



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

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Introduction

- 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 evaluates the implementation of an IVP antibiotic program in the ED, including required approvals, staff education, informatics integration, and operational challenges. It assesses the impact of IVP on time-to-antibiotic administration and workflow efficiency compared with traditional infusions, as well as the associated financial effects on drug costs.

Objective

This study aimed to evaluate the implementation of an IVP antibiotic program in the ED and its impact on antibiotic delivery times, workflow efficiency, and hospital resource utilization.

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 prospective data.
- 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.
- Continuous variables were reported as medians with interquartile ranges (IQR) and compared using the Mann-Whitney U test, while categorical variables were summarized as percentages.
- Outcomes included time to first antibiotic dose, order to administration time, and budgetary impact. Data was summarized descriptively and compared pre- and post-intervention. The study was approved by the Institutional Review Board.

Cost Savings and Administration Time

Table 1: Estimated Savings = (Monthly doses) x (Cost savings) x (Months)

Antibiotics	Doses	Average Time to Administration (hrs) (± SD)	Cost Saving per Dose (\$)	6 Months (\$) N=746 IVP 29% of orders
Aztreonam	1 g	1:46 (± 0:52)	4.76	28.56
Aztreonam	2 g	1:55 (± 0:36)	6.19	1,077.06
Cefepime	1 g	1:20 (± 0:23)	7.32	43.92
Cefepime	2 g	1:30 (± 0:46)	12.08	1,522.08
Ceftriaxone	1 g	1:00 (± 0:22)	4.76	199.92
Ceftriaxone	2 g	1:15 (± 0:19)	6.19	371.40
Ertapenem	0.5 g	1:50 (± 0:53)	1.45	8.70
Ertapenem	1 g	0:58 (± 0:29)	4.76	714.00
Meropenem	1 g	0:40 (± 0:34)	6.19	111.42
Total:				4,077.06

Figure 1: Rate of Administration

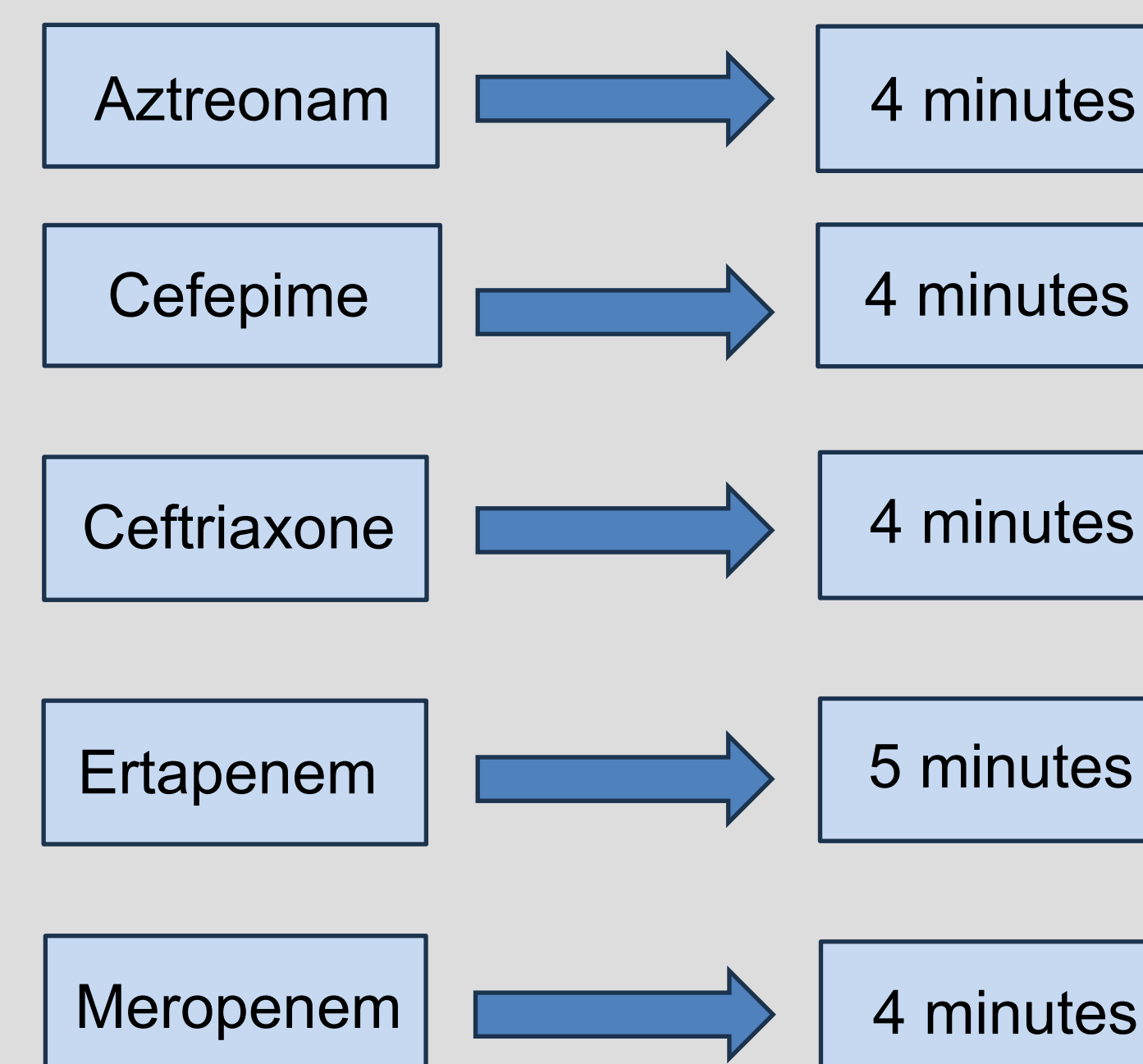


Figure 2: Results

Route	IVP	IVPB	p-value
Door-to-antibiotic administration time (min)	168.5 (IQR 159)	205.0 (IQR 172)	<0.001
Order-to-administration time (min)	31.0 (IQR 37)	26.0 (IQR 39)	0.038

Administration Method	Orders (n = 2074)	Percentage
IVPB	1,472	71%
IVP	602	29%

Discussion

- A total of 2,871 pre-intervention IVPB and 746 (29% of the 2574 orders) 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). By enabling faster antibiotics administration, reducing reliance on IV pumps and infusion supplies, and minimizing preparation steps, the IVP method facilitated patient care and improved workflow efficiency.
- The use of IVP allowed eligible antibiotics to be accessed directly from the automated medication dispensing system, thereby reducing preparation time and supporting faster administration to potentially reduce sepsis fallouts.
- 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.
- During the study, there were no documented administration-related safety issues and IVP use was well accepted by both nursing and pharmacy staff, reflecting smooth integration into existing workflows.
- This initiative showed that IVP antibiotics can be successfully integrated into emergency care practice with minimal disruption to existing workflows. Data analysis further quantified time savings, cost reduction, and overall operational impact of IVP implementation.

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.

References

