

CADTH Reference List

Antibiotic Solutions for Surgical Irrigation

October 2021

Authors: Camille Santos, Nicole Askin

Cite As: *Antibiotic Solutions for Surgical Irrigation*. (CADTH reference list: summary of abstracts). Ottawa: CADTH; 2021 Oct.

Disclaimer: The information in this document is intended to help Canadian health care decision-makers, health care professionals, health systems leaders, and policy-makers make well-informed decisions and thereby improve the quality of health care services. While patients and others may access this document, the document is made available for informational purposes only and no representations or warranties are made with respect to its fitness for any particular purpose. The information in this document should not be used as a substitute for professional medical advice or as a substitute for the application of clinical judgment in respect of the care of a particular patient or other professional judgment in any decision-making process. The Canadian Agency for Drugs and Technologies in Health (CADTH) does not endorse any information, drugs, therapies, treatments, products, processes, or services.

While care has been taken to ensure that the information prepared by CADTH in this document is accurate, complete, and up to date as at the applicable date the material was first published by CADTH, CADTH does not make any guarantees to that effect. CADTH does not guarantee and is not responsible for the quality, currency, propriety, accuracy, or reasonableness of any statements, information, or conclusions contained in any third-party materials used in preparing this document. The views and opinions of third parties published in this document do not necessarily state or reflect those of CADTH.

CADTH is not responsible for any errors, omissions, injury, loss, or damage arising from or relating to the use (or misuse) of any information, statements, or conclusions contained in or implied by the contents of this document or any of the source materials.

This document may contain links to third-party websites. CADTH does not have control over the content of such sites. Use of third-party sites is governed by the third-party website owners' own terms and conditions set out for such sites. CADTH does not make any guarantee with respect to any information contained on such third-party sites and CADTH is not responsible for any injury, loss, or damage suffered as a result of using such third-party sites. CADTH has no responsibility for the collection, use, and disclosure of personal information by third-party sites.

Subject to the aforementioned limitations, the views expressed herein do not necessarily reflect the views of Health Canada, Canada's provincial or territorial governments, other CADTH funders, or any third-party supplier of information.

This document is prepared and intended for use in the context of the Canadian health care system. The use of this document outside of Canada is done so at the user's own risk.

This disclaimer and any questions or matters of any nature arising from or relating to the content or use (or misuse) of this document will be governed by and interpreted in accordance with the laws of the Province of Ontario and the laws of Canada applicable therein, and all proceedings shall be subject to the exclusive jurisdiction of the courts of the Province of Ontario, Canada.

The copyright and other intellectual property rights in this document are owned by CADTH and its licensors. These rights are protected by the Canadian *Copyright Act* and other national and international laws and agreements. Users are permitted to make copies of this document for non-commercial purposes only, provided it is not modified when reproduced and appropriate credit is given to CADTH and its licensors.

About CADTH: CADTH is an independent, not-for-profit organization responsible for providing Canada's health care decision-makers with objective evidence to help make informed decisions about the optimal use of drugs, medical devices, diagnostics, and procedures in our health care system.

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

Questions or requests for information about this report can be directed to requests@cadth.ca

Key Messages

- One systematic review and 1 randomized controlled trial were identified regarding the clinical effectiveness of antibiotic solutions used in surgical irrigation.
- Two evidence-based guidelines were identified regarding the use of antibiotic solutions for surgical irrigation to prevent infection.

Research Questions

1. What is the clinical effectiveness of antibiotic solutions used in surgical irrigation?
2. What are the evidence-based guidelines regarding the use of antibiotic solutions for surgical irrigation to prevent infection?

Methods

Literature Search Methods

A limited literature search was conducted by an information specialist on key resources including MEDLINE, Embase, the Cochrane Library, 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 antibiotic irrigation and surgery. Search filters were applied to limit retrieval to health technology assessments, systematic reviews, meta-analyses or network meta-analyses, randomized controlled trials or controlled clinical trials, or guidelines. Comments, newspaper articles, editorials, and letters were excluded. Where possible, retrieval was limited to the human population. The search was also limited to English-language documents published between January 1, 2011 and September 30, 2021.

Selection Criteria and Summary Methods

One reviewer screened 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.

Results

One systematic review¹ and 1 randomized controlled trial² were found regarding the clinical effectiveness of antibiotic solutions used in surgical irrigation. Two evidence-based

Table 1: Selection Criteria

Criteria	Description
Population	Individuals (of any age) undergoing any type of surgery
Intervention	Antibiotic solutions used in surgical irrigation (e.g., bacitracin, vancomycin, cefazolin, gentamicin)
Comparator	Q1: Standard of care, non-antibiotic irrigation solutions (e.g., saline solution, antiseptic solution [e.g., chlorhexidine, povidone-iodine, acetic acid, sodium hypochlorite]), and/or IV infusion of pre-operation antibiotic prophylaxis Q2: Not applicable
Outcomes	Q1: Clinical effectiveness (e.g., surgery-related infections, post-inoperative infections up to 30 days, wound healing, length of stay in hospital, and safety) Q2: Recommendations regarding the use of antibiotic solutions in surgical irrigation
Study designs	Health technology assessments, systematic reviews, randomized controlled trials, evidence-based guidelines

guidelines^{3,4} were identified regarding the use of antibiotic solutions for surgical irrigation to prevent infection.

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

Overall Summary of Findings

Two studies, 1 systematic review,¹ and 1 randomized controlled trial² were identified regarding the clinical effectiveness of antibiotic solutions for surgical irrigation. The systematic review¹ found 1 study that evaluated differences in endophthalmitis between groups of patients irrigated with antibiotics in a balanced salt solution versus a balanced salt solution alone during cataract surgery. However, the study was not sufficiently powered to detect differences in endophthalmitis between the intervention and comparator group. The randomized controlled trial² found that the addition of gentamicin to saline for irrigation during anterior cruciate ligament reconstruction did not decrease post-operative deep infections when compared to normal saline alone. Detailed summaries of the studies are provided in Table 2.

One evidence-based guideline³ did not recommend the use of antibiotics for irrigation of incisional wounds to prevent surgical site infections due to the low quality of evidence available. Another evidence-based guideline⁴ only recommended the use of antibiotics before wound closure in clinical research settings.

Table 2: Summary of Included Studies

First author (year)	Study population	Intervention and comparator	Relevant outcomes	Authors' conclusions
Systematic review				
Gower (2017)¹	Adults who required cataract surgery (any method and incision type) for lens opacities due to any origin N = 101,005	RCTs included evaluated preoperative, intraoperative, or post-operative antibiotic prophylaxis for acute endophthalmitis. Studies that evaluated antiseptic preoperative preparations (e.g., povidine-iodine) or antibiotics for treating acute endophthalmitis after surgery were excluded.	One study compared differences in endophthalmitis between groups that underwent irrigation with antibiotics (vancomycin and gentamicin) in BSS vs. BSS alone.	The study was not sufficiently powered to detect differences between groups and was assessed to be of low-certainty evidence.
Randomized controlled trial				
Yazdi (2014)²	Patients who required ACL reconstruction with a hamstring autograft N = 360	Intervention: Preoperative antibiotics and irrigation with saline (0.9%) and gentamicin (80 mg/L) Comparator: Preoperative antibiotics and irrigation with saline (0.9%)	Post-operative deep infection (septic arthritis)	Using gentamicin in the irrigation solution during ACL reconstruction does not decrease post-operative septic arthritis.

ACL = anterior cruciate ligament; BSS = balanced salt solution; RCT = randomized controlled trial; vs. = versus.

References

Health Technology Assessments

No literature identified.

Systematic Reviews and Meta-analyses

1. Gower EW, Lindsley K, Tulenko SE, Nanji AA, Leyngold I, McDonnell PJ. Perioperative antibiotics for prevention of acute endophthalmitis after cataract surgery. *Cochrane Database Syst Rev.* 2017 02 13;2:CD006364. [PubMed](#)

Randomized Controlled Trials

2. Yazdi H, Moradi A, Herbort M. The effect of gentamicin in irrigating solutions on articular infection prophylaxis during arthroscopic ACL reconstruction. *Arch Orthop Trauma Surg.* 2014 Feb;134(2):257-261. [PubMed](#)

Guidelines and Recommendations

3. National Institute for Health Care and Excellence. Surgical site infections: prevention and treatment. (*NICE guideline NG125*) 2020; <https://www.nice.org.uk/guidance/ng125>. Accessed 2021 Oct 04.
See: Section 1.3.18 antiseptics and antibiotics before wound closure (page 12)
4. Global guidelines for the prevention of surgical site infection. Geneva (CH): World Health Organization (WHO); 2016: <https://apps.who.int/iris/bitstream/handle/10665/250680/9789241549882-eng.pdf>. Accessed 2021 Oct 04.
See: Section 4.18 incisional wound irrigation (page 140)

Appendix 1: References of Potential Interest

Systematic Review and Meta-Analyses

Antibiotic Not Specified

5. Awad AN, Heiman AJ, Patel A. Implants and Breast Pocket Irrigation: Outcomes of Antibiotic, Antiseptic, and Saline Irrigation. *Aesthet Surg J*. 2021 Apr 09;sjab181. [PubMed](#)
6. Baker NF, Hart AM, Carlson GW, Losken A. A Systematic Review of Breast Irrigation in Implant-Based Breast Surgery. *Ann Plast Surg*. 2021 03 01;86(3):359-364. [PubMed](#)
7. Thom H, Norman G, Welton NJ, Crosbie EJ, Blazeby J, Dumville JC. Intra-Cavity Lavage and Wound Irrigation for Prevention of Surgical Site Infection: Systematic Review and Network Meta-Analysis. *Surg Infect (Larchmt)*. 2021 Mar;22(2):144-167. [PubMed](#)
8. Lopez-Cano M, Kraft M, Curell A, et al. Use of Topical Antibiotics before Primary Incision Closure to Prevent Surgical Site Infection: A Meta-Analysis. *Surg Infect (Larchmt)*. 2019 May-June;20(4):261-270. [PubMed](#)
9. Frois AO, Harbour PO, Azimi F, et al. The Role of Antibiotics in Breast Pocket Irrigation and Implant Immersion: A Systematic Review. *Plast Reconstr Surg Glob Open*. 2018 Sep;6(9):e1868. [PubMed](#)
10. Lynch JM, Sebai ME, Rodriguez-Unda NA, Seal S, Rosson GD, Manahan MA. Breast Pocket Irrigation with Antibiotic Solution at Implant Insertion: A Systematic Review and Meta-Analysis. *Aesthetic Plast Surg*. 2018 Oct;42(5):1179-1186. [PubMed](#)
11. Samargandi OA, Joukhadar N, Al Youha S, Thoma A, Williams J. Antibiotic Irrigation of Pocket for Implant-Based Breast Augmentation to Prevent Capsular Contracture: A Systematic Review. *Plast Surg (Oakv)*. 2018 May;26(2):110-119. [PubMed](#)
12. De Jonge SW, Boldingh QJJ, Solomkin JS, et al. Systematic Review and Meta-Analysis of Randomized Controlled Trials Evaluating Prophylactic Intra-Operative Wound Irrigation for the Prevention of Surgical Site Infections. *Surg Infect (Larchmt)*. 2017 May/June;18(4):508-519. [PubMed](#)
13. Drinane JJ, Chowdhry T, Pham TH, Ritter E. Examining the Role of Antimicrobial Irrigation and Capsular Contracture: A Systematic Review and Meta-analysis. *Ann Plast Surg*. 2017 Jul;79(1):107-114. [PubMed](#)
14. Kang FG, Liu PJ, Liang LY, et al. Effect of pocket irrigation with antimicrobial on prevention of pacemaker pocket infection: a meta-analysis. *BMC Cardiovasc Disord*. 2017 Sep 30;17(1):256. [PubMed](#)
15. Nabhan AF, Allam NE, Hamed Abdel-Aziz Salama M. Routes of administration of antibiotic prophylaxis for preventing infection after caesarean section. *Cochrane Database Syst Rev*. 2016 Jun 17;6:CD011876. [PubMed](#)
16. Huang N, Liu M, Yu P, Wu J. Antibiotic prophylaxis in prosthesis-based mammoplasty: a systematic review. *Int J Surg*. 2015 Mar;15:31-37. [PubMed](#)
17. Mueller TC, Loos M, Haller B, et al. Intra-operative wound irrigation to reduce surgical site infections after abdominal surgery: a systematic review and meta-analysis. *Langenbeck's Arch Surg*. 2015 February;400(2):167-181. [PubMed](#)

Randomized Controlled Trials

Antibiotic Not Specified

18. Nguyen L, Afshari A, Green J, et al. Post-Mastectomy Surgical Pocket Irrigation With Triple Antibiotic Solution vs Chlorhexidine Gluconate: A Randomized Controlled Trial Assessing Surgical Site Infections in Immediate Tissue Expander Breast Reconstruction. *Aesthet J Surg*. 2021 Jul 22;sjab290. [PubMed](#)

Unclear Indication for Surgical Use in Canada

19. Negahi A, Arminfar A, Vaseghi H, Moradi M, Alemrajabi M. Evaluating the effect of gentamicin-clindamycin lavage on post-operational pain and infection through laparoscopic colectomy surgery. *J Coloproctol*. 2020 Jan-Mar;40(01):008-011.
20. Okunlola AI, Adeolu AA, Malomo AO, Okunlola CK, Shokunbi MT. Intra-operative wound irrigation with ceftriaxone does not reduce surgical site infection in clean neurosurgical procedures. *Br J Neurosurg*. 2020 Aug 31:1-4. [PubMed](#)
21. Sandhiya P, Sureshkumar S, Vijayakumar C, Palanivel C. Role of intraoperative wound irrigation with antibiotics in reducing surgical site infection in patients undergoing contaminated and dirty midline laparotomy surgical wound: a pilot study. *Int Surg J*. 2018 Jul;5(7):2595-2599.
22. Ruiz-Tovar J, Llaverro C, Munoz JL, Zubiaga L, Diez M. Effect of Peritoneal Lavage with Clindamycin-Gentamicin Solution on Post-Operative Pain and Analytic Acute-Phase Reactants after Laparoscopic Sleeve Gastrectomy. *Surg Infect (Larchmt)*. 2016 Jun;17(3):357-362. [PubMed](#)
23. Ruiz-Tovar J, Santos J, Arroyo A, et al. Effect of peritoneal lavage with clindamycin-gentamicin solution on infections after elective colorectal cancer surgery. *J Am Coll Surg*. 2012 Feb;214(2):202-207. [PubMed](#)

Non-Randomized Studies

24. Manka MG, Yang D, Andrews J, et al. Intraoperative Use of Betadine Irrigation is Associated With a 9-Fold Increased Likelihood of Penile Prosthesis Infection: Results From a Retrospective Case-Control Study. *Sex Med*. 2020 Sep;8(3):422-427. [PubMed](#)

25. Mohole J, Ho AL, Cannon JGD, et al. Topical Vancomycin for Surgical Prophylaxis in Pediatric Craniofacial Surgeries. *J Craniofac Surg*. 2019 Oct;30(7):2163-2167. [PubMed](#)
26. Schelonka LP, Sabell MA. Postcataract endophthalmitis prophylaxis using irrigation, incision hydration, and eye pressurization with vancomycin. *Clin Ophthalmol*. 2015 17 Jul;9:1337-1345. [PubMed](#)

Guidelines and Recommendations

Alternative Population

27. Ibrahim Y, Jamal S, Akhtar K. The evidence base for 2017 BOAST-4 guidance on open fracture management: are we due an update? *J Clin Orthop Trauma*. 2021 Apr 01;17:233-238. [PubMed](#)

Methods Not Specified

28. AHS recommended drug regimens for surgical prophylaxis. Edmonton (AB): Alberta Health Services; 2018: <https://www.albertahealthservices.ca/assets/info/hp/as/if-hp-as-surgical-prophylaxis.pdf>. Accessed 2021 Oct 08.

Review Articles

29. Papadakis M. Wound irrigation for preventing surgical site infections. *World J Methodol*. 2021 Jul 20;11(4):222-227. [PubMed](#)
30. Arora A, Bharadwaj P, Chaturvedi H, et al. A review of prevention of surgical site infections in Indian hospitals based on global guidelines for the prevention of surgical site infection, 2016. *J Patient Saf Infect Control*. 2018 January-April;6(1):1-12.
31. Edmiston CE, Jr., Leaper DJ. Intra-Operative Surgical Irrigation of the Surgical Incision: What Does the Future Hold-Saline, Antibiotic Agents, or Antiseptic Agents? *Surg Infect (Larchmt)*. 2016 Dec;17(6):656-664. [PubMed](#)
32. Brongo S, Pagliara D, Cuomo R, et al. Infections in breast implants: A review with a focus on developing countries. *J Infect Dev Ctries*. 2014 Sep 12;8(9):1089-1095. [PubMed](#)
33. Barnes S, Spencer M, Graham D, Johnson HB. Surgical wound irrigation: a call for evidence-based standardization of practice. *Am J Infect Control*. 2014 May;42(5):525-529. [PubMed](#)

Additional References

34. Abboud K, Blee J, Shah PJ. Antibiotic irrigation solutions for prevention of surgical site infections: A call to action. *Am J Health Syst Pharm*. 2020 Dec 4;77(24):2040-2041. [PubMed](#)