes in wrappers.

Leveraging past work, this will concentrate on the hip breakdown process.

**Goals:**

1. Develop a standardized template for hip procedure breakdown.
2. Decrease elapsed procedure breakdown time (i.e., patient out to next patient in) from the existing average of 55 to 58 minutes to 45 minutes.
3. Develop a process to manage sharps.
4. Develop competency skills checklists (e.g., central processing department [CPD] and OR breakdown processes).
5. Review and update surgeon preference lists.
6. Transfer knowledge gained to other procedures so that an additional procedure can be performed each day (i.e., shorter duration procedures).

**Objectives:**

Project Completion: Jan 31, 2010

**Metrics:**

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<th>Metric</th>
<th>Baseline</th>
<th>Goal</th>
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<tbody>
<tr>
<td>Sharps data</td>
<td>2 in 2009</td>
<td>0</td>
<td>100</td>
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<tr>
<td>Turnover time</td>
<td>56.5 minutes</td>
<td>45 minutes</td>
<td>20</td>
</tr>
<tr>
<td>Q1 flash sterilization</td>
<td>45</td>
<td>0</td>
<td>0%</td>
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<tr>
<td>Frequency of misplaced instruments (tray separation)</td>
<td>TBD</td>
<td>TBD</td>
<td>TBD</td>
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<tr>
<td>Case delays</td>
<td>70 delays</td>
<td>35 delays</td>
<td>50% reduction in delays</td>
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**Team**

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<th>Department</th>
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<tr>
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<td>Surgery</td>
</tr>
<tr>
<td>Director, Perioperative Services</td>
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<td>Patient Care Services</td>
</tr>
<tr>
<td>Nurse manager</td>
<td></td>
<td>Operating Rooms</td>
</tr>
<tr>
<td>Project director, Perioperative Services</td>
<td></td>
<td>Patient Care Services</td>
</tr>
<tr>
<td>RN, clinical advisor—team leader</td>
<td></td>
<td>Nursing</td>
</tr>
<tr>
<td>Core technologist, CPD east</td>
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<td>CPD</td>
</tr>
<tr>
<td>Anesthesia</td>
<td></td>
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<tr>
<td>RN, unit based educator</td>
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<tr>
<td>2nd shift supervisor, CPD east</td>
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<td>CPD</td>
</tr>
<tr>
<td>RN</td>
<td></td>
<td>Nursing</td>
</tr>
<tr>
<td>RN, clinical advisor – east</td>
<td></td>
<td>Nursing</td>
</tr>
<tr>
<td>Senior management engineer—team facilitator</td>
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<td>Business Transformation</td>
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<tr>
<td>Surgical technologist IV</td>
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<td>Nursing</td>
</tr>
<tr>
<td>Attendant</td>
<td></td>
<td>Nursing</td>
</tr>
</tbody>
</table>

**Prepared by:**

<table>
<thead>
<tr>
<th>Date:</th>
<th>Approved by:</th>
<th>Date Revised:</th>
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</thead>
<tbody>
<tr>
<td>09/25/09</td>
<td></td>
<td>04/06/10</td>
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</table>

Figure 1. An example of a scope statement—a document that management team members (i.e., those with key knowledge of the problem or opportunity) and the supervisors of likely team members create before the project is launched to provide justification for the project, goals to be accomplished, a target completion date, metrics, team membership, and simplified process flow.
to attend every team meeting, extended
members who are brought onto the team as
needed; and
- macro-flow, which is a simplified, process-
flow diagram of the current state, typically
consisting of about six steps.6

The macro-flow provides an overview of the
process on which the team will be working. This
overview is particularly helpful for those
who do not have a deep knowledge of the pro-
cess needing improvement. Although we did
not include a macro-flow in the scope statement
for this particular project, typically it is a stan-
dard element of a scope statement.

Lean improvement projects are not just per-
formed by a select few “champions” in the or-
ganization, but rather by those who do the work
every day. For example, members of the team
to reduce turnaround time between total hip
replacements at Beth Israel Deaconess Medical
Center included
- anesthetists;
- a perioperative associate chief nurse;
- attendants (ie, orderlies who assist with OR
turnover);
- the CPD second-shift supervisor;
- CPD technicians,
- the OR clinical advisor (ie, a service line
leader or coordinator who has oversight for
the day-to-day operations of specific service
lines);
- the clinical manager of scheduling
operations;
- clinical nurses from the OR, preoperative
holding area, and postanesthesia care unit;
- a management engineer who guides the team
to use Lean thinking and structured problem-
solving tools;
- an OR educator;
- the perioperative project director;
- surgeons; and
- a surgical technologist.

Value Stream Process Map
Step 2 requires that improvement team members
prepare a detailed, process-flow diagram. Team
members must come to agreement in identifying
and then becoming familiar with all steps in the
process (Figure 2). There were a total of 66 pro-
cess steps in the value stream process map for our
project. The first step begins with “Patient sees
his/her doctor” and the last step is “Anesthesia
technologist places the suction liner into canister
on wall, leaves the OR, and washes hands.”

While listing each process step, the leader posts
problems and opportunities for improvement next
to the associated steps. The following are exam-
pies of a problem and an opportunity for im-
provement we identified while listing process
steps.
- Process step #32: Central processing depart-
ment personnel pick instruments and disposable
supplies one day before the scheduled
procedure.
- Problem: Loaner instrument and supply
kits are not always sterile and ready to use.
- Process step #52: Anesthesia professional and
circulating nurse wheel the patient out of the
OR.
- Opportunity for improvement: Call atten-
dant in sooner to assist with patient trans-
fer and to be available for turnover.

Cause-and-Effect Diagram
During step 3, improvement team members trans-
fer all problems identified while preparing the
value stream process map to a cause-and-effect
diagram template to help identify the root causes
of the problems (Figure 3). The question posed
on the cause-and-effect diagram is “What are the
issues or root causes that contribute to the prob-
lem being solved or the opportunity for improve-
ment?” Team members place each problem next
to the appropriate rib. Standard categories include
- methods,
- materials,
- manpower,
32. CPD personnel pick instruments and disposable supplies approximately 1 day before the scheduled procedure.

33. Postanesthesia care unit (PACU) clinical advisor writes the time when beds are needed for the entire day for all patients and all ORs.

34. Holding area nurse checks all paperwork for accuracy, availability, and completeness.

35. PACU orderly checks with resource nurse or unit coordinator to find out which rooms patients will go into and takes beds to the assigned ORs for each patient.

36. Anesthesia professional completes the preoperative form and the anesthesia consent form.

37. Anesthesia professional places IV and other invasive lines.

38. Anesthesia professional performs pain block (50% of patients receive a pain block for postoperative pain control); femoral blocks are just for knees.

Figure 2. An excerpt from a value stream process map—a few key steps of the much larger, comprehensive process-flow diagram. Note problems (ie, shaded annotations) that team members identified while creating the value stream process map.
Figure 2. Continued

39. Anesthesia professional in holding area waits for room readiness.

40. Anesthesia professional transports the patient from the holding area to the OR.

42. Anesthesia professional prepares equipment for the procedure.

41. On the day of surgery, circulating nurse checks all of the equipment on the 1st time primary hip procedure cart—typically, no problems are encountered with primary hip procedures; problems are usually confined to revision hip procedures.

43. Circulating nurse and surgical technologist prepare the room for the procedure and ensure that there are not any roadblocks.

44. Surgeon closes the incision.

45. Scrub person puts the instruments back into the pans.

The check box signifies that all equipment is available for the procedure. It is not a room readiness checkbox. When the timing of the check is delayed, patient flow is interrupted.

Induction of anesthesia complete; surgeon should be present but sometimes is not, so circulating nurse must page to locate surgeon, which causes a delay.

PACU workflow for providing beds and oxygen holders and cylinders is not always coordinated with OR needs, which can cause a delay.

Instrument availability can be affected if booking information is not communicated to the OR clinical advisor; resources may not be keeping up with demand.
Team members can add ribs with different names, if appropriate. Then team members stand back and ask, “What problems did we miss listing when we created the value stream process map?” Normally, team members identify additional problems, some of which may be very significant. The next step is to amend the value stream process map. For instance, in our project, after we transferred the problems to the cause-and-effect diagram we identified the problem of bed availability or, specifically, the lack thereof.

### Affinity Diagram

Step 4 involves organizing the problems into logical groupings in an affinity diagram (Figure 4). This
- reduces the number of problems to manageable groups and helps define root causes;
- eliminates redundancy in problems identified during the preparation of the value stream process map;
- ensures that solutions developed will address a broad scope of related problems; and
- helps identify a few strategic themes for problem resolution so the team is not trying to address many individual problems or symptoms. The themes in our project included the following:
  - instruments availability,
  - attendant availability,
  - holding area size,
  - scheduling mishaps,
  - machinery availability and function, and
  - other (eg, delay in a patient emerging from anesthesia can delay room breakdown).

### Impact Difficulty Grid

During step 5, team members prioritize problems based on
- the impact that solving the problem group will have on meeting the team goals and
- the difficulty of implementing solutions to resolve the problem group (Figure 5).

The outcome of this step helps the team decide which group of problems should be addressed initially to achieve the greatest improvement with minimal effort. In our project, the impact/
difficulty analysis indicated that we should start developing solutions for issues related to instruments to make rapid and meaningful progress toward meeting the team’s goals. Resolution of instrument problems was achieved quickly with minimal effort. Early wins help maintain a high level of energy and team morale. Another problem, reviewing and updating preference lists, also was solved quickly, which helped keep the team motivated. Maintaining enthusiasm for the project is necessary because complex projects may require several months to complete.

**Activity Scorecard**

Step 6 involves managing action items by clearly defining all corrective actions using the activity scorecard (Figure 6). This scorecard is updated at each weekly team meeting. Key elements of each line item include the
- task name,
- issue addressed,
- next activity,
- priority relative to other action items (ie, everything cannot be “high”),
- responsible individual,
- target completion date, and
- current status.

This tool drives progress at each team meeting. The leader ensures that the matrix is visible to the team members by using a document camera or overhead projector when adding or updating action items. Doing so helps avoid confusion when defining the planned work. Making this “contract” visible during

**Figure 4.** An affinity diagram in which grouping seemingly disparate problems into logical groups helps the team manage the many problems and opportunities for improvement identified and develop corrective actions. This is a simplified diagram in which only one problem/opportunity for improvement is shown for each category; in reality, there were multiple problems in each category.

**Figure 5.** An impact difficulty grid used to prioritize the groups of problems identified in the affinity diagram according to the impact on goal attainment and difficulty to solve.
team meetings instills a sense of accountability for those tasked with completing work. This sets the tone to ensure that work happens.

**Implementation Plan**

Step 7 is the implementation plan for corrective actions to resolve the identified problems (Figure 7). This tool serves as a timeline for key action items. It provides a high-level view of key tasks and also aids in creating a sense of accountability by highlighting sluggish response to planned work. For example, a key task in our implementation plan was the need to develop and implement a loaner instrument policy.

**Holding the Gains and Spreading the Learning**

A key step when nearing completion of any improvement project is planning actions that will sustain the gains that the team has achieved. All too often, realized improvements are lost when the project closes and team members are disbanded because no plan was put in place to embed the improvements in the way work is performed.

Key metrics should be established as part of the project, and someone or a group should be assigned to regularly review the metrics. That way action can be taken when the improvements slip outside the desired parameters. Turnover time was the most important key metric for our project. Performing regular audits sets the stage for entrenching the improvement. It might be necessary to augment the existing responsibilities of an individual or create new ones to maintain the achieved gains. When new employees join the organization, they should receive training on the new and improved process. Updating position descriptions, policies,
and standard operating procedures helps ensure that the improvements live on, as will making supervisors responsible for maintaining and improving these processes.

**KAIZEN EVENTS**

Many people equate Lean implementation with rapid-movement kaizen events, which typically are two to three all-day meetings to make rapid progress on one or more tasks. In our project, a kaizen event might have been used for reviewing and modifying preference lists, which did not necessarily show where to find supplies in the OR. Time was often wasted searching for supplies, especially for someone filling in for a regular employee.

For this project, the team needed to review the content of preference lists, update them as necessary, and add storage locations. However, using a kaizen event for this and other tasks would have required that employees be pulled away from their normal job functions for an extended period of time, which management leaders did not approve. Therefore, the team selected a mixed approach in which team members met in small subgroups between the regular weekly team meetings to accomplish tasks. Updating the preference lists took several weeks to complete. Team members used the regular weekly team meetings as strategy sessions to check on the progress of tasks and decide the next steps. Team members were more comfortable with this model of making steady progress over the course of the project rather than holding kaizen rapid-improvement events.

**CONCLUSION**

Many process improvement projects in a health care setting can benefit from the structured Lean approach, which has been successfully applied to many other Beth Israel Deaconess Medical Center...
Ambulatory Takeaways

Applying Lean Management Principles in an Ambulatory Surgery Center

The basic principles of Lean management are applicable to all facilities where surgical and other invasive procedures are performed. These tools and techniques can be applied in ambulatory surgery centers (ASCs) in a more simplified but equally effective manner.

The internal and external customers of an ASC are similar to those of an acute care facility, but often the stakeholders have different motivations because of an ASC’s organizational structure, ownership, and customer base. For example, in a traditional facility, the surgeon is a provider, whereas in an ASC, the surgeon also may be an owner or investor in the ASC as a business. In an ASC, the patient’s value chain begins when the patient enters the surgeon’s office, which is especially true when physician-owned ASCs are contiguous with the professional medical offices.

For ASCs, Lean processes can be used to monitor quality indicators as a result of regulatory requirements or quality indicators that the ASC governing board has selected to document efforts and outcomes (eg, patient satisfaction, infection prevention). Waste and redundancy are high priorities for all perioperative departments, but in a physician-owned ASC, there is an additional incentive to use Lean processes to find cost savings. Reimbursement for ASCs is a flat, procedure-based, fixed amount. Therefore, any additional high-cost items (eg, implants, medications, newly released products) must be evaluated in a thorough multidisciplinary manner as described in the Lean process. On the other hand, acute care, inpatient perioperative services are reimbursed based on time-related (ie, minute) charges for the OR, anesthesia services, and direct costs of supplies with approved markup beyond cost. In hospital-based outpatient departments, reimbursement is also procedure based, but ASCs only receive 65% of hospital-based outpatient rates.

As in all facilities, miscommunication is often the root cause of failures. Because there are fewer staff members in an ASC, it is imperative to evaluate the workflow and patient care rendered using a Lean process so that staff members who are very familiar with one another do not develop unsafe or inefficient workarounds. It is important to use the Lean process when implementing regulatory compliance processes, such as mistake-proofing activities (eg, time out, read back and verifying verbal orders, no passing zones). In an ASC, the processes and tools may not be as complex as in the acute care counterparts but can be equally effective in quality improvement.

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projects. Positive results from our project included the following:

- A standardized hip procedure breakdown process was developed and implemented.
- Room turnover time was decreased by 10 minutes.
- A process for safely managing sharps was developed and implemented.
- All hip preference lists and pick tickets were updated.
- The basic hip kit was standardized and its weight was reduced by 14 lb.
- A loaner instrument policy was developed and implemented.
- The role to manage loaner instrumentation was developed and implemented.
- One-piece flow in assembly of kits in the CPD was developed and implemented.
- The number of surgeon-specific kits was reduced.
- The use of an enzymatic cleaning solution to pretreat contaminated instrumentation was implemented throughout the hospital.
- A red-tag tracking process for kits sent to the CPD was implemented.

We also learned valuable lessons, such as having all involved disciplines and key stakeholders participate in the project. This allowed everyone to gain an understanding and an appreciation of each other’s role in caring for this patient population. It also gave everyone an understanding of Lean management in action. In addition, when you bring together the people who do the work and arm them with a structured problem-solving methodology, there is no limit to what they can accomplish.

The Lean approach is simple and straightforward. Using cross-functional teams guided by Lean principles and tools to solve complex problems in a health care setting allowed employees, patients, and the organization all to benefit. Employees, who for years have tried unsuccessfully to influence positive change through the manager/employee relationship, now have the opportunity to offer their thoughts and good suggestions in an open, friendly, and structured environment where their input is valued and acted upon. The organization benefits by tapping into a rich reservoir of talent and experience to solve its most challenging problems.

References

Resources
Dennis P. Getting the Right Things Done. Cambridge, MA: Lean Enterprise Institute, Inc; 2006.


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A Practical Guide to Applying Lean Tools and Management Principles to Health Care Improvement Projects

PURPOSE/GOAL

To educate perioperative nurses about how to apply principles of Lean management to health care improvement projects.

OBJECTIVES

1. Describe how Lean improvement focuses on understanding the customer.
2. Discuss how Lean management principles can be applied to health care.
3. Explain how Lean management principles are used to improve quality.
4. Differentiate between the Lean management leadership roles in a quality improvement project.
5. Identify key Lean management tools.

The Examination and Learner Evaluation are printed here for your convenience. To receive continuing education credit, you must complete the Examination and Learner Evaluation online at http://www.aorn.org/CE.

QUESTIONS

1. Direct observation of the work where it occurs, which is a key element of Lean problem solving and process improvement, is described by the Japanese term
   a. kaizen.
   b. jidoka.
   c. gemba.
   d. hoshin kanri.

2. The root cause for failures, including breakdowns in communication and misunderstanding the needs of customers, are often the same for manufacturing and health care.
   a. true
   b. false

3. Wastes are activities that add no value from a customer perspective; these include
   1. time spent inspecting for and correcting defects.
   2. unnecessary movement by employees.
   3. overprocessing and overproduction.
   4. unnecessary transportation of equipment or supplies.
      a. 1 and 3
      b. 2 and 4
      c. 1, 2, and 3
      d. 1, 2, 3, and 4

4. Involving individuals who have knowledge of the problem when drafting the project charter or scope statement
   1. helps ensure that there is a clear understanding of all aspects of the issue.
   2. helps in identifying the first steps of the project.
3. is advantageous because they have a stake in its solution.
   a. 1 and 2  
   b. 1 and 3  
   c. 2 and 3  
   d. 1, 2, and 3

5. Lean theory is focused on achieving process perfection immediately after implementation.
   a. true  
   b. false

6. The ____________ is concerned with how the team works and ensuring that progress is made at each team meeting.
   a. facilitator  
   b. project manager  
   c. sponsor  
   d. team leader

7. A scope statement
   1. clearly defines the details of the project.  
   2. contains a clear definition of the problem to be solved.  
   3. identifies measurable goals.  
   4. includes the voice of the patient if possible.  
   5. is developed by one individual from the management team.
   a. 1 and 2  
   b. 2, 3, and 5  
   c. 1, 2, 3, and 4  
   d. 1, 2, 3, 4, and 5

8. Organizing the identified problems into logical groupings is done using a/an
   a. scope statement.  
   b. impact difficulty grid.  
   c. affinity diagram.  
   d. cause-and-effect diagram.

9. Managing action items by clearly defining all corrective actions is done with the use of a/an
   a. implementation plan.  
   b. activity scorecard.  
   c. value stream process map.  
   d. impact difficulty grid.

10. Rapid-movement kaizen events
    1. are two to three all-day meetings to make rapid progress on one or more tasks.  
    2. require that employees be pulled away from their normal job functions for a period of time.  
    3. are accomplished using small subgroups that meet between the regular weekly team meetings to accomplish tasks.
    a. 1 and 2  
    b. 1 and 3  
    c. 2 and 3  
    d. 1, 2, and 3

The behavioral objectives and examination for this program were prepared by Rebecca Holm, MSN, RN, CNOR, clinical editor, with consultation from Susan Bakewell, MS, RN-BC, director, Perioperative Education. Ms Holm and Ms Bakewell have no declared affiliations that could be perceived as potential conflicts of interest in the publication of this article.
This evaluation is used to determine the extent to which this continuing education program met your learning needs. Rate the items as described below.

**OBJECTIVES**

To what extent were the following objectives of this continuing education program achieved?

1. Describe how Lean improvement focuses on understanding the customer.
   - Low 1  2  3  4  5  High

2. Discuss how Lean management principles can be applied to health care.
   - Low 1  2  3  4  5  High

3. Explain how Lean management principles are used to improve quality.
   - Low 1  2  3  4  5  High

4. Differentiate between the Lean management leadership roles in a quality improvement project.
   - Low 1  2  3  4  5  High

5. Identify key Lean management tools.
   - Low 1  2  3  4  5  High

**CONTENT**

6. To what extent did this article increase your knowledge of the subject matter?
   - Low 1  2  3  4  5  High

7. To what extent were your individual objectives met?
   - Low 1  2  3  4  5  High

8. Will you be able to use the information from this article in your work setting? 1. Yes  2. No

9. Will you change your practice as a result of reading this article? (If yes, answer question #9A. If no, answer question #9B.)

9A. How will you change your practice? (Select all that apply)

   1. I will provide education to my team regarding why change is needed.
   2. I will work with management to change/implement a policy and procedure.
   3. I will plan an informational meeting with physicians to seek their input and acceptance of the need for change.
   4. I will implement change and evaluate the effect of the change at regular intervals until the change is incorporated as best practice.

9B. If you will not change your practice as a result of reading this article, why? (Select all that apply)

   1. The content of the article is not relevant to my practice.
   2. I do not have enough time to teach others about the purpose of the needed change.
   3. I do not have management support to make a change.

10. Our accrediting body requires that we verify the time you needed to complete the 3.6 continuing education contact hour (216-minute) program: _