

CADTH Reference List

First Dose of Antibiotics Administered Using Intravenous Push Versus Intravenous Mini Bag Systems

June 2021

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Cite As: *First Dose of Antibiotics Administered Using Intravenous Push versus Intravenous Mini Bag Systems*. (CADTH reference list: summary of abstracts). Ottawa: CADTH; 2021 June.

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Funding: CADTH receives funding from Canada's federal, provincial, and territorial governments, with the exception of Quebec.

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Key Messages

- One non-randomized study was identified regarding the comparative clinical effectiveness of the administration of the first dose of antibiotics using intravenous push versus intravenous mini bag systems in patients in acute care settings.
- No evidence-based guidelines were identified regarding the administration of the first dose of intravenous antibiotics in patients in acute care settings.

Research Questions

1. What is the comparative clinical effectiveness of the administration of the first dose of antibiotics using intravenous push versus intravenous mini bag systems in patients in acute care settings?
2. What are the evidence-based guidelines regarding the administration of the first dose of intravenous antibiotics in patients in acute care settings?

Methods

Literature Search Methods

A limited literature search was conducted by an information specialist on key resources including MEDLINE, the Cochrane Database of Systematic Reviews, the international health technology assessment database, the websites of Canadian and major international health technology agencies, as well as a focused internet search. The search strategy comprised both controlled vocabulary, such as the National Library of Medicine's MeSH (Medical Subject Headings), and keywords. The main search concepts were intravenous administration (direct and intermittent), acute care, and antibiotics. No filters were applied to limit the retrieval by study type. A secondary search was conducted with the search concept intravenous administration (direct and intermittent), and CADTH-developed search filters were applied to limit retrieval to guidelines. When possible, retrieval was limited to the human population. The search was also limited to English-language documents published between January 1, 2016, and May 20, 2021. Internet links were provided if available.

Selection Criteria and Summary Methods

One reviewer screened the literature search results (titles and abstracts) and selected publications according to the inclusion criteria presented in Table 1. Full texts of study publications were not reviewed. The Overall Summary of Findings was based on information available in the abstracts of selected publications. Open-access, full-text versions of evidence-based guidelines were reviewed when abstracts were not available, and relevant recommendations were summarized.

Table 1: Selection Criteria

Criteria	Description
Population	Patients in acute care settings
Intervention	Q1: Administration of the first dose of antibiotics using intravenous push (also known as direct intravenous) Q2: Administration of the first dose of intravenous antibiotics using any technique
Comparator	Q1: Administration of the first dose of antibiotics using intravenous mini bag systems (also known as secondary infusion, intermittent intravenous infusion, or piggyback infusion) Q2: Not applicable
Outcomes	Q1: Clinical effectiveness (e.g., bacterial infections, quality of life, safety [e.g., adverse events, allergic reactions]) Q2: Recommendations regarding best practices (e.g., administration protocols, guidance regarding which delivery methods should be used, recommended safeguards)
Study designs	Health technology assessments, systematic reviews, randomized controlled trials, non-randomized studies, evidence-based guidelines

Results

One non-randomized study was identified regarding the comparative clinical effectiveness of the administration of the first dose of antibiotics using intravenous push versus intravenous mini bag systems in patients in acute care settings.¹ No relevant health technology assessments, systematic reviews, randomized controlled trials, or evidence-based guidelines were identified.

Additional references of potential interest that did not meet the inclusion criteria are provided in Appendix 1.

Overall Summary of Findings

One non-randomized study¹ assessed adult patients diagnosed with severe sepsis or sepsis shock in an emergency department and had received their first dose of beta-lactam antibiotics by intravenous push or intravenous piggyback administration. The authors concluded that the intravenous push strategy did not affect mortality, need for intensive care unit admission, or intensive care unit length of stay.¹ Furthermore, no adverse events, including infusion reactions, were found in either group.¹ No evidence-based guidelines were found regarding the administration of the first dose of intravenous antibiotics in patients in acute care settings; therefore, no summary can be provided.

References

Health Technology Assessments

No literature identified.

Systematic Reviews and Meta-Analyses

No literature identified.

Randomized Controlled Trials

No literature identified.

Non-Randomized Studies

1. Gregorowicz AJ, Costello PG, Gajdosik DA, et al. Effect of IV Push Antibiotic Administration on Antibiotic Therapy Delays in Sepsis. *Crit Care Med.* 2020 Aug;48(8):1175-1179. [PubMed](#)

Guidelines and Recommendations

No literature identified.

Appendix 1: References of Potential Interest

Previous CADTH Reports

2. Intravenous push injections in adults: safety and guidelines. Ottawa: CADTH; 2020 Mar. <https://cadth.ca/sites/default/files/pdf/htis/2020/RB1457%20Secondary%20Infusions%20Final.pdf> Accessed 2021 May 25.
3. Medication Administration via Direct Intravenous Push versus Minibags: Comparative Clinical Effectiveness and Guidelines. Ottawa (ON): CADTH; 2017 Jan. <https://cadth.ca/sites/default/files/pdf/htis/2017/RB1049%20IV%20Push%20vs%20Minibag%20Final.pdf> Accessed 2021 May 25.

Systematic Reviews and Meta-Analyses

Systematic Review of Guidelines: First Dose Not Specified

4. Chang Y, Bhandari M, Zhu KL, et al. Antibiotic Prophylaxis in the Management of Open Fractures: A Systematic Survey of Current Practice and Recommendations. *JBJS Rev.* 2019 Feb;7(2):e1. [PubMed](#)

Non-Randomized Studies

Unclear Intervention: First Dose Not Specified

5. Agunbiade A, Routsolias JC, Rizvanolli L, et al. The effects of ceftriaxone by intravenous push on adverse drug reactions in the emergency department. *Am J Emerg Med.* 2021 May;43:245-248. [PubMed](#)
6. Marsh K, Dubrovskaya Y, Jen SP, et al. Intravenous push versus intravenous piggyback beta-lactams for the empiric management of gram-negative bacteremia. *J Clin Pharm Ther.* 2021 Apr;46(2):373-381. [PubMed](#)

No Comparator

7. Hays WB, Flack T. Safety and tolerability of i.v. push piperacillin/tazobactam within an emergency department. *Am J Health Syst Pharm.* 2020 Jun 23;77(13):1051-1053. [PubMed](#)

Guidelines and Recommendations

Unclear Intervention: Not Specific to First Dose

8. Maschmeyer G, Helweg-Larsen J, Pagano L, et al. ECIL guidelines for treatment of *Pneumocystis jirovecii* pneumonia in non-HIV-infected haematology patients. *J Antimicrob Chemother.* 2016 Sep;71(9):2405-2413. [PubMed](#)

Alternative Methodology and Unclear Intervention: Not Specific to First Dose

9. Floto RA, Olivier KN, Saiman L, et al. US Cystic Fibrosis Foundation and European Cystic Fibrosis Society consensus recommendations for the management of non-tuberculous mycobacteria in individuals with cystic fibrosis. *Thorax.* 2016 Jan;71 Suppl 1:i1-22. [PubMed](#)
10. Longuet P, Lecapitaine AL, Cassard B, et al. Preparing and administering injectable antibiotics: How to avoid playing God. *Med Mal Infect.* 2016 Jul;46(5):242-268. [PubMed](#)

Review Articles

11. Spencer S, Ipema H, Hartke P, et al. Intravenous Push Administration of Antibiotics: Literature and Considerations. *Hosp Pharm.* 2018 Jun;53(3):157-169. [PubMed](#)