CADTH COVID-19 PANDEMIC

COVID-19 CADTH REFERENCE LIST

Disposable Continuous Positive Airway Pressure Devices for Respiratory Distress: Clinical Effectiveness and Guidelines

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To produce this report, CADTH used a modified approach to the selection, appraisal, and synthesis of the evidence to meet decision-making needs during the COVID-19 pandemic. Care has been taken to ensure the information is accurate and complete, but it should be noted that international scientific evidence about COVID-19 is changing and growing rapidly.

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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.

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

Research Questions

1. What is the comparative clinical effectiveness of disposable continuous positive airway pressure devices versus mechanical continuous positive airway pressure devices for patients in respiratory distress?
2. What are the evidence based guidelines regarding the use of disposable continuous positive airway pressure devices?

Key Findings

One non-randomized study was identified regarding the comparative clinical effectiveness of disposable continuous positive airway pressure devices versus mechanical continuous positive airway pressure devices for patients in respiratory distress. No evidence-based guidelines were identified regarding the use of disposable continuous positive airway pressure devices.

Methods

A limited literature search was conducted by an information specialist on key resources including PubMed, Medline via Ovid, 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 disposable continuous positive airway pressure systems and patients in respiratory distress. No filters were applied to limit the retrieval by study type. The search was limited to English language documents published between Jan 1, 2015 and May 5, 2020. 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	Patients in respiratory distress (i.e., difficulty breathing)
Intervention	Disposable, hospital grade continuous positive airway pressure devices (e.g., Flow-Safe II® system)
Comparator	Q1: Standard mechanical, hospital grade continuous positive airway pressure devices (e.g., Carestream PortO2vent, MAC device) Q2: Not applicable
Outcomes	Q1: Clinical effectiveness (e.g., pulmonary function, respiratory rate, need for ventilation, hospitalization) and safety (e.g., infection, death) Q2: Recommendations regarding the use of disposable continuous positive airway pressure devices
Study Designs	Health technology assessments, systematic reviews, randomized controlled trials, non-randomized studies, 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 study[1] was identified regarding the comparative clinical effectiveness of disposable continuous positive airway pressure devices versus mechanical continuous positive airway pressure devices for patients in respiratory distress. No evidence-based guidelines were identified regarding the use of disposable continuous positive airway pressure devices. Additionally, no relevant health technology assessments, systematic reviews, or randomized clinical trials were identified.

Additional references of potential interest are provided in the appendix.

Health Technology Assessments

No literature identified.

Systematic Reviews and Meta-Analyses

No literature identified.

Randomized Controlled Trials

No literature identified.

Non-Randomized Studies

1. Uz I, Kiyan GS, Ozcete E, et al. Is the flow-safe disposable continuous positive airway pressure (CPAP) system as effective as non-invasive mechanical ventilation (NIMV) in the treatment of acute cardiogenic pulmonary Oedema? [published online ahead of print, 2020 Jan 18]. *Am J Emerg Med.* 2020;S0735-6757(20)30033-4. PubMed: PM31983599

Guidelines and Recommendations

No literature identified.

Appendix — Further Information

Health Technology Assessments

Alternative Comparator

2. Pandor A, Thokala P, Goodacre S, Poku E, Stevens JW, Ren S, et al. Pre-hospital non-invasive ventilation for acute respiratory failure: a systematic review and cost-effectiveness evaluation. *Health Technol Assess* 2015;19(42) https://njl-admin.nihr.ac.uk/document/download/2002728 Accessed 2020 May 6.
See: Effects of interventions, page 20

Randomized Controlled Trials

Alternative Comparator

3. Medical Technology Transfer and Services Hong Kong Ltd. Comparison of CPAP Machines With Reusable vs Disposable Circuits. 2017 April 20. [last updated 2019 November 20]. In: *ClinicalTrials.gov*. Bethesda (MD): U.S. National Library of Medicine. https://clinicaltrials.gov/ct2/show/study/NCT03121612 Accessed 2020 May 6.

4. McCollum ED, Mvalo T, Eckerle M, et al. Bubble continuous positive airway pressure for children with high-risk conditions and severe pneumonia in Malawi: an open label, randomised, controlled trial. *Lancet Respir Med*. 2019;7(11):964 - 974. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6838668/ Accessed 2020 May 6.

Study Protocol

5. Fuller GW, Goodacre S, Keating S, et al. The ACUTE (Ambulance CPAP: Use, Treatment effect and economics) feasibility study: a pilot randomised controlled trial of prehospital CPAP for acute respiratory failure. *Pilot Feasibility Stud.* 2018;4:86. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6004668/ Accessed 2020 May 6.

Non-Randomized Studies

Alternative Comparator

6. Nielsen VM, Madsen J, Aasen A, et al. Prehospital treatment with continuous positive airway pressure in patients with acute respiratory failure: a regional observational study. Scand J Trauma *Resusc Emerg Med*. 2016;24(1):121. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5057371/ Accessed 2020 May 6.

No Comparator

7. Luiz T, Kumpch M, Gruttner J, Madler C, Viergutz T. Prehospital CPAP Therapy by Emergency Physicians in Patients with Acute Respiratory Failure due to Acute Cardiogenic Pulmonary Edema or Acutely Exacerbated COPD. *In Vivo*. 2016 Mar-Apr;30(2):133-139. PubMed: PM26912824

8. Willmore A, Dionne R, Maloney J, Ouston E, Stiell I. Effectiveness and safety of a prehospital program of continuous positive airway pressure (CPAP) in an urban setting. *CJEM*. 2015;17(6):609-616. PubMed: PM25800082

Review Articles

9. AlAhmari M, Sreedharan J. Noninvasive ventilation in prehospital settings: A narrative review. *Indian J Res Care*. 2020;9(1):20-25. http://www.ijrconline.org/article.asp?issn=2277-9019;year=2020;volume=9;issue=1;spage=20;epage=25;aulast=AlAhmari Accessed 2020 May 6.

Additional References

10. EMS, Prehospital CPAP Devices; 2019. Treasure Island (FL): StatPearls Publishing; https://www.ncbi.nlm.nih.gov/books/NBK470429/ Accessed 2020 May 6.

11. Ministry of Health and Long-Term Care. Provincial Equipment Standards for Ontario Ambulance Services. Toronto: The Ministry; 2018. http://www.health.gov.on.ca/en/pro/programs/emergency_health/docs/pes_ambulance_services_v3.4.pdf Accessed 2020 May 6.
See: Part C – Auxiliary Equipment Standards, Continuous Positive Airway Pressure Unit - No. A-910, page 115

12. Boussignac CPAP. Ecouen (FR): Vygon; 2017. https://www.vygon.com/catalog/?prd=00556332&doc=2299 Accessed 2020 May 6.
See: "What are the indications for Boussignac CPAP?", page 3