

CADTH RAPID RESPONSE REPORT: SUMMARY OF ABSTRACTS

Low-Level Disinfection Techniques and Solutions for Infusion Pump Cleaning: Clinical Effectiveness and Guidelines

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Research Questions

1. What is the clinical effectiveness of various low-level disinfection techniques and procedures for infusion pumps?
2. What is the cost-effectiveness of various low-level disinfection techniques and procedures for infusion pumps?
3. What are evidence-based guidelines informing the use of low-level disinfection techniques and procedures for infusion pumps?>

Key Findings

One evidence-based guideline was identified regarding the various low-level disinfection techniques and procedures for infusion pumps. No relevant literature was identified regarding the clinical and cost effectiveness of low-level disinfection techniques and procedures for infusion pumps.

Methods

A limited literature search was conducted by an information specialist on key resources including MEDLINE, Cumulative Index to Nursing and Allied Health Literature (CINAHL), 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 infusion pumps and disinfection. No filters were applied to limit the retrieval by study type. Where possible, retrieval was limited to the human population. The search was also limited to English language documents published between January 1, 2009 and September 11, 2019. Internet links were 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	Q1-3: Patients in an inpatient or outpatient setting requiring use of an infusion delivery system, also known as non-critical equipment (e.g., large volume infusion pumps, syringe pumps, PCA pumps and epidural pumps, smart pumps) who are not colonized with microbes requiring higher level of disinfection
Intervention	Q1-3: Low-level disinfection techniques and solutions after infusion pump use (e.g., accelerated hydrogen peroxide, isopropyl alcohol, quaternary ammonium in a wipe, spray, or gel form) (brand names: Perdiem, Cavicide, Oxivir Plus)

Comparator	Q1-3: Alternative cleansing techniques; alternative cleansing solutions in various forms (e.g., sodium hypochloride, chlorhexidine gluconate (CHG) wipes, hydrogen peroxide, isopropyl alcohol, quaternary ammonium)
Outcomes	Q1: Clinical effectiveness (e.g., reduced infection rates) Q2: Cost-effectiveness Q3: Evidence-based guidelines (e.g., recommended contact time for disinfectants)
Study Designs	Health technology assessments, systematic reviews, meta-analyses, randomized controlled trials, non-randomized studies, evidence-based guidelines

Results

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

One evidence-based guideline¹ was identified regarding the various low-level disinfection techniques and procedures for infusion pumps. No relevant health technology assessments, systematic reviews, meta-analyses, randomized controlled trials, or non-randomized studies were identified.

Additional references of potential interest are provided in the appendix.

Overall Summary of Findings

A guideline from Public Health Ontario¹ was identified regarding the various low-level disinfection techniques and procedures for infusion pumps. The guideline states that using a hospital disinfectant (i.e., alcohol, improved hydrogen peroxide, iodophors, phenolics, quaternary ammonium compounds, sodium hypochlorite) is appropriate for non-critical equipment such as infusion or intravenous pumps. Moreover, hospital disinfectants should be used according to the manufacturer's instructions for dilution and contact time. The guidelines also state that hospitals should try to minimize the number of disinfectants in general in order to reduce risk of error and inadequate disinfection. The guideline recommends using the following list of criteria when choosing a disinfectant: the efficacy, ease of use, compatibility with surfaces for cleaning, use and safety for hospital and staff, and lastly the cost and impact on the environment.¹

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

No literature identified.

Guidelines and Recommendations

1. Ontario Agency for Health Protection and Promotion (Public Health Ontario), Provincial Infectious Diseases Advisory Committee (PIDAC). Best practices for environmental cleaning for prevention and control of infections in all health care settings. 3rd ed. Toronto (ON): Queen's Printer for Ontario; 2018:
<https://www.publichealthontario.ca/-/media/documents/bp-environmental-cleaning.pdf?la=en>. (Accessed 2019 Sep 25).
See: 1.3.2.2 Using Disinfectants, page 30

Appendix — Further Information

Previous CADTH Reports

2. Cowling T, de Léséleuc L. Reprocessing of single-use medical devices: a 2015 update. (*CADTH Environmental scan no. 48*). Ottawa (ON): CADTH; 2015: <https://www.cadth.ca/reprocessing-single-use-medical-devices-2015-update>. (Accessed 2019 Sep 25).
3. Reuse of infusion pumps after treating patients with mycobacterium infection: safety and guidelines. (*CADTH Rapid response report: reference list*). Ottawa (ON): CADTH; 2011: <https://www.cadth.ca/reuse-infusion-pumps-after-treating-patients-mycobacterium-infection-safety-and-guidelines>. (Accessed 2019 Sep 25).

Systematic Reviews – Infusion Pumps Not Specified

4. Leas BF, Sullivan N, Han JH, Pegues DA, Kaczmarek JL, Umscheid CA. Environmental cleaning for the prevention of healthcare-associated infections. Technical brief no. 22 (*Prepared by the ECRI Institute – Penn Medicine Evidence-based Practice Center under Contract No. 290-2012-00011-1*) AHRQ Publication No. 15-EHC020-EF. Rockville (MD): Agency for Healthcare Research and Quality; 2015: https://effectivehealthcare.ahrq.gov/sites/default/files/pdf/healthcare-infections_technical-brief.pdf. (Accessed 2019 Sep 25).

Non-Randomized Studies

Patient Outcomes Not Specified

5. Seenama C, Tachasirinugune P, Jintanothaitavorn D, Kachintorn K, Thamlikitkul V. Effectiveness of disinfectant wipes for decontamination of bacteria on patients' environmental and medical equipment surfaces at Siriraj Hospital. *J Med Assoc Thai*. 2013 Feb;96 Suppl 2:S111-116. [PubMed: PM23590030](https://pubmed.ncbi.nlm.nih.gov/23590030/)
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Infusion Pumps Not Specifically Mentioned and Alternative Outcome

7. Casini B, Righi A, De Feo N, et al. Improving cleaning and disinfection of high-touch surfaces in intensive care during carbapenem-resistant *Acinetobacter baumannii* endemo-epidemic situations. *Int J Environ Res Public Health*. 2018 Oct 19;15(10). pii: E2305. [PubMed: PM30347749](https://pubmed.ncbi.nlm.nih.gov/30347749/)
8. Gonzalez EA, Nandy P, Lucas AD, Hitchins VM. Ability of cleaning-disinfecting wipes to remove bacteria from medical device surfaces. *Am J Infect Control*. 2015 Dec 1;43(12):1331-5. [PubMed: PM26654235](https://pubmed.ncbi.nlm.nih.gov/26654235/)

Guidelines and Recommendations – Methods Not Specified

9. Provincial Infection Control Network of British Columbia (PICNet). British Columbia best practice for environmental cleaning for prevention and control of infections in all healthcare settings and programs. Appendix A. Vancouver (BC); PICNet; 2016: <https://www.picnet.ca/wp-content/uploads/British-Columbia-Best-Practices-for-Environmental-Cleaning-for-Prevention-and-Control-of-Infections-in-All-Healthcare-Settings-and-Programs.pdf>. (Accessed 2019 Sep 25).
10. Infection prevention and control: master equipment cleaning & disinfecting manual. Vancouver (BC): Vancouver Coastal Health; 2019: <http://ipac.vch.ca/Documents/Cleaning%20and%20Disinfection/VCH%200291.pdf>. (Accessed 2019 Sep 25).
See page 28.
11. IPAC standard operating procedure (SOP): IV pumps (e.g. Alaris) cleaning & disinfecting. Vancouver (BC): Vancouver Coastal Health; 2017: <http://ipac.vch.ca/Documents/Cleaning%20and%20Disinfection/VCH%20IPAC%20SOP%20IV%20Pump%20Cleaning%20%20Disinfecting.pdf>. (Accessed 2019 Sep 25).
12. Regional infection prevention and control manual for Northern Ireland. Cleaning & disinfection. Belfast (IE): Public Health Agency; 2008 (reviewed 2015): <https://www.niinfectioncontrolmanual.net/cleaning-disinfection>. (Accessed 2019 Sep 25).
13. Cleaning and disinfection of medical equipment/devices (critical, semi-critical & non-critical). Brandon (MB): Prairie Mountain Health; 2014: <https://www.prairiemountainhealth.ca/images/PPG/PPG-00026.pdf>. (Accessed 2019 Sep 25).
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15. Non critical patient care equipment – cleaning and disinfection. Saskatoon (SK): Saskatoon Health Region; 2012: <https://www.saskatoonhealthregion.ca/about/IPCPolicies/20-80.pdf>. (Accessed 2019 Sep 25).

Evidence Bundles

16. Rutala WA, Weber DJ. Best practices for disinfection of noncritical environmental surfaces and equipment in health care facilities: A bundle approach. *Am J Infect Control*. 2019;47S:A96-A105.
[PubMed: PM31146858](#)
17. Rutala WA, Weber DJ. Disinfection, sterilization, and antisepsis: An overview. *Am J Infect Control*. 2019;47S:A3-A9.
[PubMed: PM31146848](#)

Additional References

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19. Cleaning product guidelines The Alaris™ System. BD: San Diego (CA); 2017: https://www.bd.com/documents/guides/tip-sheets/IF_Alaris-System-Cleaning-Products-Guidelines_TS_EN.pdf. (Accessed 2019 Sep 25).
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