Research

Title: Optimizing Antibiotic Delivery in the Emergency Department: Implementation of Intravenous Push Antibiotics

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Background & Purpose:

Timely antibiotic administration is essential in the emergency department (ED), particularly for patients with sepsis or severe infections. Traditional IV infusions require additional preparation and setup, often delaying first-dose delivery and potentially affecting patient outcomes. Intravenous push (IVP) administration delivers antibiotics within minutes, reducing treatment delays and improving workflow efficiency by eliminating the need for IV bags, tubing, and pumps. This study assesses the impact of IVP on time-to-antibiotic administration and workflow efficiency compared with traditional infusions, as well as the associated financial impact on drug costs and supplies.

Methods:

This was a quasi-experimental, pre-post intervention study in the ED comparing IVP antibiotics with standard IV infusions. The pre-intervention period (January-June 2025) used retrospective data, and the post-intervention period (July-December 2025) collected data in real time. IVP antibiotics approved by the Pharmacy and Therapeutics Committee included aztreonam, cefepime, ceftriaxone, ertapenem, and meropenem. Cerner Discern Analytics was used to identify eligible patients receiving IVP doses. The initiative rollout included staff education and updates to the informatics system. The primary outcome was time-to-antibiotic administration. The secondary outcome included analysis of cost differences associated with implementation, comparing overall supply-related expenses between the study groups. Continuous variables were reported as medians with interquartile ranges (IQR) and compared using the Mann-Whitney U test, while categorial variables were summarized as percentages. Data was summarized descriptively and compared pre- and post-intervention. The study was approved by the IRB.

Results:

A total of 2,871 pre-intervention IVPB and 746 post-intervention IVP orders were included in the study. The IVP administration reduced door-to-antibiotic time compared with IVPB (median 168.5 vs 205.0 minutes; $p<0.001$) and shortened time from order to administration (31.0 vs 36.0 minutes; $p=0.038$). Moreover, IVP allowed direct access to antibiotics from the automated dispensing cabinets and administration over 3–5 minutes, reducing pharmacy preparation time and eliminating infusion setup requirements. The use of IVP increased over time, representing 29.0% (746 of 2,574 orders) of antibiotic administration in the post-intervention period. No administration-related adverse events were observed, and the approach was well accepted by staff. Financial analysis showed $4,077 in cost savings over six months at 29% IVP utilization (n=746), with an estimated $5.46 saved per order as utilization increases. If IVP use were increased to 80%, projected savings would approximately be $ 11,246 over the same period, assuming a proportional relationship between utilization and cost savings.

Conclusion:

The IVP antibiotic initiative was implemented in the ED with minimal workflow disruption. IVP administration reduced time to first dose and material costs versus standard infusions, demonstrating clear operational and financial advantages and supporting broader ED adoption. Further study is warranted in sepsis patients where timely antibiotic administration is crucial for improved outcomes.