Title: Effects of a QI Intervention to Improve Time From Door to Antibiotics in Open Orthopedic Fractures in the Emergency Department

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Background: Door to antibiotic (abx) response time has a strong correlation with patient outcomes and reduced infection risk in patients with open wound fractures. A gold standard for this response time is sixty minutes or less. This study aimed to investigate compliance with that standard as well as more precisely identify areas for improvement following an internal QI.

Methods: Adults ≥ 18 years with open fractures of the extremities and pelvis who presented to the ED before and after the QI intervention (n=169) were included. The QI intervention included adding abx to trauma timeout, medical staff education, emphasis on in-person communication and emails describing fallouts. Data was collected for “trauma level”, “triage time”, “trauma activation”, “time to room”, “time to abx order and administration”, and “time to imaging order, administration, and reading”. A time series graph for median times was created using GraphPad and a linear regression was run using R version 4.4.2.

Results: Median abx administration time pre QI 86.5 (IQR: 28 – 162) and post 73.5 (IQR: 17 – 148). Median abx order time pre QI 86 (IQR: 33.8 – 131) and post 53 (IQR: 26 – 104). Time series data revealed the QI had a short-term improvement in abx administration time, followed by a temporary worsened administration time, then a second greater improvement, leading to an overall reduction in time to administration. January abx administration median: 94; December: 53. Level 1 and level 2 trauma activations were associated with a much lower likelihood of delays in abx administration compared to no trauma activation (OR for level 1 = 0.02, CI: 0.00 - 0.08; OR for level 2 = 0.19, CI: 0.04 – 0.33). Triage time was a significant predictor of delayed abx administration. For every one-minute increase in triage time, the odds of a delay in abx administration increased by approximately 22.5% (Odds Ratio = 1.23, CI: 1.08 – 1.46 $p < 0.01$).

Conclusion: The QI intervention improved time to abx administration, though there was a rebound effect. This effect may be mitigated by relearning or continuing education. In addition, triage time was a significant predictor for antibiotic response time. If hospitals shorten triage times, it may further shorten antibiotic administration time and improve patient recovery. While the data was limited to a single site patient population, the broad inclusion criteria make the findings generalizable to any healthcare facility.

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