

## Hygroscopic or hydrophobic heat and moisture exchanger (HME)?

**B.S. Niël-Weise<sup>1</sup>, P.J. van den Broek<sup>2</sup>**

<sup>1</sup>Dutch Infection Prevention Working Party, Leiden, The Netherlands

<sup>2</sup>Department of Infectious Diseases, Leiden University Medical Centre

Study population: mechanically ventilated ICU patients

Comparison: hygroscopic HME versus hydrophobic HME

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 hygroscopic HME with hydrophobic HME 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

One parallel-group randomised controlled trial was included (1).

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)	Note
<b>Davies et al. 2000</b>	Incl: surgical IC patients, ventilation $\leq$ 3 days  Excl: ventilation < 48 hrs	Treatment (60): hygroscopic HME changed every 120 hrs T: 4/60  Control (60): hydrophobic HME changed every 120 hrs C: 5/60  Note: 1) hygroscopic HME: Aqua+, hudson-RCI, Temecula, CA ; 2) hydrophobic HME: Duration, Nellcor-Puritan Bennett, Minneapolis, MN	VAP was defined as new or progressive infiltrate and new onset of fever $>38.0^{\circ}\text{C}$ and new onset of purulent sputum or change in sputum character and positive ETS; $> 24$ hrs after initiation of ventilation and before extubation	Randomization into three groups: 1) hygroscopic HME changed every 24hrs 2) Hydrophobic HME changed every 120 hrs 3) hygroscopic HME changed every 120 hrs  End of the study protocol: after 3 days

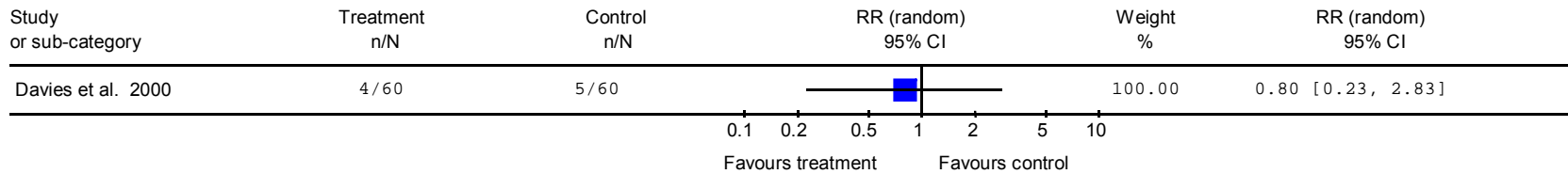
Table II: Data on quality assessment

Davies et al. 2000	<i>Generation of allocation sequence:</i> <i>Concealment of allocation:</i> <i>Blinding attending physician:</i> <i>Blinding outcome assessors:</i> <i>Description of dropouts:</i> <i>Analysis by intention-to-treat:</i>	Not reported Unclear No No No Unclear
--------------------	---	--

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: Hygroscopic HME vs hydrophobic HME

Outcome: Ventilator-associated pneumonia



**Conclusion**

The evidence available whether hygroscopic HMEs are superior to hydrophobic HMEs in the prevention of ventilator-associated pneumonia is not sufficient as a basis for determining practice. Only a single trial with a small sample size and insufficient methodological quality investigated this issue.

**References**

1. Davis K, Evans SL, Campbell RS, Johannigman JA, Luchette FA, Porembka DT, et al. Prolonged use of heat and moisture exchangers does not affect device efficiency or frequency rate of nosocomial pneumonia. Crit Care Med 2000;28(5):1412-18.