

Which heat and moisture exchanger (HME) with bacteria-filtering property should be used?

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Study population: mechanical ventilated ICU patients

Comparison: different HMEs with bacteria-filtering property compared to each other

Outcome: ventilator-associated pneumonia

Methods

Data sources

Publications were retrieved by a search of Medline and the Cochrane Library up to february 2006. Terms included were 'pneumonia' and 'ventilator*' and 'heat and moisture exchanger*'. To identify randomised controlled trials in Medline the following search strategy was used: (humid* OR humidification OR circuit* OR humidity OR humidifier OR humidifiers OR heat and moisture exchanger* OR artificial nose) AND (((ventilator associated pneumonia) OR (VAP AND (pneumonia OR pneum*)) OR ("Respiration, Artificial"[MAJR] AND pneumonia) OR (ventilated AND pneumonia) OR (ventilation AND pneumonia)) AND (((randomized controlled trial[pt] OR controlled clinical trial[pt] OR randomized controlled trials[mh] OR random allocation[mh] OR double-blind method[mh] OR single-blind method[mh] OR clinical trial[pt] OR clinical trials[mh] OR ("clinical trial"[tw]) OR ((singl*[tw] OR doubl*[tw] OR trebl*[tw] OR tripl*[tw]) AND (mask*[tw] OR blind*[tw])) OR ("latin square"[tw]) OR placebos[mh] OR placebo*[tw] OR random*[tw] OR research design[mh:noexp] OR comparative study[mh] OR evaluation studies[mh] OR follow-up studies[mh] OR prospective studies[mh] OR cross-over studies[mh] OR control*[tw] OR prospective*[tw] OR volunteer*[tw]) NOT (animal[mh] NOT human[mh])))). Additionally, all reference lists of identified trials were examined.

Selection criteria

All randomised and quasi-randomised trials comparing different brands of HMEs and ventilator-associated pneumonia as the outcome measure.

Review methods

Data were extracted by two reviewers independently and compared. Disagreements were resolved by discussion. Data from the original publications were used to calculate the relative risk of ventilator-associated pneumonia. Data for similar outcomes were combined in the analysis where appropriate, using a random-effects model.

Results

Two parallel-group randomised controlled trials were included (1, 2).

Study population, interventions and outcome definitions

See Table I

Validity assessment

See Table II

Summary estimates of associations between treatment and control group

See Figure I

Table I: Study population, interventions and outcome definitions

	Participants	Interventions	Definition of ventilator associated pneumonia (VAP)
Thomachot et al. 1999	<p>Incl: all ICU patients, ventilation \geq 24 hrs</p> <p>Excl: not reported</p> <p>Mean number of ventilation days (SD): T: 11.1(6.8); C: 12.3(7.8)</p>	<p>Treatment (77 analyzed): Humid-Vent Filter Light (Louis Gibek AB, Upplands-Vasby, Sweden)</p> <p>Control (63 analyzed): Clear ThermaI 1841 (Intersurgical, Fontenay-sousbois, France)</p> <p>Note: 1) HMEs with different humidification compounds and different filter membranes; 2) HMEs changed daily</p> <p>End of the study protocol: not reported</p>	<p>VAP was defined as purulent ETS or worsening of PaO₂ and new infiltrates and a positive quantitative culture from a distal airway sample (BAL \geq 10⁴ CFU/ml or PSB \geq 10³ CFU/ml)</p>

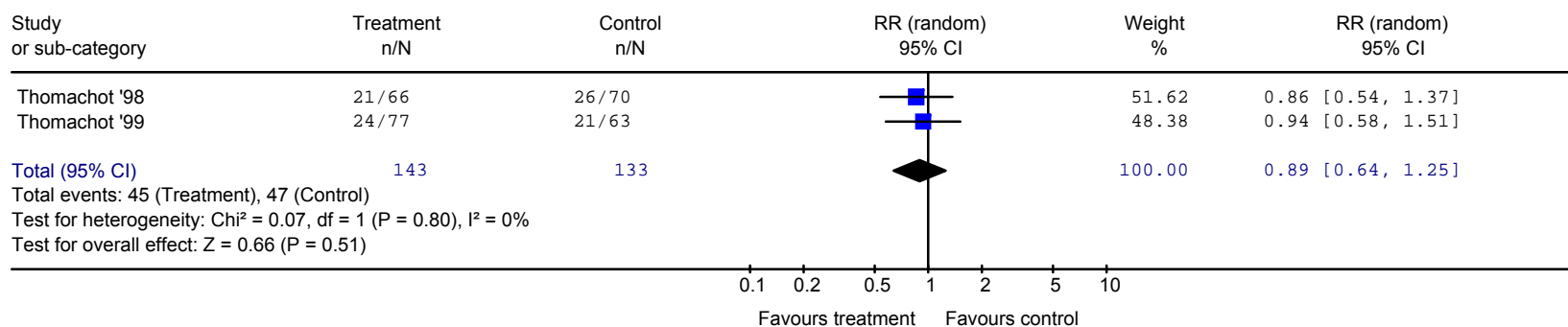
Thomachot et al. 1998	<p>Incl: all ICU patients, ventilation \geq 24 hrs, no contraindications of HMEFs (bronchopleuro-cutaneous fistula, hemoptysis, significant gas leakage around the tracheal tube cuff)</p> <p>Excl: not reported</p> <p>Mean number of ventilation days (SD): T: 11.7 (11.0); C: 12.2 (12.0)</p>	<p>Treatment (66 analyzed): Humid-Vent Filter Light (Gibeck, Upplands Vaesby, Sweden) VAP: T: 21/66</p> <p>Control (70 analyzed): Pall BB 100 (Pall, Newquay, UK) VAP: C: 26/70</p> <p>End of the study protocol: not reported</p>	<p>VAP was defined as purulent ETS or worsening of PaO₂ and new infiltrates and a positive quantitative culture from a distal airway sample (BAL \geq 10⁴ CFU/ml or PSB \geq 10³ CFU/ml)</p>
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Table II: Data on quality assessment

Thomachot et al. 1999	<p><i>Generation of allocation sequence:</i></p> <p><i>Concealment of allocation:</i></p> <p><i>Blinding attending physician:</i></p> <p><i>Blinding outcome assessors:</i></p> <p><i>Description of dropouts:</i></p> <p><i>Analysis by intention-to-treat:</i></p>	<p>Not reported</p> <p>Unclear</p> <p>No</p> <p>No</p> <p>No</p> <p>Unclear</p>
Thomachot et al. 1998	<p><i>Generation of allocation sequence:</i></p> <p><i>Concealment of allocation:</i></p> <p><i>Blinding attending physician:</i></p> <p><i>Blinding outcome assessors:</i></p> <p><i>Description of dropouts:</i></p> <p><i>Analysis by intention-to-treat:</i></p>	<p>Not reported</p> <p>Unclear</p> <p>No</p> <p>No</p> <p>No</p> <p>Unclear</p>

Figure I: Summary estimates of associations between treatment and control group expressed as relative risk (RR) and 95% confidence interval (CI) using a random effects model

Review: VAP - HMEF / different brands
 Comparison: 01 HMEF vs HMEF
 Outcome: 01 Ventilator-associated pneumonia



Conclusion

The evidence of two trials indicates that different brands of HMEs have not any effect on the incidence of ventilator-associated pneumonia. The evidence, however, was low because of small sample sizes and insufficient methodological quality.

References

1. Thomachot L, Viviand X, Arnaud S, Boisson C, Martin CD. Comparing two heat and moisture exchangers, one hydrophobic and one hygroscopic, on humidifying efficacy and the rate of nosocomial pneumonia. *Chest* 1998;114:1383-1389.
2. Thomachot L, Vialet R, Arnaud S, Barberon B, Michel-Nguyen A, Claude M. Do the components of heat and moisture exchanger filters affect their humidifying efficacy and the incidence of nosocomial pneumonia? *Crit Care Med* 1999;27(5):923-928.