Healthcare organizations are becoming more competitive as they center strategies around maintaining and expanding their patient populations while struggling to achieve a profitable bottom line. Progressive leaders are realizing it is critical to focus on the patient experience. Many are looking to Lean Six Sigma’s basic concepts and tools to guide them in improving their patient-related core processes.

*Why Lean?* Lean targets the elimination of waste while improving process flow to achieve speed and agility at lower cost. *Why Six Sigma?* Six Sigma’s DMAIC (Define, Measure, Analyze, Improve, and Control) process improvement methodology is a proven effective, systematic approach to problem solving. *Why combine Lean and Six Sigma?* When the speed and common sense of Lean is combined with Six Sigma’s organized approach (Figure 1), rapid change occurs within 30 to 90 days.

![Figure 1: DMAIC Approach](Image)
The first step is to **define** the opportunity for improvement. This is where many improvement initiatives fail. Organizations commonly choose processes that may frustrate patients. It is important to seek patient feedback; potential patient input sources are formal satisfaction surveys, “how are we doing?” cards given during each encounter, or the informal neighborhood conversation with someone who knows where you work and is sharing an experience that makes you cringe.

One organization took patient complaints about its imaging registration seriously and decided to focus on the process from the time of physician order to the time of bill payment. When this imaging service **measured** the time it took a patient to complete the process, it was shocked at the findings: (1) significant process time variation from the point of physician order to patient exam that ranged from hours to many days, (2) each site within the healthcare system had different processes, with registration identified as the main source of dissatisfaction, and (3) some patients had to visit two different imaging sites to complete all the requested procedures, therefore experiencing two different processes. One comment the system received seemed to sum up the patient experience when compared to a local freestanding imaging center competitor: “Coming here is an ‘afternoon event’ compared to [Competitor A]’s ‘over the lunch hour’ type of experience!”

To measure and **analyze** its imaging process, the organization employed a common Lean tool known as a value stream map (VSM). A VSM starts with a basic process map and expands on it by assessing each process step or activity to determine whether it is value-added or waste. Lean defines value as the worth of a product as judged by the patient (customer). For an activity to be determined as value-added, the following elements must be present:

1. The activity meets the needs of a customer,
2. The activity changes the product/service, and
3. The activity is not rework.

If these three statements are not true for the process step under evaluation, the probability is high that it is “waste” and an opportunity for elimination or improvement. Some activities may not add value but are essential, such as those required by law or regulation; these tasks are called “value enabling.”

The VSM in Figure 2 (see next page) shows the state of the above mentioned organization’s imaging patient experience at the beginning of the process improvement project. The gold colored boxes on the map indicate steps that represented possible waste or non-value-added activities to be addressed.
Figure 2: Current State Imaging Patient Process Flow

<table>
<thead>
<tr>
<th>Imaging Patient Process Flow (Current State)</th>
<th>KEY:</th>
<th>Process Step</th>
<th>Decision</th>
<th>Re-work, additional work, (checking)</th>
<th>Process Delay</th>
<th>Patient Transport</th>
</tr>
</thead>
</table>

### Scheduling
- Clinician orders procedure
  - Clinician office staff (80%) or patient (10%) contacts Scheduling
  - Clinician faxes orders to Imaging (<10%)
  - Urgent?
    - Search Census Books for each site and room for 1st available
    - Patient is scheduled in Census Books based on desired location, recording verbal orders
    - Screening Memmo?
    - Patient is instructed to contact Pre-Registration

### Pre-Registration
- Patient contacts Pre-Registration
- Patient Pre-Registered in Star, verbal information provided (50+ questions)
- Procedure specific questions?
  - Patient asked procedure specific questions
  - Patient instructed Imaging will contact with prep information
  - Pre-Registered?
    - CoPay?
      - Patient waits in waiting room for procedure
      - Transfer Patient to Changing Room or Procedure Room

### Imaging Reception
- Imaging contacts patient with procedure prep instructions
  - Patient reports to Imaging
  - Clinician orders collected and reviewed
  - Orders available & complete?
    - Resolve issue(s) with Radiologist, Tech or contact Clinician
    - Prep-Registered?
      - CoPay?
        - Patient waits in waiting room for procedure
        - Transfer Patient to Changing Room or Procedure Room

### Registration
- Patient Registered
  - Paperwork Signed & Insurance Card Copied
  - CoPay?
    - Patient either escorted to Imaging or returns to waiting room
  - Collect Copay

### Technical Procedure
- Patient in changing room or procedure room
  - Tech enters order in Census
  - Procedure performed
  - Radiologist Reviews
  - Additional work needed?
    - Patient Available?
      - Imaging contacts patient, schedules procedure
      - Patient instructed to contact Pre-Registration

### Billing
- Patient bill drops within 4 days of service
  - Billing Complete
    - Patient sent “Do Not Pay” invoice within 10 days of service
      - Friendly reminders sent periodically depending on Payor: from 14 (Medicare) to 60 (Commercial) days
      - Did Insurance pay?
        - 100%?
          - Patient balance billed
            - Did Patient pay?
              - Patient account transferred to collections

Prepared by Chi Solutions, Inc.
Another common quality tool used in Lean to discover the “pain points” in a process is a cause and effect diagram, known as a fishbone analysis. The head of the fish is the effect being analyzed, which in Figure 3 below is “Unsatisfactory Patient Experience.” Through brainstorming the potential causes, the bones of the fish are identified and grouped in six common categories: management, process, people, materials, equipment, and environment. In some processes, it may make sense to combine some of the categories.

Figure 3: Fishbone Analysis

A spaghetti diagram is another Lean tool often employed during the analyze phase of the Six Sigma DMAIC process improvement methodology approach. This type of diagram illustrates the physical flow of a person, product, or information as it moves through multiple steps in a process. The benefit is to identify workflow inefficiencies and provide a method of modeling potential improvements before making major (or minor) process changes. Figure 4 is an example of how quickly this visual tool is able to pinpoint sources of patient dissatisfaction and common sense solutions.

Findings: Primary “pain points” were process-related.
The final step in the analyze phase that leads into the implementation phase is to determine what the ideal or future state process should look like. This is accomplished by going back to the original value stream map and determining what non-value-added steps or waste can be eliminated and what possible solutions need to be implemented. As Figure 5 on the next page illustrates, this exercise can result in major process efficiency improvements when compared to the original process (see Figure 2). At times, not all waste can be removed right away, but over time, much of it can be addressed.
Figure 5: Future State Imaging Patient Process Flow

Future State Imaging Patient Process Flow

**KEY:**
- Process Step
- Decision
- Re-work, additional work, (checking)
- Process Delay
- Patient Transport

Prepared by Chi Solutions, Inc.

**Scheduling & Pre-Registration**
- Clinician orders procedure
- Patient is scheduled in Cerner (90%) or patient (10%) contacts Scheduling
- Patient asked procedure specific questions
- Patient instructed to report to Hospital Registration or OutPatient Imaging Department
- Clinician faxes orders to Imaging (<10%)

**Imaging Reception & Registration**
- Orders available & complete?
- Pre-Registered?
- Patient waits in waiting room for procedure
- Transfer Patient to Changing Room or Procedure Room
- Patient reports to Imaging
- Clinician orders collected and reviewed
- Paperwork signed, insurance card copied
- Collect CoPay
- Resolve issue(s) with Radiologist, Techs or contact Clinician
- Patient Registered
- Patient in changing room (procedure room)
- Tech enters order in Cerner
- Procedure performed
- Radiologist Reviews
- Additional work needed?
- Patient Available?
- Imaging contacts patient, schedules procedure
- Patient Report Released
- Patient bill drops within 4 days of service
- Billing Info Complete?
- Bill Patient or Insurance
- Payment received?
- Balance Bill Patient?
- Patient balance billed
- Did Patient pay?
- Patient account transferred to collections
- Patient Account Complete
- Contact Clinician
- Contact Patient
The reason for applying a systematic approach to process improvement is to assure any action taken is of highest value to the patient (customer). When a process is properly defined, measured, and analyzed, the solutions to be implemented generally become very obvious. One comment from a Lean Six Sigma team member sums it up nicely: “The solutions are just common sense; why did we not think of this a long time ago?”

If multiple solutions are identified for implementation, the development of a formal implementation plan to guide and monitor progress is needed. Figure 6 offers an example of a simple spreadsheet format with the key components an effective plan would include.

Figure 6: Implementation Plan

Basic project management components:
- Action steps to be taken
- Assigned accountabilities
- Timeline tracked
- ROI tracked
- Progress report

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“Common sense is not necessarily common practice.”
–Benjamin Franklin

After solutions have been implemented, it is essential that ongoing monitoring of performance occur in order to assure control is maintained. Change can be met with resistance from employees until they realize the new process is much better than the old one—this may take time. Depending on the solutions, control strategies may range from daily tracking of patient wait times with a monthly roll-up to monthly compilation of patient satisfaction feedback. The process performance metric utilized during the project to measure improvement should be included in the department’s ongoing Quality Report if it had not already been monitored.

Once success has been achieved, it is crucial to take time and celebrate! Publicly recognizing the efforts of the team not only energizes the participants, it also creates positive momentum that engages others to tackle the next improvement initiative.

For more information, please call us at (800) 860-5454 or visit www.chisolutionsinc.com.