

## Interposing bacterial filters in ventilator circuits or not?

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Study population: mechanically ventilated ICU patients

Comparison: circuit without bacterial filter versus circuit with bacterial filter

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 'filter\*'. To identify randomised controlled trials in Medline the following search strategy was used: (bacterial filter\* OR filter\* OR Equipment Contamination/prevention & control\* OR Filtration/instrumentation\*) 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 ventilator circuits with bacterial filters with ventilator circuits without bacterial filters 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)
<b>Lorente et al. 2003</b>	<p>Incl: medicosurgical ICU patients, ventilated &gt; 24 hrs</p> <p>Excl: not reported</p> <p>Mean number of ventilation days (SD): T: 14.84 (17.65); C: 13.68 (14.92)</p>	<p>Treatment (116 analyzed): no bacterial filter</p> <p>Control (114 analyzed): bacterial filter: one in the inhalation branch right after the exit of the circuit and one in the exhalation branch right before the entrance of the respiratory circuit; filters changed every 48 hours</p> <p>Notes: 1) Sterivent (Mallinckrodt, Hazelwood, MO); 2) humidification by a heat and moisture exchanger in both groups</p>	<p>VAP was defined as new onset of purulent sputum and T &gt; 38° C or &lt; 35.5° C and WBC &gt; 10<sup>4</sup> mmm<sup>3</sup> or &lt; 4x10<sup>3</sup> mm<sup>3</sup> and new or progressive infiltrate and positive cultures of EBS &gt; 10<sup>6</sup> CFU/ml or BAL &gt; 10<sup>4</sup> CFU/ml or PSB &gt; 10<sup>3</sup> CFU/ml or same organism found in blood culture than in bronchial secretion, which was quantitatively not significant.</p>

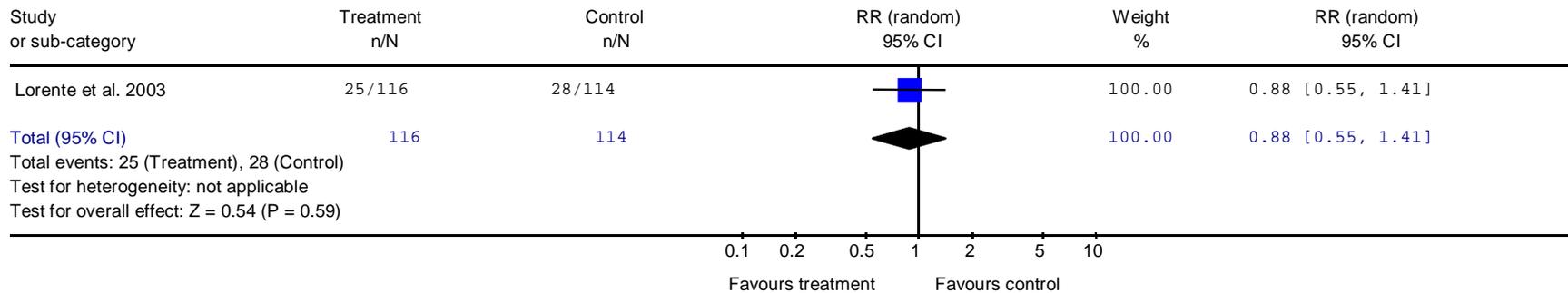
	End of the study protocol: not reported	
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Table II: Data on quality assessment

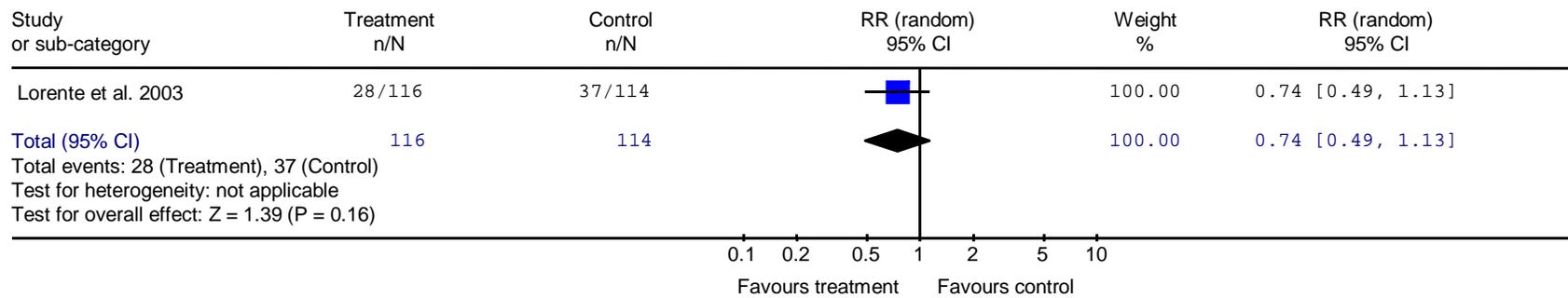
<b>Lorente et al. 2003</b>	<i>Generation of allocation sequence:</i> <i>Concealment of allocation:</i> <i>Blinding attending physician:</i> <i>Blinding outcome assessors:</i> <i>Description of dropouts:</i> <i>Analysis by intention-to-treat:</i>	Randomization by a random number generated from Excel software Unclear No No No Unclear
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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 - Circuits with bacterial filters  
 Comparison: Respiratory circuits without bacterial filters vs with bacterial filters  
 Outcome: 01 At least one episode of ventilator-associated pneumonia



Review: VAP - Circuits with bacterial filters  
 Comparison: Respiratory circuits without bacterial filters vs with bacterial filters  
 Outcome: 02 Mortality



### Conclusion

The evidence available whether circuit without bacterial filter versus circuit with bacterial filter 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 unclear methodology investigated this issue.

### References

1. Lorente L, Lecuona M, Málaga J, Revert C, Mora ML, Sierra A. Bacterial filters in respiratory circuits: An unnecessary cost? Crit Care Med 2003;31(8):2126-2130.