Impact of Radiology Order on ED Orthopedic Consult Turnaround Time

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Introduction

ED orthopedic consult turnaround time impacts patient outcomes and ED efficiency, influencing diagnosis, treatment decisions, and disposition[1]. While imaging delays[2] and other factors contribute, this study leverages data-driven analysis to assess orthopedic consult turnaround time patterns, examine radiology order timing effects, and identify informatics-driven optimization for consult workflow efficiency.

Methods

We analyzed ED visits with orthopedic consult orders (N = 1568) in a large hospital from December 31, 2023, to December 31, 2024, excluding trauma cases. Consult turnaround time was measured from consult order to disposition decision (observation, inpatient, or discharge). Radiology orders (CT, MRI) were examined for timing (before/after consult), number of tests ordered per patient. Mann-Whitney tests were used to compare turnaround time differences.

Results

- The mean (SD) turnaround time for orthopedic consults in the 1568 patients was 4.21 (3.00) hours, with 785 (46%) in admitted or observed patients (4.38 (3.09) hours) and 783 (50%) discharged from the ED (4.04 (2.90) hours) (Figure 1)

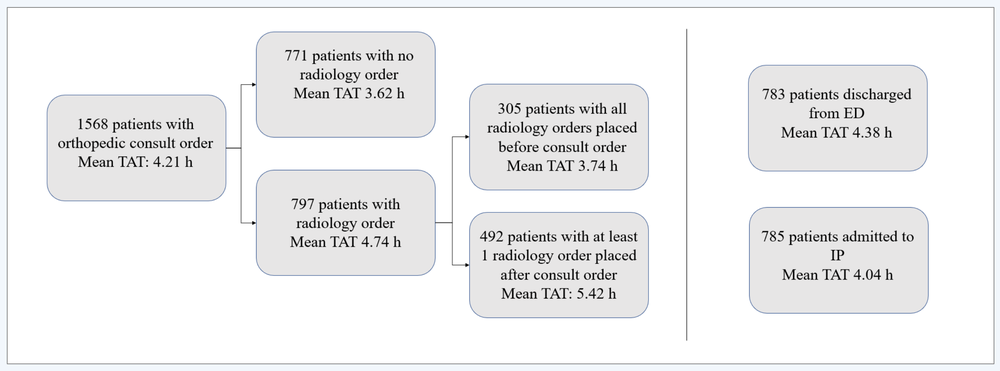

Figure 1: Flowchart containing mean consult turnaround times for patients with and without radiology orders

- Radiology order timing significantly impacted consult turnaround time, as patients with at least one post-consult radiology order had a turnaround which was 1.46 hours or 30% longer than those with pre-consult orders ($p < 0.001$, Figure 2)
- Among 492 post-consult radiology patients, 256 (52%) had only one imaging, suggesting delayed initiation. This was observed in all admitted, observed and discharged patients

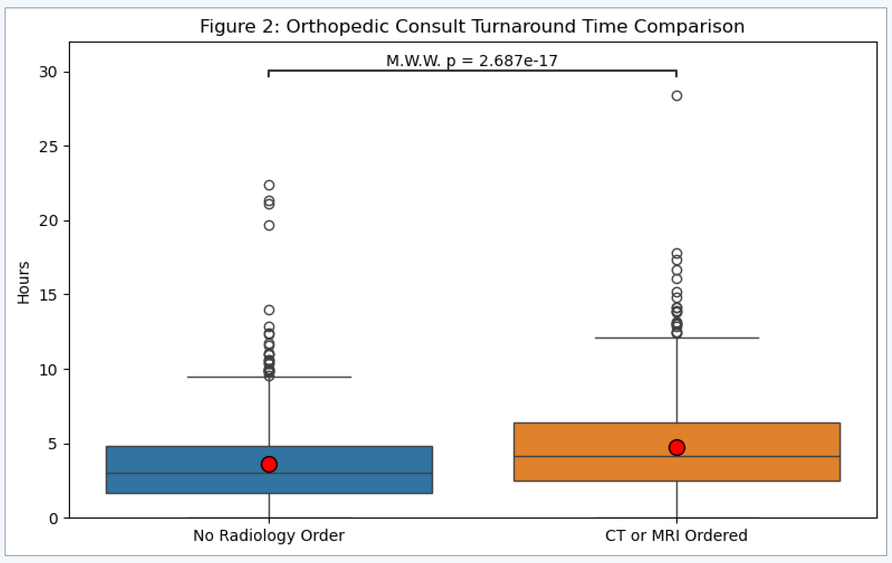

Figure 2: Boxplot showing consult turnaround times in hours for patients that did not contain a radiology order compared to patients with a radiology order associated to the visit. Mean times are highlighted in red. The results of the Mann-Whitney-Wilcoxon test are shown with brackets.

- Among admitted or observed patients, those with pre-consult radiology orders had a turnaround of 3.49 (2.48) hours, while post-consult orders led to a significantly longer turnaround of 5.48 (3.40) hours ($p < 0.001$, Figure 3A)
- Similarly, in discharged patients, pre-consult orders resulted in 4.07 (3.32) hours, while post-consult orders significantly increased turnaround to 5.34 (2.66) hours ($p < 0.001$, Figure 3B)

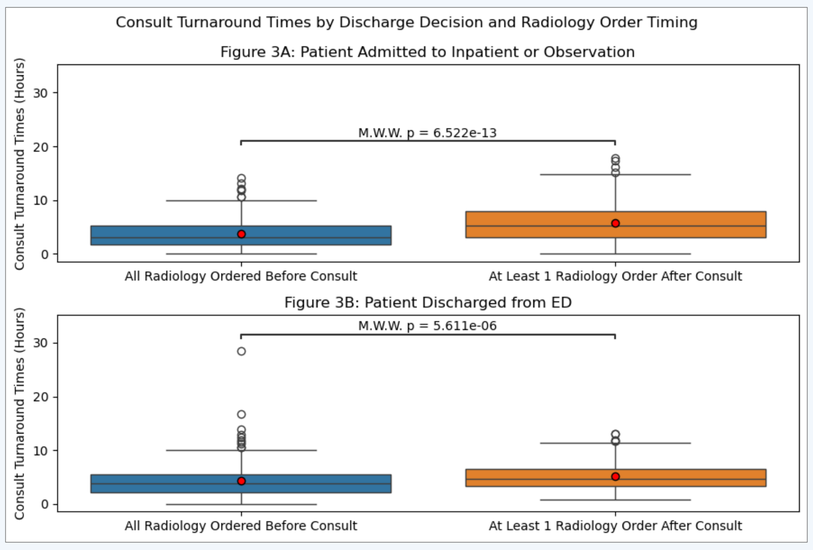

Figure 3: **(A)** Boxplot comparing consult turnaround times in hours for patients later admitted to Inpatient or Observation. **(B)** Boxplot comparing consult turnaround times for patients later discharged from ED. Means are highlighted with a red circle. The results of the Mann-Whitney-Wilcoxon test are shown with brackets.

- The most frequently ordered procedure was CT Brain w/o contrast (Figure 4) with 104 patients containing keywords for injury and/or pain in the Reason for Visit description and 66 patients containing keywords for motor vehicle accident/motorcycle accident
- Consult turnaround time did not differ based on single or multiple orders per patient, as patients with multiple orders (N = 422) had a turnaround of 4.88 (3.36) hours, compared to 4.57 (2.81) hours for patients with a single radiology order (N = 375, $p = 0.35$)

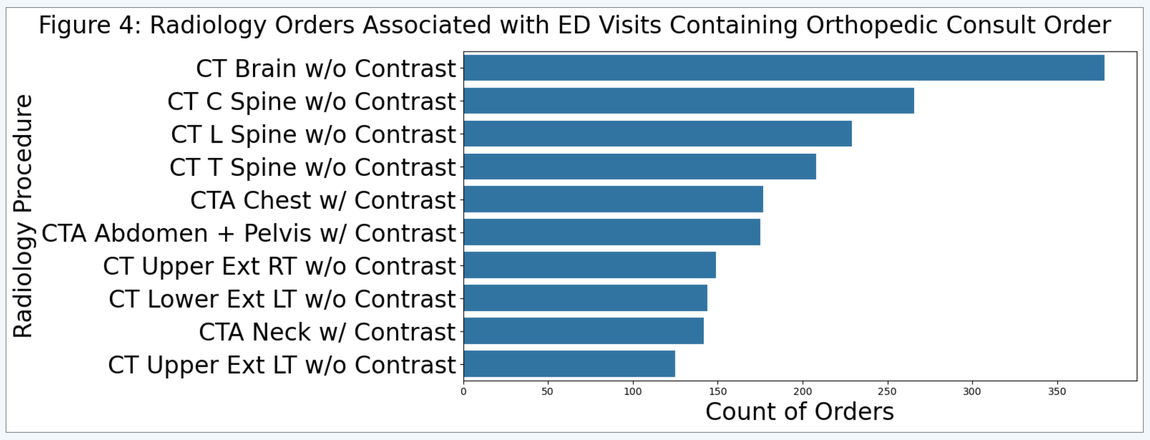

Figure 4: Countplot of radiology orders associated with orthopedic consult order

Discussion and Conclusions

Our study shows that post-consult radiology orders increased orthopedic consult turnaround time by 30% (5.42 vs. 3.74 hours, $p< 0.001$). This pattern held across disposition statuses and was especially relevant for admitted or observed patients, where shifting post-consult radiology orders to inpatient or observation settings could help to free up ED beds. We also found that consult ordered during the 8 AM hour experienced the longest turnaround, suggesting hour-based window inefficiencies.

References

1. Ataman MG, Sariyer G, Saglam C, Karagoz A, Unluer EE. Factors relating to decision delay in the emergency department: effects of diagnostic tests and consultations. Open Access Emergency Medicine. 2023 Dec 31:119-31.
2. Perotte R, Lewin GO, Tambe U, Galorenzo JB, Vawdrey DK, Akala OO, Makkar JS, Lin DJ, Mainieri L, Chang BC. Improving emergency department flow: reducing turnaround time for emergent CT scans. AMIA Annual Symposium Proceedings 2018 Dec 5 (Vol. 2018, p. 897).

Key Takeaway

To improve consult efficiency and ED throughput, future efforts should focus on automated imaging prioritization and workflow analytics.