Methods:

An interdepartmental improvement team was assembled with members from the radiology department, the division of emergency medicine, and the James M. Anderson Center for Health Systems Excellence.

The team first determined the goal and defined the metric for TAT. An interdepartmental improvement team was assembled with members from the radiology department, the radiologist’s reading workflow as well as a modified real-time measure of how well the department is making up a large percentage of the ED census.

Methods of analysis:

• Statistical process control

- Obtained TAT values for every ED radiographic study
- per 24-hour calendar-day
- The percent of ED radiographs with a TAT of 35 minutes or less was calculated for each day and plotted on a p-chart.
- X-bar and s-bar charts were used to measure the change in the variability of the TAT for ED radiographs.
- In order to measure if the changes in radiology had an effect on patient flow in the ED, the time from when the ED staff first met with the patient to the time a final treatment decision was made (“doc to disposition” time) was measured and charted on a bar chart.
- Statistical significance for all process control charts was determined with the accepted rules for identifying special cause variation.

- Two-tailed t-test for independent variables to compare means
- Wilcoxon rank sum to compare medians
- Two-sample t-test to compare percentages.

Results:

- Baseline

  - 80 days between July 1, 2011, and September 19, 2011
  - 8,602 ED radiographs performed
  - Mean TAT was 23.9 minutes
  - Median TAT was 15 minutes
  - 7,073 or 82.2% of all ED radiographs were read with a TAT of 35 minutes or less
  - Standard deviation for TAT was 22.8 minutes

- After implementation

  - 89 days between October 17, 2011, and January 13, 2012
  - 8,913 ED radiographs performed
  - Mean TAT improved to 14.6 minutes (p<0.01)
  - Median TAT improved to 10 minutes (p<0.01)
  - 8,283 or 92.9% (p<0.01) of all ED radiographs were read with a TAT of 35 minutes or less (Fig 3)
  - Standard deviation for TAT was 12.7 minutes (Fig 4)

- Additional benefits

  - Daily TAT reports helped to identify reading practices that negatively affected TAT (Fig 5)
  - Balance measures

  - Percentage of studies read by trainees
    - Baseline: 62%
    - After intervention: 59.9%
  - TAT for non-ED Radiographs
    - Baseline: 65 minutes
    - After intervention: 64 minutes (p<0.01)
  - TAT for all imaging studies
    - Baseline: 102 minutes
    - After intervention: 79 minutes (p<0.01)
  - Effect on ED Doc to disposition time
    - Baseline: 98.7 minutes
    - After intervention: 79.8 minutes

Conclusion:

- As the departmental TAT fell under 25 minutes, further movement was shown to data that the mean TAT was excellent.

- In order to continue to improve the TAT, technological interventions are not enough.

- In the past, we have improved the TAT through workflow design, reading room enhancements, and standardizing/structured reporting.

- In order to continue to improve, we worked to decrease provider variability.

- We were successful in decreasing the average TAT for ED radiographs as well as the variability, as manifested by:

  - Decrease in mean TAT from 23.8 to 14.6 minutes
  - Increase in the percentage of ED radiographs with a TAT of within 35 minutes from 62.2% to 92.9%
  - Decrease in the standard deviation for TAT from 22.8 to 12.7 minutes

- The improvements in radiology TAT had a direct effect on the overall ED patient experience

- Decrease in ED Doc to disposition time from 81.7 to 79.8 minutes

- Overall improvements accomplished through increased transparency, feedback, and individual coaching in a setting where workflow and electronic systems had already been redesigned to optimize TAT.