

Review: several interventions prevent ventilator associated pneumonia in critically ill patients

Collard HR, Saint S, Matthay MA. *Prevention of ventilator-associated pneumonia: an evidence-based systematic review. Ann Intern Med* 2003;138:494–501.

QUESTION: Which interventions prevent ventilator associated pneumonia (VAP) in critically ill patients?

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Data sources

English language studies were identified by searching Medline (1966–2001) and the Cochrane Library, and by reviewing bibliographies of retrieved articles.

Study selection

Studies were selected if they were randomised controlled trials (RCTs) or observational cohort controlled trials.

Data extraction

Data were extracted on study design, intervention, and outcomes.

Main results

34 studies met the selection criteria. Meta-analysis was not done because of study variations in the diagnostic criteria for pneumonia. Results are summarised in the table.

Conclusions

Semirecumbent positioning, stress ulcer prophylaxis (sucralfate rather than H₂ antagonists), aspiration of subglottic secretions, selective digestive tract decontamination, and oscillating beds reduce ventilator associated pneumonia (VAP) in select critically ill patients. No evidence currently supports specific methods of enteral feeding or increased frequency of ventilator circuitry changes for prevention of VAP.

*Effectiveness of interventions for preventing ventilator associated pneumonia (VAP) in critically ill patients**

Intervention	Results
Semirecumbent v supine positioning† (3 trials, n=116)	↓ VAP (1 RCT, n=86); ↓ gastroesophageal reflux and aspiration events (2 controlled clinical trials, n=30); no difference in mortality (1 RCT, n=86)
Stress ulcer prophylaxis: sucralfate v H ₂ antagonists (7 MAs of >20 RCTs; 1 recent RCT, n=1200)	↓ VAP (4 of 7 MAs), 3 MAs found no difference; ↓ mortality (3 of 4 MAs); equivocal evidence regarding increased gastrointestinal bleeding (2 MAs), 1 recent RCT (n=1200) found increased bleeding
Aspiration of subglottic secretions v none† (3 RCTs, n=641)	no difference in VAP (2 RCTs, n=496), reduced VAP (1 RCT, n=145), delayed time to VAP development (3 RCTs, n=641); no difference in mortality (3 RCTs, n=641)
Oscillating v standard non-oscillating beds† (1 MA of 6 RCTs; 1 recent RCT, n=103)	↓ pneumonia (1 MA), no difference (1 RCT, n=103); no difference in mortality (1 MA, 1 RCT, n=103)
Selective digestive tract decontamination v none† (7 MAs of >40 RCTs)	↓ VAP (7 MAs); ↓ mortality (4 of 7 MAs)
Topical + systemic antibiotics v none†	↓ VAP (3 of 3 MAs); ↓ mortality (4 of 4 MAs)
Topical antibiotics alone v none†	↓ VAP (3 of 3 MAs); no difference in mortality (4 of 4 MAs)
Ventilator circuit management (4 RCTs, n=NA)	
Fewer v more changes (4 RCTs)	no difference in VAP (4 RCTs)
Fewer v more changes in heat and moisture exchangers (1 RCT)	no difference in VAP (1 RCT)
Heat and moisture exchanger v humidifier (1 MA of 5 RCTs)	no difference in VAP (4 of 5 RCTs in 1 MA); no difference in mortality (4 of 4 RCTs in 1 MA)
Enteral feeding methods (4 RCTs, n=504)	
Small intestinal v gastric feeding	no difference in VAP or mortality (1 RCT, n=44)
Metoclopramide v none†	no difference in VAP or mortality (1 RCT, n=305)
Acidified v normal feedings†	no difference in VAP or mortality (1 RCT, n=95)
Intermittent v continuous feeding	no difference in VAP or mortality (1 RCT, n=60)

*RCT = randomised controlled trial, MA = meta-analysis, NA = not available.

†Information on comparison group provided by author.

COMMENTARY

VAP is a common condition among critically ill patients and a burden to healthcare systems. Although the incidence of VAP is difficult to determine because of diagnostic variability, research shows a 20–30% mortality rate,¹ longer ICU and hospital stays, and higher hospital costs for patients with VAP.²

The systematic review by Collard *et al* provides a thorough analysis of the evidence to date, highlighting the considerable gaps in our knowledge. In selecting studies for inclusion, the authors noted the lack of standardised diagnostic criteria, which prevented pooling of individual study results in a meta-analysis. Diagnostic criteria for VAP may include fever, leukocytosis, purulent secretions, and changes on chest radiography and microbiology. Limitations of existing studies included small sample sizes, lack of power, and equivocal and conflicting findings.

Although semirecumbent positioning of all eligible patients appears easy, inexpensive, and relatively uncontroversial, evidence on practices such as oscillation beds and selective digestive decontamination is equivocal. Collard *et al* correctly attributed these conflicting findings to differences in inclusion criteria, outcome measures, and analyses used in individual studies. They also caution practitioners about the use of selective digestive tract decontamination because of uncertainties about effects of such treatment on antibiotic resistance, although no additional evidence to support this was included in the review.

Although cost may be a barrier for many of these practices, it is important to educate clinicians to take measures to prevent and recognise symptoms, and diagnose VAP. Collard *et al* also noted that to date, no RCT has evaluated the effectiveness of combined preventative practices. Given the high mortality rate associated with VAP, this research should be a priority.

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- 1 Chastre J, Fagon JY. *Am J Respir Crit Care Med* 2002;165:867–903.
- 2 Warren DK, Shukla SJ, Olsen MA, *et al. Crit Care Med* 2003;31:1312–7.