Semi-recumbent position or not?

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Study population: mechanically ventilated ICU patients
Comparison: semi-recumbent position versus standard care
Outcome: ventilator-associated pneumonia

Methods

Data sources
Publications were retrieved by a search of Medline and the Cochrane Library up to March 2006. Terms included were 'pneumonia' and 'ventilator*' and 'semi-recumbent'. To identify randomised controlled trials in Medline the following search strategy was used: (((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])))) AND (semi-recumbent OR semi recumbent). Additionally, all reference lists of identified trials were examined.

Selection criteria
All randomised and quasi-randomised trials comparing semi-recumbent position versus standard care 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

<table>
<thead>
<tr>
<th>Participants</th>
<th>Interventions</th>
<th>Definition of ventilator associated pneumonia (VAP)</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>van Nieuwenhoven et al. 2006</td>
<td>Incl: 221 adult patients admitted to four ICUs in three university hospitals in the Netherlands, intubated within 24 hrs of ICU admission, predicted time on the ventilator &gt; 48h</td>
<td>Treatment (112): semi-recumbent position (an aimed 45° position of the head and back)</td>
<td>End of the study protocol: 1) Microbiologically confirmed VAP 2) Patients were placed in a bed without the possibility to alter backrest elevation 3) Extubation 4) Death</td>
</tr>
<tr>
<td>Excl: selective decontamination of the digestive tract, patients treated in other positions: patients with trauma of the pelvic region, extensive abdominal surgery, cared for in beds</td>
<td>Control (109): supine position (backrest elevation of 10°)</td>
<td>Notes: 1) the targeted backrest elevation of 45° for semi-recumbent positioning was not achieved for 85% of the study time; reasons remained unclear</td>
<td>Median days in study (range): T: 6 (2-7); C: 5 (0-64)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Clinical VAP was defined as new or persistent or progressive infiltrate with at least two of the following criteria: T &gt; 38° C or &lt; 35° C; WBC &gt; 10 x 10⁹/L or, &lt; 3 x 10⁹/L; positive cultures of tracheal aspirate.</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>VAP was defined as clinical VAP and BAL ≥ 10⁴ cfu/ml or positive blood culture with the same microorganisms than in tracheal aspirate.</td>
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</tbody>
</table>
without the possibility of altering backrest elevation, neurosurgery patients treated with 30° head elevation

| Drakulovic et al. 1999 | Treatment (43): semi-recumbent position (45°) | Clinical VAP was defined as new or persistent infiltrate with at least two of the following criteria: \( T \geq 38.3 \, ^\circ C \); \( WBC \geq 12 \times 10^9/L \) or \( \leq 4 \times 10^9/L \); purulent tracheal secretions.

Control (47): supine position (0°) | VAP was defined as clinical VAP and ETS \( \geq 10^5 \, cfu/ml \) or \( BAL \geq 10^4 \, cfu/ml \) or \( PSB \geq 10^3 \, cfu/ml \) or positive blood or pleural culture with the same microorganisms than in tracheal aspirate.

End of the study protocol:
1) Change in position for more than 45 min
2) Death
3) Weaning trial
4) Extubation

Mean (SD) hours of ventilation in study: T: 145 (149); C: 171 (167)

| van Nieuwenhoven et al. 2006 | Generation of allocation sequence: Randomization occurred within ICUs; randomization by means of closed, nontransparent numbered envelopes; an independent person who mixed the envelopes before numbering generated the allocations Adequate

Concealment of allocation: No
Blinding attending physician: Three investigators, blinded for randomization code, independently evaluated all relevant data to the diagnosis of VAP Adequately described in figure 1
Blinding outcome assessors: Yes

Description of dropouts: Adequate: T: 1 died, 3 withdrawn because of protocol violation (re-intubations)
Analysis by intention-to-treat: No

Drakulovic et al. 1999 Generation of allocation sequence: Randomization by a computer-generated list; the allocation table was generated and disclosed by an independent person Adequate

Concealment of allocation: No
Blinding attending physician: No
Blinding outcome assessors: No

Description of dropouts: Adequate: T: 1 died, 3 withdrawn because of protocol violation (re-intubations)
Analysis by intention-to-treat: No

Table II: Data on quality assessment
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

<table>
<thead>
<tr>
<th>Study or sub-category</th>
<th>Treatment n/N</th>
<th>Control n/N</th>
<th>RR (random)</th>
<th>Weight</th>
<th>RR (random)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drakulovic 1999</td>
<td>2/39</td>
<td>11/47</td>
<td>0.22 [0.05, 0.93]</td>
<td>45.52</td>
<td></td>
</tr>
<tr>
<td>v. Nieuwenhoven 2006</td>
<td>13/112</td>
<td>8/109</td>
<td>1.58 [0.68, 3.66]</td>
<td>54.48</td>
<td></td>
</tr>
</tbody>
</table>

Review: VAP - Semi-recumbent position
Comparison: 01 Semirecumbent position vs standard care
Outcome: 01 Ventilator-associated pneumonia

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Review: VAP - Semi-recumbent position
Comparison: 01 Semirecumbent position vs standard care
Outcome: 02 Mortality in ICU

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<tr>
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<th>Treatment n/N</th>
<th>Control n/N</th>
<th>RR (random)</th>
<th>Weight</th>
<th>RR (random)</th>
</tr>
</thead>
<tbody>
<tr>
<td>v. Nieuwenhoven 2006</td>
<td>33/112</td>
<td>33/109</td>
<td>0.97 [0.65, 1.46]</td>
<td>0.70</td>
<td></td>
</tr>
</tbody>
</table>
**Conclusion**
Two methodological good trials showed conflicting results whether semi-recumbent position versus standard care should be used to prevent ventilator-associated pneumonia. In one trial, the targeted backrest elevation of $45^\circ$ for semi-recumbent positioning was not achieved for 85% of the study time. The other trial did not check whether the targeted semi-recumbent position was achieved during study. No conclusions for practice can be drawn.

**References**