

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
Branson et al. 1996	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)

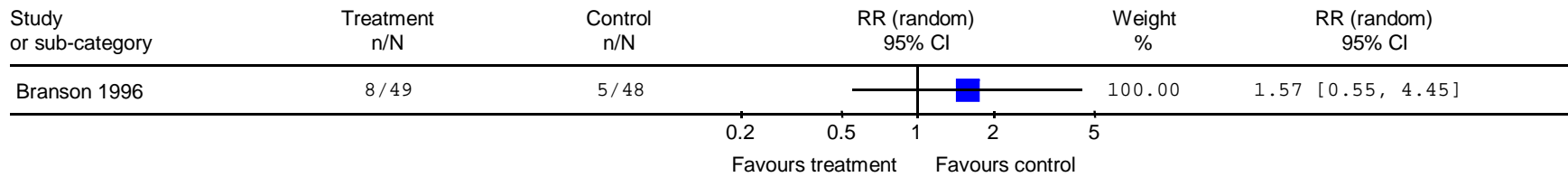
	Mean number of ventilation days (SD): T: 10.8 (6.5); C: 8.9 (9.2)	Notes: 1) circuits changed every 7 days; 2) no definition of circuit was given; 3) MR-730 humidifier (Fisher & Paykel, Auckland, New Zealand) End of the study protocol: not reported		
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Table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

Branson et al. 1996	<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.