Utilizing Value Stream Mapping to Reduce Patient Lead Time in Bone Densitometry

Laura Tibor (English), MBA, BEng; T Valley, BS, MA, CNMT; C Berg; T Callahan; D Enright; J Kindseth; D Krisik; B Lehnertz; B Mullan, MD; L Nesberg; W Oswald, CNMT; M Rank, CNMT; J Stock, RT

Department of Radiology, Mayo Clinic, Rochester, MN

Objectives

The project goal was to reduce the Bone Densitometry patient's total lead time from check-in to completion by at least 10% from 94.4 minutes in September of 2013 to 84.9 minutes or less prior to December 31, 2013.

Key:

BMD = Bone Mineral Densitometry

DOB = Date of Birth

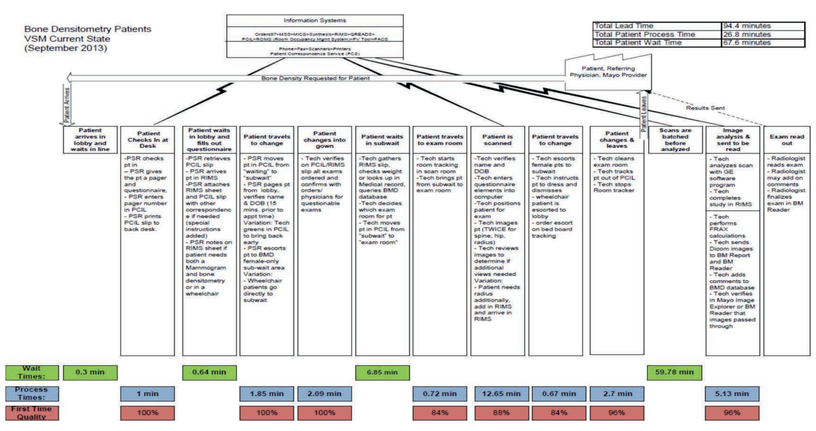
PSR = Front desk staff

Methods / Tools

DMAIC framework

- **Define:**
  - Project charter
  - Stakeholder analysis
  - Value Stream Map (VSM)
- **Measure:**
  - Data collection sheet
- **Analyze:**
  - Pareto chart
- **Improve:**
  - Plan, Do, Study, Act (PDSA)
  - Value Stream Map (VSM)
- **Control:**
  - Run chart
  - Control plan
  - Transition plan

Define: Current State Value Stream Map



Measure

The baseline measurement for the Bone Densitometry patients lead time was 94.4 minutes. Lead time was defined from when the patient checked-in (timestamp in PCIL) through study completion (timestamp in RIMS). The baseline data came from all patients completed between 9/12/2013 and 9/30/2013 which was approximately 750 patients.

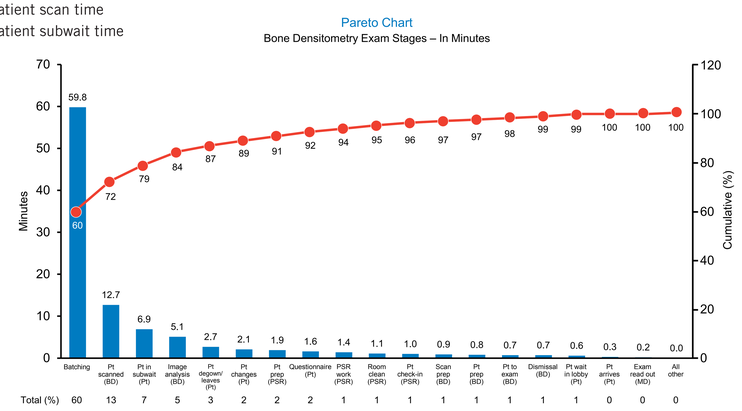
The team utilized the current state VSM to breakdown the total lead time into process and wait times. Tools used to collect the data:

- PCIL = Patient Check-in Locator System (used for patient tracking)
- RIMS = Radiology Information Management System (RIS)
- Manual timings and observation

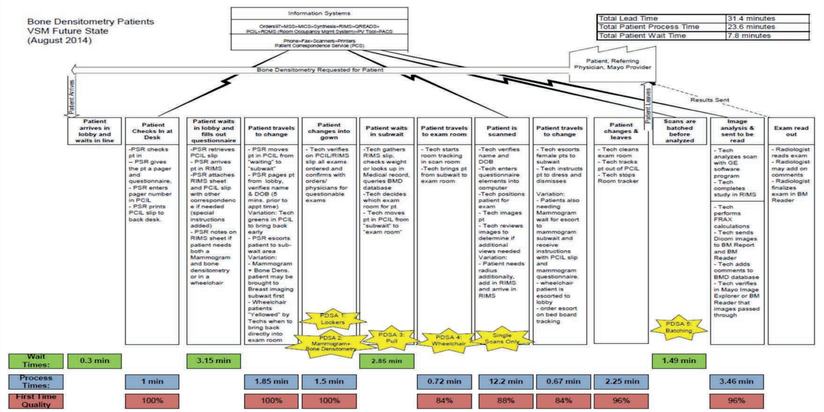
Analyze

A Pareto chart was utilized to determine which steps in the process would have the greatest impact in reducing the total lead time.

- Batching before analysis
- Patient scan time
- Patient subwait time

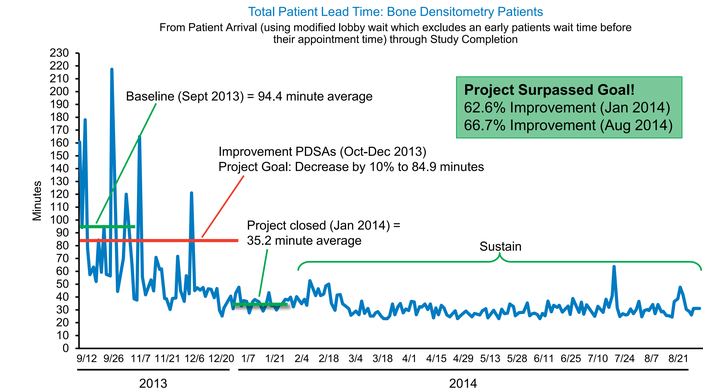


Improve: Future State Value Stream Map



Control

Bone Densitometry leadership performs monthly checks to maintain success. Improvement post project: Leadership reviewed historical data and concluded that the duplicate scans on spine and hip studies were unnecessary (March 2014).



Improve

5 PDSA cycles were utilized. For each cycle, the team reviewed the data and outcomes to decide whether the change would be implemented or modified before testing the cycle again.

1. Eliminate use of lockers in the changing room to reduce gowning time by having the patients lock belongings in changing booth.
2. Have all patients needing both a Mammogram and Bone Densitometry change in Breast Imaging dressing booth and leave belongings there before waiting in the Bone Densitometry subwait area.
3. Front desk staff will bring patients back 5 minutes prior to their scheduled exam. If a patient arrives early and can be brought back earlier, Bone Densitometry techs will use a "yellow" highlight in PCIL to inform the front desk staff to bring that patient back.
4. Bone Densitometry techs will highlight in "yellow" when they want the front desk staff to bring wheelchair patients back for their scan.
5. Eliminate the practice of holding exams overnight for analysis the following day (batching).

PDSA 1: Lockers

PDSA 2: Mammo. +BMD

PDSA 3: Pull

PDSA 4: Wheelchair

PDSA 5: Batching

Conclusion

Several minor changes had a significant impact on the total lead time for patients. Staff have shared that the new process has improved their workflow throughout the course of the day.

Since the closure of this project, the team has sustained the changes for several months and further decreased the total patient lead time by an additional 4 minutes to an average of 31 minutes.

Lessons Learned:

- Brief morning huddles were key to testing successful process changes
- Small changes can have a big impact on other stakeholders
- PDSA cycles need to be short
- Don't jump to solutions at the beginning of the project