

## Heated-wire circuits or not?

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Study population: mechanically ventilated ICU patients

Comparison: heated humidification (HH) with heated-wire circuit versus HH without heated-wire circuit

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\*' or circuit\* or humidif\*'. 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 heated humidification with heated-wire circuit versus HH without heated-wire circuit 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)	Notes
<b>Branson et al. 1996</b>	Incl: medical and surgical ICU patients ineligible for HME use (bloody secretions, thick tenacious sputum, core temperature <32°) Excl: patients in the recovery room, postoperative cardiac surgery patients	Intervention (49 analyzed): HH with dual heated-wire circuit (gas temperature at the Y-piece was 36°C)  Control (48 analyzed): HH without heated wire-circuit (gas temperature at the Y-piece was 34°C)	VAP was defined as purulent sputum and positive ETS culture for potential pathogen and T>38°C and new infiltrate	Comparison of three humidification techniques (see also active versus passive humidification)

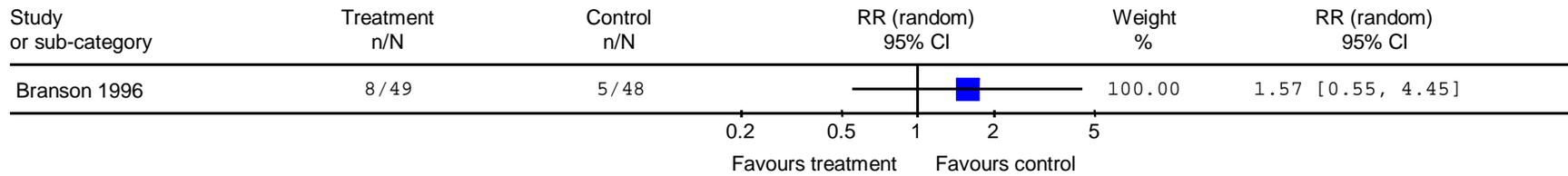
	Mean number of ventilation days (SD): T: 10.8 (6.5); C: 8.9 (9.2)	Notes: 1) circuits changed every 7 days; 2) no definition of circuit was given; 3) MR-730 humidifier (Fisher & Paykel, Auckland, New Zealand)  End of the study protocol: not reported		
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Table II: Data on quality assessment

<b>Branson et al. 1996</b>	<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>	Randomization by the last digit in the patients' medical record number Inadequate No No Inadequate: 14 patients expired within 6 hours of admission or were transferred and lost to follow-up; treatment: 4 patients switched from HME to HH. It is not clear in which group these patients were analyzed No
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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 - Heated wire circuits  
 Comparison: Heated wire circuit vs unheated wire circuit  
 Outcome: Ventilator-associated pneumonia



### Conclusion

The evidence available whether heated humidification with heated-wire circuit versus heated humidification without heated-wire circuit should be used to prevent 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. Branson RD, Davis K, Brown R, Rashkin M. Comparison of 3 humidification techniques during mechanical ventilation: patient selection, cost, and infection considerations. *Respir Care* 1996;41(9):809-16.