Evaluating Turnaround Times for Diagnostic CT/MR Angiography Reports by an Interventional Radiology Division: A Single Institution's Experience for Quality Improvement in the Current Era

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BACKGROUND

- Prolonged turnaround times (TATs) for radiology exams are a ubiquitous challenge among institutions, and often a significant cause of delay in patient care.
- May lead to critical findings going unnoticed, prevent timely treatment, and contribute to increased length of stay costs.
- Some contributing factors include the growing volume of exams, case complexity, radiologist speed/interpretation style, time spent teaching trainees, and non-interpretative interruptions (1).
- CTA/MRA exams tend to be performed emergently/urgently for critically ill patients requiring timely management.
- At our institution, the IR division is responsible for interpreting most of these exams. This poses a challenge to manage alongside the daily clinical & procedural workload.

OBJECTIVES

- Identify causes of TAT delays for CTA/MRA exam in our department
- Identify opportunities to optimize efficiency
- Effectively decrease our TATs for these exams
- Improve patient care

METHODS

- Single institution, multi-hospital, retrospective review of runoff and extremity CT/MR angiography exams over an initial 6-month period (January-June 2022).
- Univariate and Multivariate analysis of several stratified turn-around time intervals of each segment of the exam process (ex. Order to protocol time, exam completion to prelim report time, exam completion to final report time, etc).
- Review of the 6-month period (July 2022-January 2023) after implementing an intervention, with repeat analysis.

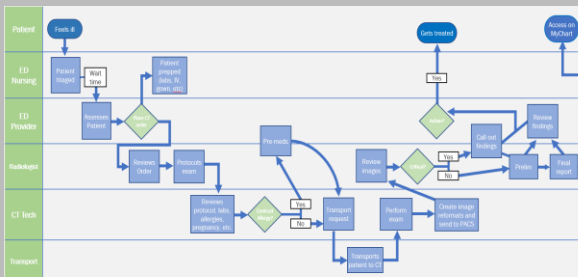

Figure 1 A swim-lane flow chart outlines the typical process of events of CTA exams in the ED. Starting with generation of an exam order and concluding with the exam reporting and patient care decision.

INTERVENTION

Comparison of Workflows

Before Intervention	After Intervention
No daily designed radiologist to interpret	Daily designated resident
Haphazard resident assignment for interpreting exams	Coincides with call schedule to ensure consistency
Interpretation typically occurred after morning rounds, consults, first start procedure	Resident was exempt from certain clinical duties for the work-day to limit interruption
Frequent interruptions occurred (phone calls, pager, consents, etc.)	Vigilance of work-list filtering
Delay in reviewing exams with attending radiologist	Daily designated attending for exam review, with goal of at least prelim published same day
Inconsistent work-list filtering	Emphasis on timely communication of findings
	Ancillary staff instructed to not interrupt unless critical issue
	Complete buy-in of these changes by all staff before implementing

Figure 2 depicts the primary intervention in this study. This includes summary of the workflow process of interpreting these exams before and after changes were made within our department.

RESULTS

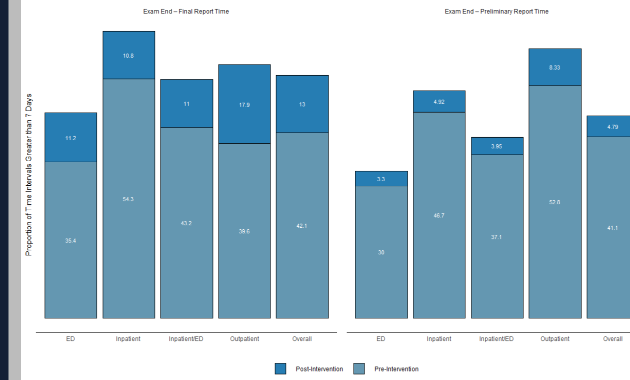

Figure 3 depicts the proportion of final and prelim reports that took 7 days or longer to result pre/post intervention. Overall, the proportion of reports taking over 7 days time, demonstrated a significant decrease. There was also a significant decrease when stratified by exam type (outpatient, inpatient, ED and inpatient/ED) [p<0.0001, p< 0.001, p<0.0001, p<.001and p<0.0001].

RESULTS

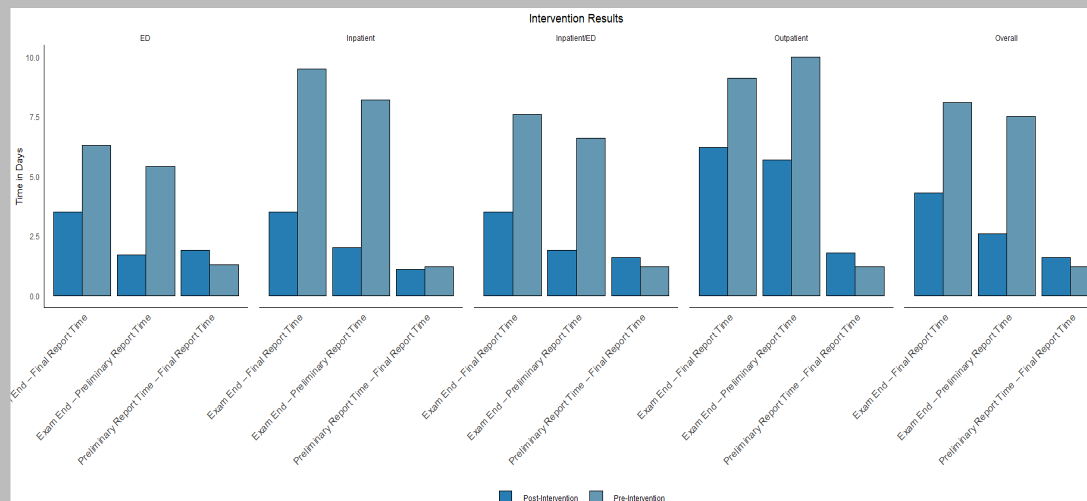

Figure 4 depicts the mean TATs for several intervals across different patient settings. TATs for exam end to final report time demonstrated a statistically significant decrease overall, and when stratified for inpatient, ED and pooled inpatient/ED groups [p<0.0001, p< 0.0001, p<0.01, and p<0.0001]. Mean TATs for exam end to the release of the preliminary report also showed statistically significant decrease overall, and when stratified for inpatient, ED, and inpatient/ED groups [p<0.0001, p< 0.0001, p<0.01, and p<0.0001]. There was no statistically significant difference for mean TATs for time between the release of the preliminary report to the final report after intervention.

CONCLUSIONS

- Preliminary analysis revealed the most significant time delays occurred for mean TAT intervals that were radiologist-dependent (exam end to prelim report, exam end to final report, and prelim to final report). Therefore, we felt that a change to the radiologist workflow process was the most appropriate intervention.
- Post-analysis showed an overall 47% reduction in the mean TAT from the exam end to the release of the final report and 54% reduction in the mean TAT from the exam end to the release of the final report for the inpatient and ED subgroups.
- More significant reduction in the mean TAT for the release of preliminary reports, suggesting that our intervention was effective, as the resident radiologist was a primary factor in the workflow change and generates most of the prelim reports.
- Variable range of the prelim to the final reporting time, and the mean TAT slightly increased overall, and for ED subgroup, although this difference was not statistically significant.
- Pre-intervention, no significant delays were identified in TAT intervals that were dependent on other professionals (RT, RN, transport, etc). Also, these intervals did not change post intervention.
- No significant difference in mean TAT between exams performed on weekdays and weekends. The overwhelming majority of exams were performed on weekdays.
- Pre-intervention, 42% of exams took 7 days or more to finalize a report. Post-intervention, this percentage significantly decreased to 13% of exams.
- TATs for prelim/final reports across each patient settings had a significantly lower proportion of exams that required greater than 7 days to receive a final read, supporting the inference that worklist filtering was contributing to delayed reporting.

POTENTIAL FUTURE DIRECTIONS

- Standardized Template with pick lists; may help improve speed, efficiency, and quality of the report
- Standardized education for junior trainees for these challenging exams; goal to improve interpretation confidence and reading speed
- Update CTA protocol to include 3D rotational MIPS segmented to major inflow vessels; may allow for rapid assessment for critical stenosis
- There are numerous confounding variables that impact reporting delays not assessed in this study such as the increased patient volume that may be present at institutions with ED (2), and trending rates of utilization of these advanced imaging studies, contrast shortages, as well as EMR and PACS system downtime.

SCAN ME!

REFERENCES

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