Noninvasive positive pressure ventilation (NPPV) has gained wide acceptance in past two decades in the management of acute and chronic respiratory failure in both hospital and home settings, mainly through achieving a reduction of intubation, mortality, and complications. A variety of ventilation modes, for example bi-level positive airway pressure (BPAP), continuous positive airway pressure (CPAP), and proportional-assist ventilation (PAV), are applied in NPPV. Most experience with NPPV in patients with an exacerbation of their underlying chronic obstructive pulmonary disease (COPD) has been with BPAP; CPAP is used less frequently for this condition. On the other hand, both BPAP and CPAP are effective in patients with congestive heart failure (CHF), with CPAP possibly being more effective as a first-line therapy. Facial and nasal pressure injury and sores, gastric distension, dry mucous membranes and thick secretions, and aspiration of gastric contents are complications of noninvasive ventilation (NIV). There are a few weaning strategies used to decrease the amount of mechanical ventilator support until discontinuation, and successful weaning leads to less morbidity, mortality and resource utilization.

Utilization of NPPV is variable among hospitals, health regions, and countries. BPAP has proven ideal for home use or areas other than critical care settings because bi-level devices are more portable and less expensive. In real world practice, emergency medical services (EMS) may apply CPAP to patients with acute respiratory conditions in the pre-hospital setting. When patients are transported to the emergency department (ED) tertiary facilities, BPAP is used for those patients as a support for weaning and next-step care. A previous CADTH report, published in June 2008, reported that no evidence regarding the use of CPAP for the management of acute respiratory distress in pre-hospital and rural community settings was found from health technology assessments (HTAs), economic analyses, or randomized controlled trials (RCTs).
The purpose of this report is to review the clinical evidence regarding BPAP as a weaning respiratory intervention for adult patients in rural settings with acute respiratory exacerbations or congestive conditions effectively managed by CPAP ventilation in pre-hospital settings. Evidence-based guidelines regarding optimal care to support successful weaning from CPAP in a similar population will also be reviewed.

**RESEARCH QUESTIONS**

1. What is the clinical evidence regarding the use of non-invasive bi-level positive airway pressure (BPAP) as a weaning respiratory intervention for adult patients who have received pre-hospital non-invasive continuous positive airway pressure (CPAP) to manage acute respiratory exacerbations or congestive conditions?

2. What is the comparative evidence regarding the use of non-invasive BPAP versus other methods to assist with weaning from non-invasive CPAP in adult patients requiring pre-hospital airway support due to acute respiratory exacerbations or congestive conditions?

3. What are the evidence-based guidelines regarding the optimal interventions and care pathways to support successful weaning from non-invasive CPAP in adult patients requiring pre-hospital airway support?

**KEY MESSAGE**

No clinical evidence was identified regarding the use of BPAP as a weaning respiratory intervention for adult patients requiring pre-hospital CPAP support to manage acute respiratory exacerbations or congestive conditions. No evidence-based guidelines were identified with recommendations for optimal care to support successful weaning from CPAP.

**METHODS**

**Literature Search Strategy**

A limited literature search was conducted on key resources including PubMed, The Cochrane Library (2012, Issue 4), University of York Centre for Reviews and Dissemination (CRD) databases, Canadian and major international health technology agencies, as well as a focused Internet search. 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, 2005 and May 15, 2012.

**Selection Criteria and Methods**

One reviewer screened titles and abstracts of the retrieved publications and evaluated the full-text publications for the final article selection according to selection criteria presented in Table 1.
Table 1: Selection Criteria

<table>
<thead>
<tr>
<th>Population</th>
<th>Adult patients in rural settings with respiratory symptoms (i.e. acute respiratory exacerbations or congestive conditions) effectively managed by non-invasive CPAP ventilation in pre-hospital settings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intervention</td>
<td>Use of non-invasive BPAP to assist with weaning from CPAP</td>
</tr>
<tr>
<td>Comparator</td>
<td>Q1- No comparator/any comparator</td>
</tr>
<tr>
<td></td>
<td>Q2 - Other medical interventions (for example. diuretics, continuation with CPAP) to wean patients effectively</td>
</tr>
<tr>
<td>Outcomes</td>
<td>Q1 - Successful weaning from non-invasive ventilation with improvement in condition; improved patient outcomes; non-clinical implications (e.g. optimal resource use, limited supply of oxygen in ambulances, optimal transport experience)</td>
</tr>
<tr>
<td></td>
<td>Q2 – Comparative evidence regarding successful weaning from non-invasive ventilation with improvement in condition; improved patient outcomes; non-clinical implications (e.g. optimal resource use, limited supply of oxygen in ambulances, optimal transport experience)</td>
</tr>
<tr>
<td></td>
<td>Q3 – Guidelines, optimal treatment pathways, and optimal treatment for weaning.</td>
</tr>
<tr>
<td>Study Designs</td>
<td>Health technology assessments (HTA), systematic reviews (SR) and meta-analyses (MA), randomized controlled trials (RCT), non-randomized studies, and evidence-based guidelines</td>
</tr>
</tbody>
</table>

Exclusion Criteria

Studies were excluded if they did not meet the selection criteria, were published prior to 2005, or were duplicate publications.

SUMMARY OF EVIDENCE

Quantity of Research Available

The literature search yielded 143 citations. Upon screening titles and abstracts, 138 citations were excluded and 5 potentially relevant articles were retrieved for full-text review. No potentially relevant reports were identified through grey literature searching. Of the 5 potentially relevant reports, none met the inclusion criteria. The study selection process is outlined in a PRISMA flowchart (Appendix 1). Additional references of potential interest are provided in the Appendix 2. The primary reason for exclusion was incorrect intervention (n=3 studies). These studies focused on noninvasive ventilation (NIV) for acute respiratory failure, not weaning from CPAP to BPAP.
CONCLUSIONS AND IMPLICATIONS FOR DECISION OR POLICY MAKING

No conclusions can be drawn regarding the use of BPAP as a weaning respiratory intervention for adult patients who have received pre-hospital CPAP to manage acute conditions, as no evidence was identified.

PREPARED BY:
Canadian Agency for Drugs and Technologies in Health
Tel: 1-866-898-8439
www.cadth.ca
REFERENCES


APPENDIX 1: Selection of Included Studies

143 citations identified from electronic literature search and screened

138 citations excluded

5 potentially relevant articles retrieved for scrutiny (full text, if available)

0 potentially relevant reports retrieved from other sources (grey literature, hand search)

5 potentially relevant reports

5 reports excluded:
- irrelevant intervention (3)
- irrelevant population (1)
- other (review articles) (1)

0 reports included in review
APPENDIX 2: Additional Articles of Potential Interest


