

# Improving the Patient Experience in Breast Imaging by Using Lean Principles to Reduce Waste and Errors

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## Background

Radiology's Division of Breast Imaging and Intervention started a Lean journey empowering staff to improve patient experience. Our team's efforts focused on reducing wait time for screening mammogram patients. 63% of a screening mammogram patient's 39 minute lead time was waiting/waste (Figure 1).

## Objectives

Decrease the average screening mammogram patient's total lead time from 39 minutes to 29 minutes by 12/31/2015. Additional goals included reducing hand-offs, eliminating batching, improving communication via visual management, decreasing paperwork stacking errors, and improving patient satisfaction.

## Methods

- A multi-disciplinary team developed a value stream map (VSM) illustrated in Figure 2 to analyze the screening mammogram practice which averages 150 patients per day.
- Using Lean principles, potential improvements were tested from August-November 2015.
- The spaghetti chart in Figure 3 shows waste related to walking, waiting and hand-offs. The previous workflow involved a clinical assistant or CA (blue lines) batching patients (purple lines) from the lobby to the subwait, having patients use changing booths, sit and wait in subwait chairs and finally being escorted to the mammogram room by a technologist (green lines).
- To get to our future state as shown in the VSM (Figure 5), we performed a total of 9 Plan-Do-Study-Act (PDSA) cycles.
- Initial PDSAs involved a single mock patient, a single room and one technologist and then the team progressed through additional PDSAs involving multiple technologists and additional rooms for hours, one day and then a complete week of exams.
- Some of the significant improvements are shown in Figure 4 (over 50% less waiting) and Figure 5 (focused improvement bursts).
- As the spaghetti chart in Figure 6 shows, the new streamlined workflow uses a technologist (green) to escort an individual patient (purple) directly from the lobby to the mammogram room to change and have their exam. While certain rooms require a minimal amount of additional technologist walking, the CA and patient walk less and the patient waits less in the improved process.
- The completion/implementation worksheet illustrated in Figure 7 is an example of the PDSA documentation for each cycle.

## Figure 7

**PDSA – "Small Test of Change" Worksheet**

**Test Aim/Goal: COMPLETION OF SCREENING MAMMOGRAM - Subwaitless practice**

Overall Objective: To decrease patient wait and exam time here in Breast Imaging from 39 to 29 minutes by 12/31/2015.  
 Background/Baseline: Patients spent an average of 39 minutes here for their mammogram.

**PLAN - Describe the intervention. What do you want to learn?**  
 Who (involved, leading, data collection): CA, Technologists, FAs  
 What (measures): The patient wait time (lead time) in Breast Imaging  
 Where (location/area): Gonda 2 Breast Imaging  
 When (start and stop): December 7, 2015  
 How (methods, description of test): See previous PDSA documents for details summaries  
 Prediction (hypothesis): We have significantly decreased wait/lead time for screening mammogram patients

**DO - Carry out the change and collect data!**  
 PDSA 1 Mock patient LMW, BXX, Royce timer: 13 minutes from check in to check out including exam. Pt changed in the room Rm H  
 PDSA 2 Mock patient LMW, BXX, Royce timer: 14:05 total time. Patient changed in booth. Room H.  
 PDSA 3 3 scheduled patients, LMW tech, Royce timer: 10 min, 11:15 min, and 11:05 min. total time respectively. Room H  
 PDSA 4 2 scheduled patients, BXX tech, Royce timer: 14:15 and 14:40 total time respectively. Room H.  
 PDSA 5 Several techs participated for this trial. Each tech did 2 or 3 patients for a total of 14 patients, 5 dates; Birgit, Lyn, and Royce were timers depending on the day. Exams took between 14 and 25 minutes to complete. Room H or I  
 PDSA 6 All scheduled patients between 8-10 a.m., 5 imaging rooms and the techs that staffed them. Royce to pull timing data from PCIL. Lead time (overall time) 24 minutes.  
 PDSA 7 All scheduled screening patients. Pt. lead time was 28.3 minutes  
 PDSA 8 All day 7-5. All scheduled screening patients. Pt. lead time was 28.3 minutes  
 PDSA 9 One week, all scheduled screening patients. Patients continued to really like the new work flow, the technologists had concerns regarding the additional walking. Royce printed data/ graphs for the week.

**STUDY - What were the results, analyze data. What did we observe, conclude, or learn?**  
 After 9 testing cycles, and analyzing all the data, the wait/lead time is now significantly less.  
 The patients benefit from this lower lead time and are extremely satisfied with this new workflow.  
 Current lead time for patients is 26.1. A great improvement from 39 minutes!  
 Note: Due to concerns from the technologists related to the waste of motion, a new testing cycle of change has been started. We plan to test different scenarios that may decrease the daily technologist walking, with the goal to decrease staff fatigue and increase staff satisfaction.

**ACT - What are the objectives and modification of the next small test?**  
 This is the conclusion of the PDSA for screening mammograms!  
 We concluded that patient satisfaction improved greatly and lead time decreased significantly by going to a subwaitless practice. Starting 12/7/2015 we will move to doing screening mammograms in this workflow.

Figure 1

### Waiting vs. Exam (baseline)

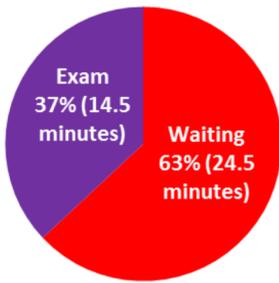


Figure 2

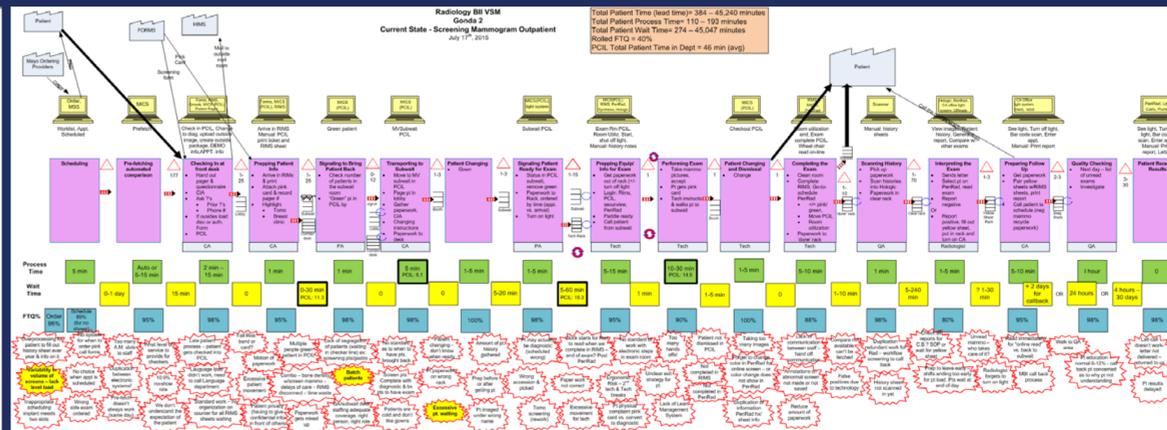


Figure 3

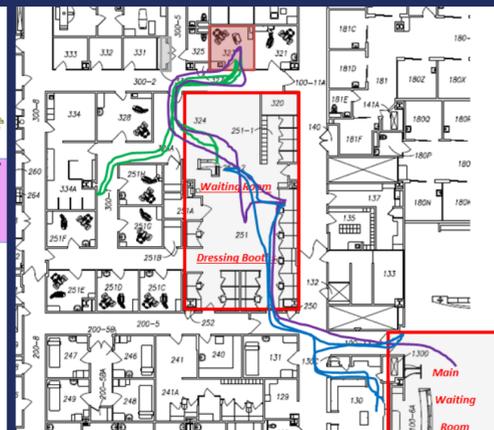


Figure 4

### Waiting vs. Exam (post implementation)

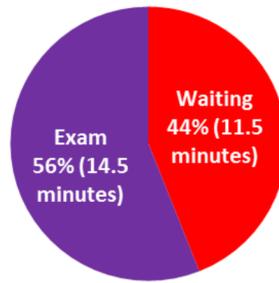


Figure 5

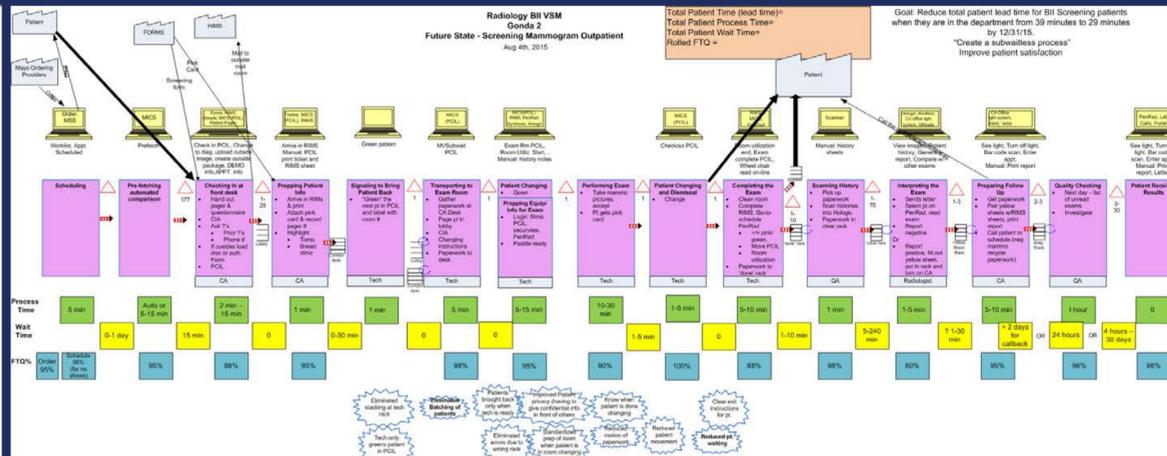


Figure 6

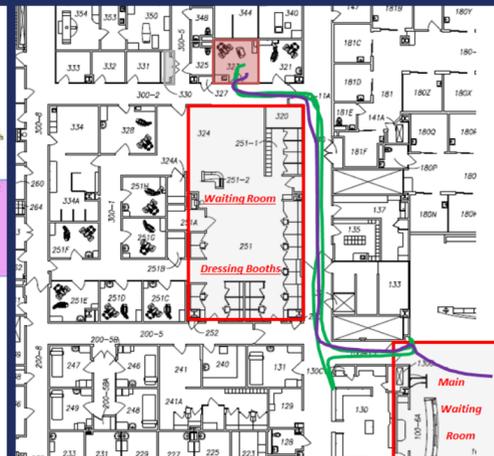
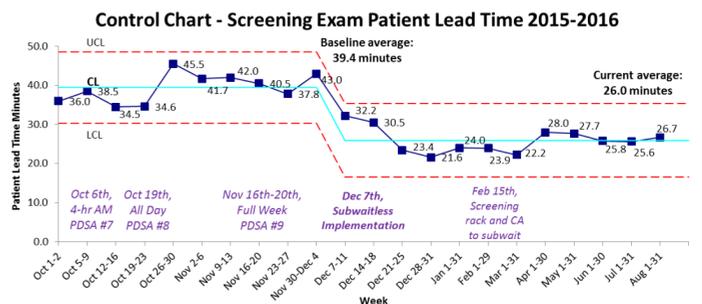


Figure 8



## Conclusions

By utilizing Lean methodology in our screening mammogram practice, patient experience has improved while waste and errors have been significantly reduced.