

CADTH RAPID RESPONSE REPORT: SUMMARY OF ABSTRACTS

Intravenous Push Injections in Adults: Safety and Guidelines

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Research Questions

1. What is the comparative safety of push injections versus secondary infusions or piggybacking in adults requiring intravenous medication?
2. What is the comparative safety of push injections administered through distal ports in the intravenous line versus push injections administered through proximal ports in the intravenous line in adults requiring intravenous medication?
3. What are the evidence-based guidelines regarding secondary infusions and push injections in adults requiring intravenous medication?
4. What are the evidence-based guidelines regarding port choice in push injections in adults requiring intravenous medication?

Key Findings

One non-randomized study was identified regarding the comparative safety of push injections versus piggybacking in adults requiring intravenous medication. In addition, one evidence-based guideline was regarding secondary infusions and push injections in adults requiring intravenous medication.

Methods

A limited literature search was conducted by an information specialist on key resources including PubMed, the Cochrane Library, the University of York Centre for Reviews and Dissemination (CRD) databases, the websites of Canadian and major international health technology agencies, as well as a focused internet search. The search strategy was comprised of both controlled vocabulary, such as the National Library of Medicine’s MeSH (Medical Subject Headings), and keywords. The main search concepts were secondary infusions, intravenous delivery and port site. Filters were applied to limit the retrieval to health technology assessments, systematic reviews, and meta analyses, randomized controlled trials, non-randomized studies/safety, and guidelines. The search was also limited to English language documents published between January 1, 2015 and March 9, 2020. Internet links are provided, where available.

Selection Criteria

One reviewer screened citations and selected studies based on the inclusion criteria presented in Table 1.

Table 1: Selection Criteria

Population	Adults requiring administration of medication intravenously
Intervention	Q1 & Q3: Secondary infusions (i.e., piggybacking, secondary medication, intravenous intermittent infusion) using an infusion pump delivery system Q2 & Q4: Push injections performed at the distal port of intravenous tube; Excluding implanted ports

Comparator	Q1: Direct intravenous push injections (i.e., bolus medication) Q2: Push injections performed at the proximal port of intravenous tube; Excluding implanted ports Q3 & Q4: Not applicable
Outcomes	Q1 & Q2: Safety (e.g., phlebitis, infiltration, mortality, medication errors, over-dilution of medication) Q3: Recommendations regarding the choice of medication administration through intravenous lines Q4: Recommendations regarding the port choice for push injections through intravenous lines
Study Designs	Health technology assessments, systematic reviews, randomized controlled trials, non-randomized studies (safety only), and evidence-based guidelines

Results

Rapid Response reports are organized so that the higher quality evidence is presented first. Therefore, health technology assessment reports and systematic reviews are presented first. These are followed by randomized controlled trials, non-randomized studies, and evidence-based guidelines.

One non-randomized study¹ was identified regarding the comparative safety of push injections versus piggybacking in adults requiring intravenous medication. In addition, one evidence-based guideline² was identified regarding secondary infusions and push injections in adults requiring intravenous medication. No relevant health technology assessments, systematic reviews, or randomized controlled trials were identified.

Additional references of potential interest are provided in the appendix.

Overall Summary of Findings

One non-randomized study¹ was identified regarding the comparative safety of push injections versus piggybacking in adults requiring intravenous (IV) medication. The authors of the identified non-randomized study found that IV push administration of lacosamide resulted in similar adverse effects compared to piggybacking, with no statistically significant differences in the rates of hypotension and bradycardia between groups.¹

Guidelines from the Infusion Nurses Society suggest that IV push medications should be administered through the needleless connector port closest to the patient in an existing IV infusion.² They also recommend that IV push medications not be diluted or reconstituted outside the pharmacy compounding area.² Furthermore, secondary continuous administration sets should be changed no more frequently than every 96 hours, and intermittent administration sets should be changed every 24 hours.²

References Summarized

Health Technology Assessments

No literature identified.

Systematic Reviews and Meta-analyses

No literature identified.

Randomized Controlled Trials

No literature identified.

Non-Randomized Studies

1. Davidson KE, Newell J, Alsherbini K, Krushinski J, Jones GM. Safety and efficiency of intravenous push Lacosamide administration. *Neurocrit Care*. 2018;29(3):491-495.
[PubMed: PM29949010](#)

Guidelines and Recommendations

2. Gorski L, Hadaway L, Hagle ME, et al. Infusion therapy: standards of practice. *J Infus Nurs*. 2016 Jan/Feb;39(15):Suppl 1.
<https://source.yiboshi.com/20170417/1492425631944540325.pdf>
Accessed 2020 Mar 12.
See: 17. Compounding and Preparation of Parenteral Solutions and Medications -C, page S39; 40. Flushing and Locking -E, page S78; 42. Administration Change Set -II, page S84; 57. Parenteral Medication and Solution Administration -G, page S126.

Appendix — Further Information

Systematic Reviews and Meta-analyses – No Comparator

- Oragano CA, Patton D, Moore Z. Phlebitis in intravenous amiodarone administration: incidence and contributing factors. *Crit Care Nurse*. 2019;39(1):e1-e12. PM:30710042

Clinical Practice Guidelines

- IWK Health Centre. Administration of intravenous medications [*clinical policy*]. Halifax (NS): IWK Health Centre; 2018 Apr: http://policy.nshealth.ca/Site_Published/IWK/document_render.aspx?documentRender.IdType=6&documentRender.GenericField=&documentRender.Id=69678
Accessed 2020 Mar 12.
See: IV Medication Administration via Secondary/Piggy Back Infusion on a Primary Infusion via Large Volume Pump or by Gravity (Adult), page 9
- The Institute for Safe Medication Practices (ISMP). ISMP Safe practice guidelines for adult IV push medications. Horsham (PA): ISMP; 2015 Jul: <https://www.ismp.org/guidelines/iv-push> Accessed 2020 Mar 12.
See: *Safe Practice Guidelines, Clinical Administration, page 13*
- Doyle GR, McCutcheon JA. Administering intermittent intravenous medication (secondary medication) and continuous IV infusions. *In: Clinical Procedure for Safer Patient Care*. OpenText BC; 2015 Nov: <https://opentextbc.ca/clinicalskills/chapter/6-11-administering-intravenous-medications-by-piggyback-mini-bags-intermittent-infusion-sets-and-mini-infusion-pumps/>
Accessed 2020 Mar 12.
- Doyle GR, McCutcheon JA. Intravenous medications by direct IV route. *In: Clinical Procedure for Safer Patient Care*. OpenText BC; 2015 Nov: <https://opentextbc.ca/clinicalskills/chapter/6-9-iv-main-and-mini-bag-medications/>
Accessed 2020 Mar 12.
- Saskatoon Health Region. Chemotherapy drugs for cancer treatment: administration, safe handling & disposal. Saskatoon (SK): Saskatoon Health Region; 2015 Jan: <https://www.saskatoonhealthregion.ca/about/NursingManual/1065.pdf>
Accessed 2020 Mar 12.
See: Sections 3.6.8 and 3.6.10

Review Articles

- Spencer S, Ipema H, Hartke P, et al. Intravenous push administration of antibiotics: literature and considerations. *Hosp Pharm*. 2018 Jun;53(3):157-169. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6102793/>