



Reduction in Turnaround Times for STAT Exams in Body Imaging

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Overview

- The Department of Diagnostic and Interventional Imaging at Memorial Hermann-TMC provides 24 hour coverage by staff and residents.
- Overnight efforts are concentrated on Emergency Department patients, but preliminary reports may be posted on any exam as soon as it becomes available on PACS.
- Transcribed reports, i.e. those that have been reviewed or dictated by the attending radiologists, may be available subsequently.
- Similar to other institutions, the current standard for STAT radiology exams is the availability of a finalized report within four hours of the order.



Problem Statement

- At the time of our project, turnaround times (TAT) significantly exceeded that standard.
- Exam report TAT were also highly variable, which added to the perception of exam delays.
- Extended wait times for exam results frustrate ordering physicians and prolong decisions regarding treatment plans.
- Reasons for delay and variability in finalized report availability include variable coverage during the day, exam interpretation by resident and significant overutilization of the STAT priority (~40-50% of exams), among others.



Goals

- Decrease the “order to transcribed” TAT of body imaging STAT exams (CR, CT, US) to a median of 4 hrs. and significantly decrease process variation within six months.

- Improve customer satisfaction
 - Primary customer: Ordering provider
 - Secondary customer: Patient

- Use effort as model and expand scope from body imaging CR, CT and US TAT to TAT across the entire Department.

- Institute of Medicine Aims: Timely and Efficient



Project Alignment

- Institutional goal: providing better care for the community.
 - Operational Excellence
 - Provide extended coverage
 - Prioritize STAT exams
 - Customer Safety
 - Rapid report time improves patient care

- Business goals
 - Decrease TAT to provide for more expedient, efficient and efficacious treatment, improving patient flow.
 - Decrease indiscriminate STAT orders to decrease overutilization and waste.



Team Members

- Eduardo Matta, MD
- Logan Boatman, MD
- Bill Shepherd, MS
- Kathy Masters, MS, RD – Six Sigma Black Belt
- Staff and Residents in Body Imaging at Memorial Hermann-TMC



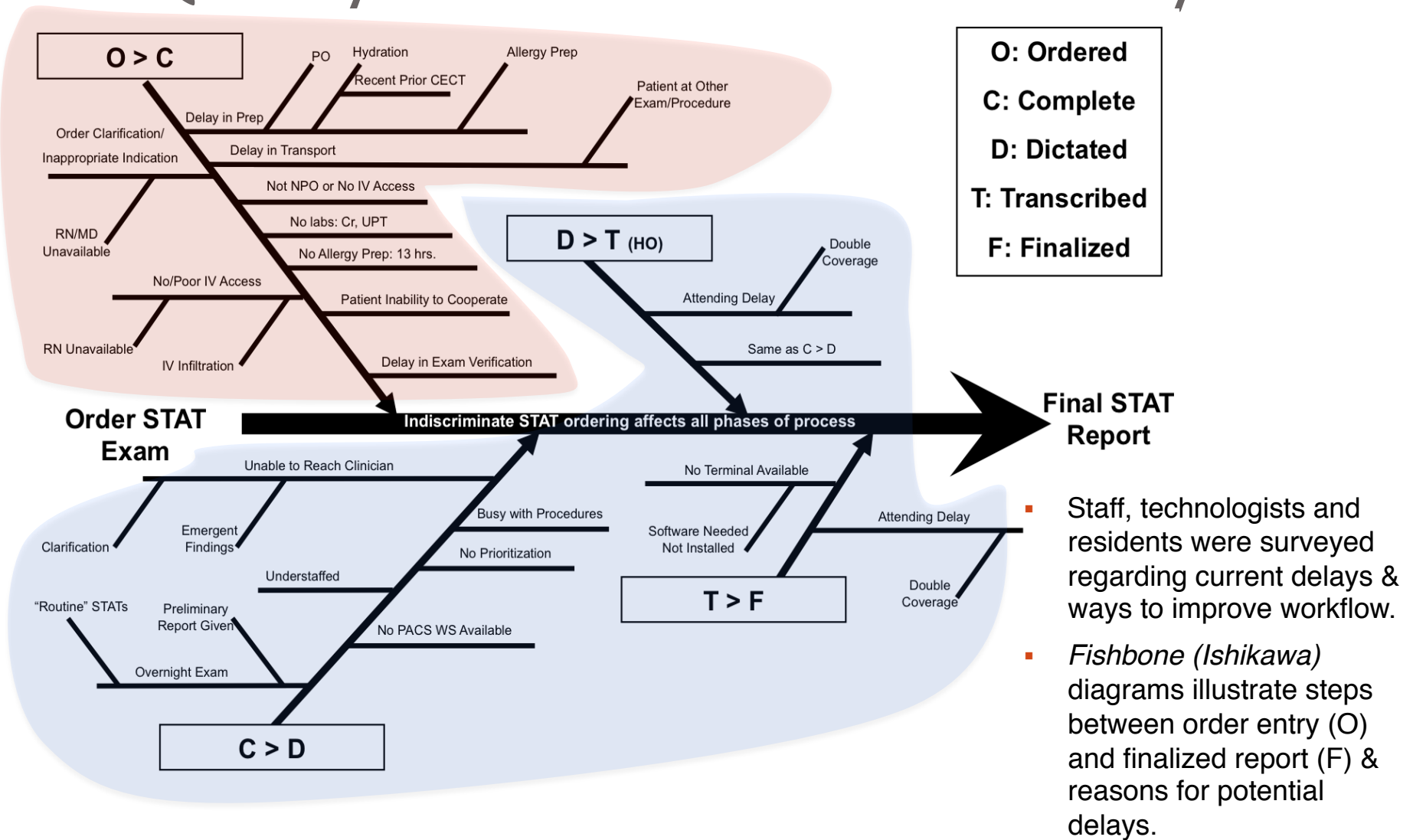


Measurements

- Baseline data was acquired for the 3-5/2010 period (Phase 1).
- Mean, median, and standard deviation of our TAT were calculated.
- Observations were plotted on control charts.
- After implementation of two interventions (Phases 2 and 3), data was also acquired and analyzed with similar metrics.
- Statistical analyses were performed to demonstrate a statistically significant improvement.
- Data was similarly acquired for a period after the withdrawal of one of the interventions (Phase 4).



Quality Tools: Fishbone CT Delays

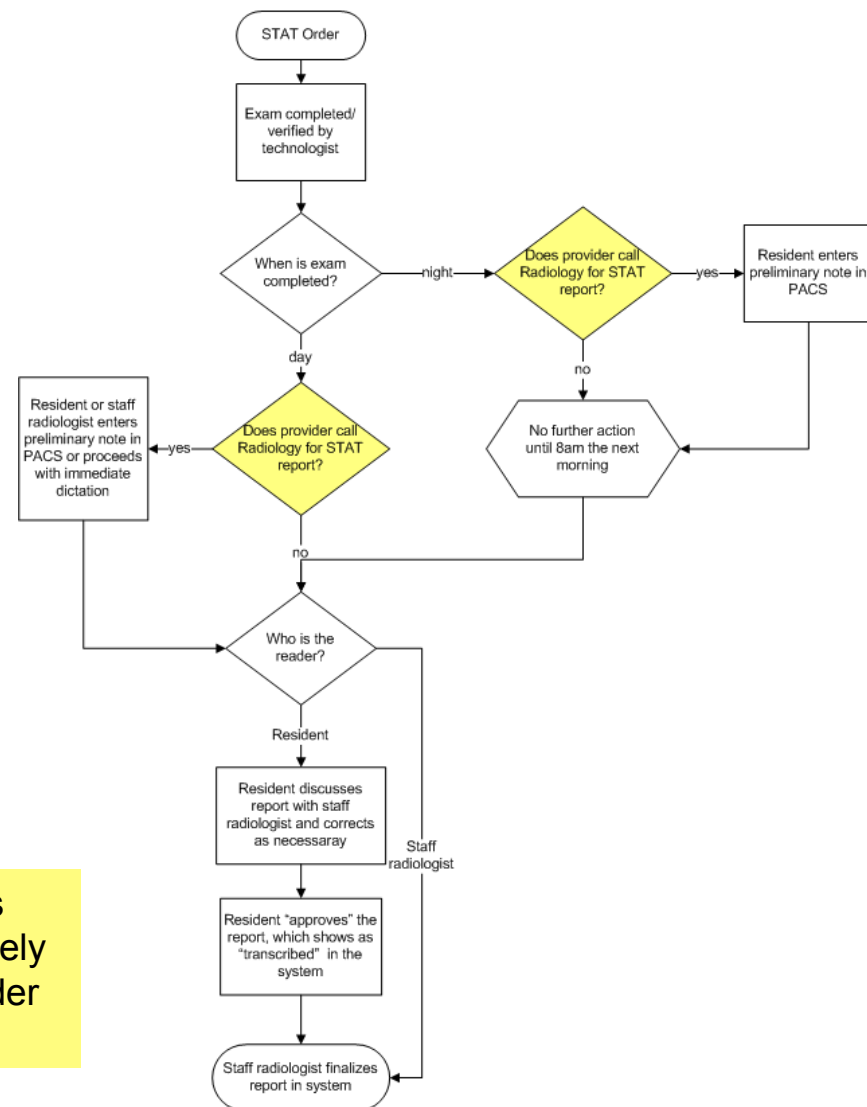


Quality Tools: Process Map (C>T)



- Among many areas of potential delays, the most straightforward area to effect change was on the **reading** of exams (C>T).
- The steps to follow from exam completion to finalized report were traced on a **process map**.

*Due to the volume of STAT orders (~40-50%), reports were not routinely transcribed STAT unless the provider specifically called to request this.





Interventions

- Phase 1 (3 - 5/2010) - Baseline

- Phase 2 (6 - 8/2010) - Department-wide implementation of an evening/night shift for radiology attending physicians
 - Redistribution of Staff to cover 6PM – midnight
 - (This is in addition to 24h coverage by the ED radiologists.)

- Phase 3 (9 - 10/2010) - Prioritization of STAT Exams:
 - Resident checkout immediately following exam review
 - Sign-out Reminders
 - Redistribution of STAT exam work

- Phase 4 (10/2010 - 2/2011) - Relaxation of prioritization



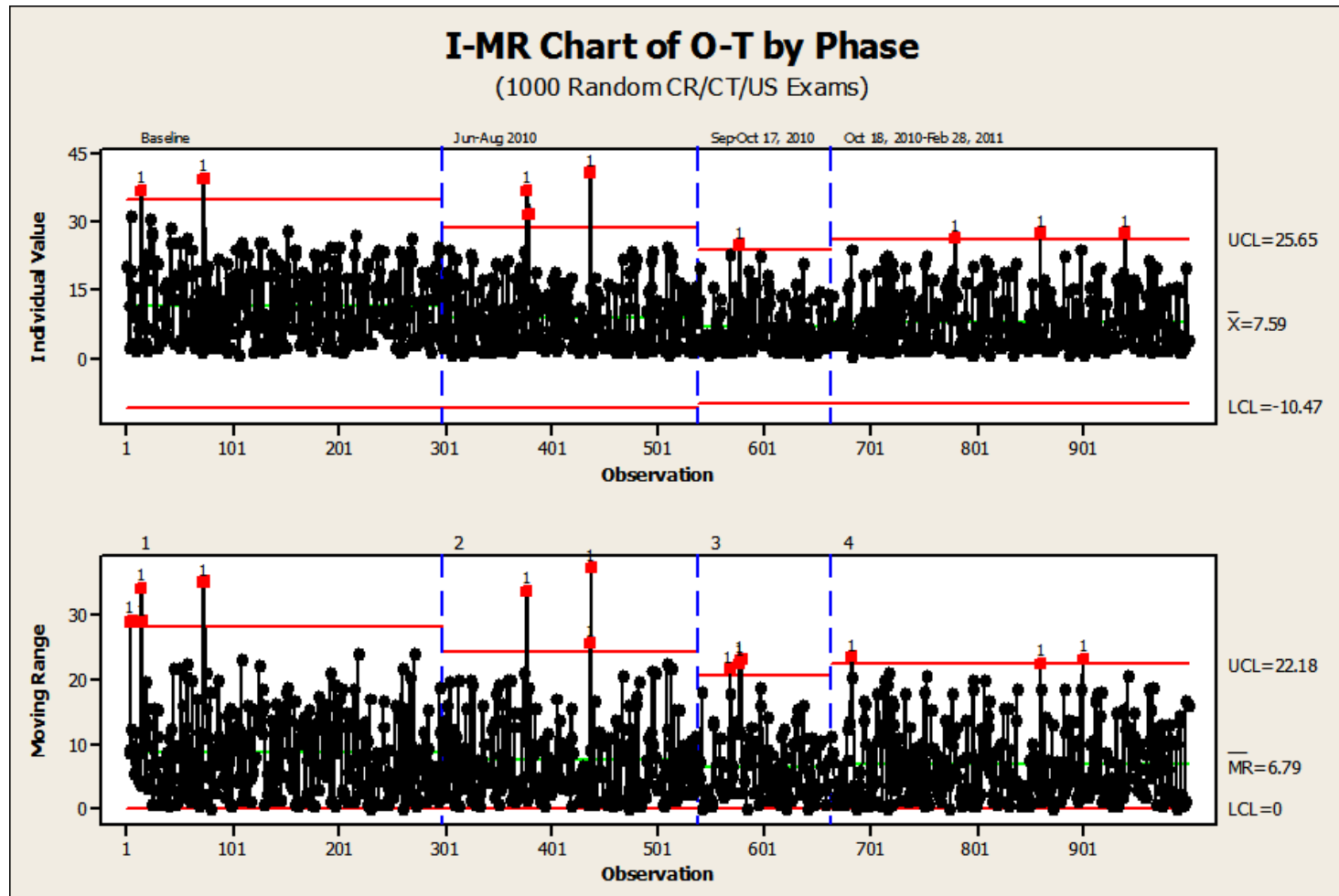


Results

- At the baseline (Phase 1), < 25% of the exams were meeting the goal of having a report in the system within 4 hours of order.
 - Mean “exam complete to transcribed” TAT was 9.0 hrs (median 8.1 hrs).
 - The process was highly variable (S.D. 7.3 hrs).
- The evening shift (Phase 2) and the targeted STAT exam prioritization interventions (Phase 3), significantly decreased TAT mean, median (3.0 hrs.) and variability.
- By the end of both interventions, the percentage of STAT exams transcribed within 4 hrs of order almost doubled (~45%).
- Withdrawal of Phase 3 reminders returned the Phase 4 TAT to what had been achieved in Phase 2.



Results



Baseline C>T TAT mean and variability was analyzed using a control chart, later expanded as new data was acquired.



Results

Exam “**Ordered to Transcribed**” Turnaround Time by Project Phase

Project Phase	Mean (hrs)	Median (hrs)	S.D. (hrs)	Yield*
Baseline	11.2	10.4	7.8	24.9%
Phase 2	8.1	5.9	7.0	39.9%
Phase 3	7.3	4.7	6.3	44.6%
Phase 4	8.0	5.6	6.7	40.0%

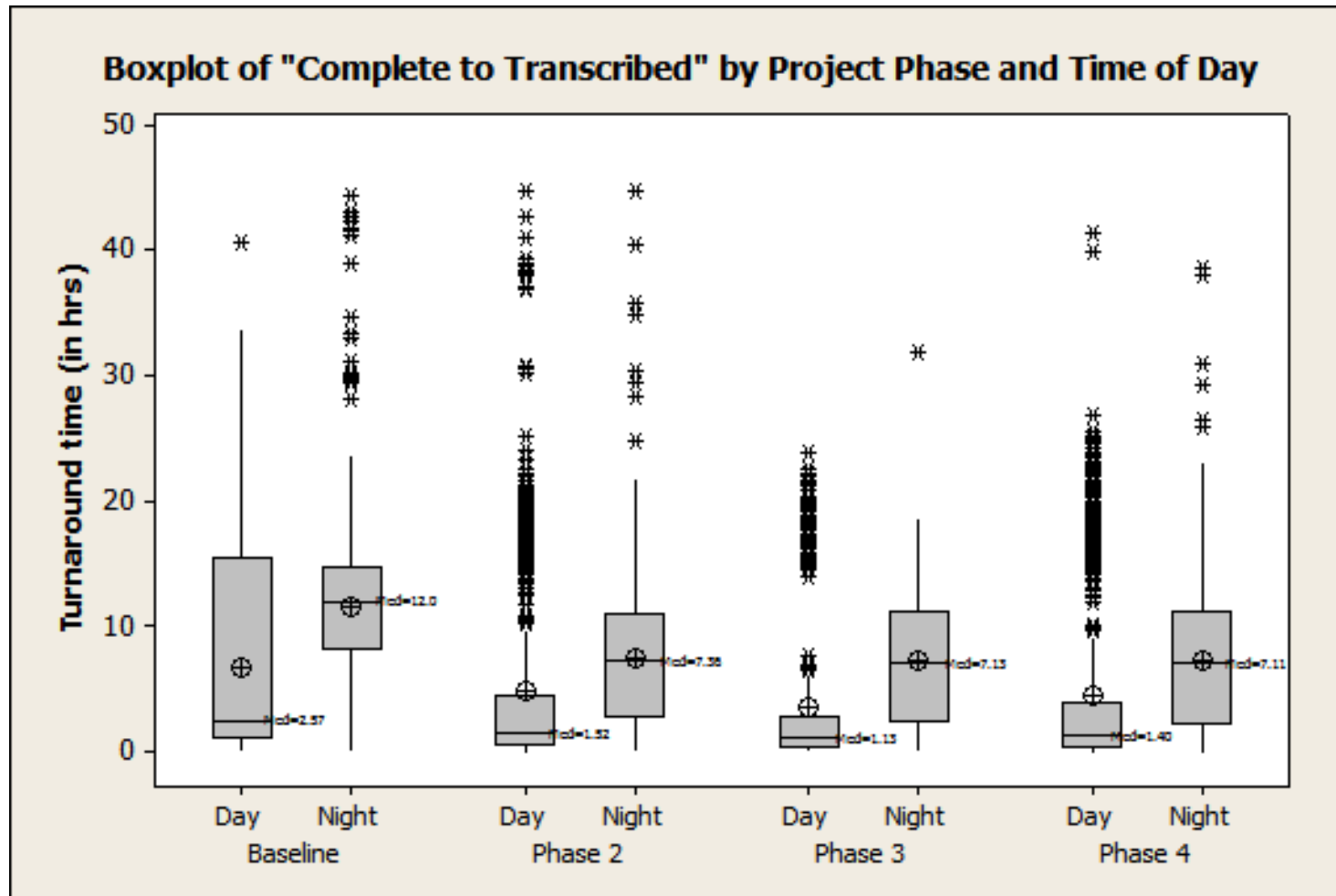
** Percentage of STAT exams transcribed within 4 hrs of the order.*

Exam “**Complete to Transcribed**” Turnaround Time by Project Phase

Project Phase	Mean (hrs)	Median (hrs)	S.D. (hrs)
Baseline	9.0	8.1	7.4
Phase 2	6.1	3.2	6.6
Phase 3	5.3	2.3	5.8
Phase 4	5.9	3.0	6.2



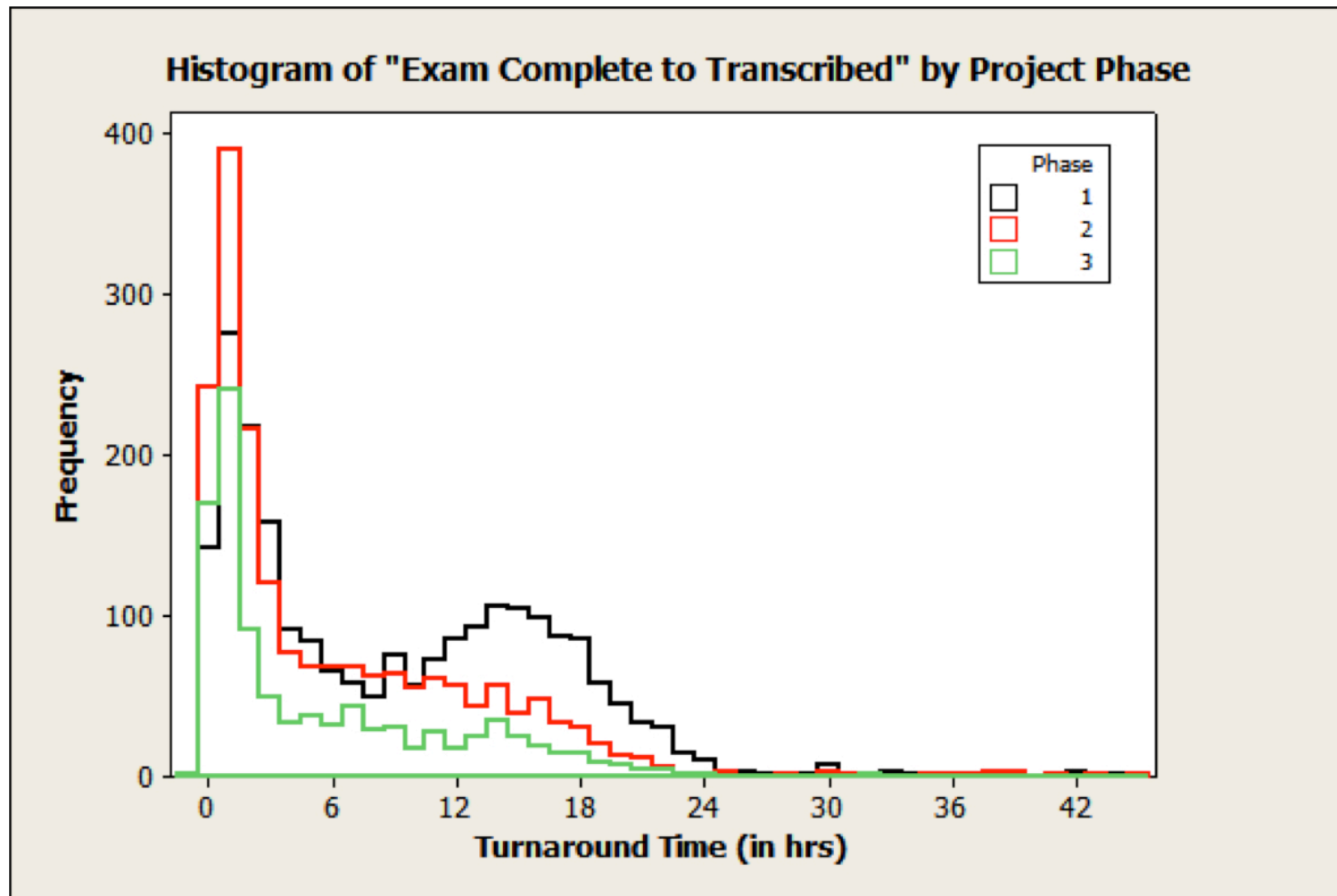
Results



Initial interventions targeted night exams, but daytime TAT and variation during the day improved as well.



Results



Bi-modal distribution present during baseline much less pronounced by Phase 3.



Conclusions: Lessons Learned

- The evening shift significantly improves STAT TAT.
 - Major undertaking: a full radiologist is removed from dayshift.
 - Does not adversely affect daytime exams at this point.

- Prioritizing STAT exam readout and checkout improves TAT.
 - More targeted approach.
 - More of a “zero-sum” process in regards to routine exams.

- The impact of this change on routine exams during the day will continue to be evaluated.



Conclusions: What Worked Well

- Evening Shift
 - Decreased our TAT
 - Staff radiologists more available for consultation,
 - Decreased the time to call-back for actionable findings
 - Improved clinician satisfaction.

- Reminders: Use of reminders in the form of text pagers twice a day had a measurable impact that, when withdrawn, reverted to its expected level.



Next Steps

- Streamlining the many steps leading to exam completion (O>C). This will require engagement of technologists, nurses, transport personnel, clerks, etc.
- New measures, such as flags, alarms or reminders on 'overdue' exams may help address this issue.
- Decrease STAT priority overutilization. Hopefully, the prospect of obtaining a timely STAT report may be incentive for more appropriate ordering.
- Expansion of the project to the entire Department.



New Effort

- Department-wide expansion has already started.
- Data is being analyzed in rule-based format.
 - More closely matches customer perception during working hours.
 - Which percent of exams meet our TAT criteria.
 - Routine exams ordered before noon are to be read same day.
 - Routine exams ordered after noon are to be read by noon next day.
- Radiologists not meeting goals are paged with reminders.
- Section delays are posted outside reading room areas.

New Effort



AUGUST 2011

D_MONTH	AUGUST 2011
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Orders	Column Labels					%	%
Row Labels	Delay Day	Delay Eve	Delay Night	Ontime	Grand Total	Ontime	Delay
EMERGENCY RADIOLOGY	120	237	272	4,618	5,247	88.01%	11.99%
CHEST RADIOLOGY	166	127	441	2,934	3,668	79.99%	20.01%
NEURORADIOLOGY	298	432	229	1,814	2,773	65.42%	34.58%
PEDI RADIOLOGY	68	101	157	2,171	2,497	86.94%	13.06%
BODY IMAGING	273	164	135	1,802	2,374	75.91%	24.09%
VASCULAR INTERVENTION	38	11	8	303	360	84.17%	15.83%
NUCLEAR MEDICINE	56	25	1	91	173	52.60%	47.40%
Grand Total	1,019	1,097	1,243	13,733	17,092	80.35%	19.65%

SEPTEMBER 1-15 2011

D_MONTH	SEP 1-15 2011
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Orders	Column Labels					%	%
Row Labels	Delay Day	Delay Eve	Delay Night	Ontime	Grand Total	Ontime	Delay
EMERGENCY RADIOLOGY	77	131	166	2,331	2,705	86.17%	13.83%
PEDI RADIOLOGY	53	70	104	1,167	1,394	83.72%	16.28%
CHEST RADIOLOGY	72	42	134	1,031	1,279	80.61%	19.39%
NEURORADIOLOGY	110	180	150	754	1,194	63.15%	36.85%
BODY IMAGING	137	28	18	874	1,057	82.69%	17.31%
VASCULAR INTERVENTION	20	13	5	120	158	75.95%	24.05%
NUCLEAR MEDICINE	25	10		38	73	52.05%	47.95%
Grand Total	494	474	577	6,315	7,860	80.34%	19.66%

Source: RADNET



Thank you.

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