Nasotracheal or orotracheal tubes?

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Study population: mechanically ventilated ICU patients
Comparison: nasotracheal tubes versus orotracheal tubes
Outcome: ventilator-associated pneumonia and / or nosocomial maxillary sinusitis

Methods

Searching

Publications were retrieved by a search of Medline and the Cochrane Library up to April 2006. Terms included were 'sinusitis' or 'pneumonia' and 'ventilat* or intub*' and 'naso* or oro*'. 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)) OR (sinusitis AND (intub* OR ventil*)) 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).

Selection

We included studies when the following criteria were met: planned as a randomised trial, quasi-randomised trial or systematic review/meta-analysis of randomised or quasi-randomised trials; published as an article; mechanically ventilated patients included with nasal or oral endotracheal tubes; sufficient data presented for calculating the risks of ventilator-associated pneumonia (VAP) and / or sinusitis in the treatment and control group. Trials in which the primary outcomes were not VAP or sinusitis were excluded.

Two reviewers independently assessed all titles and abstracts identified by the search and confirmed the eligibility of the identified trials. Any disagreements that could not be resolved by discussion were resolved by consultation of an independent third person.

Quality assessment
Two reviewers independently assessed trial quality by examining three components: concealment of allocation (classified as adequate if based on central randomisation, sealed envelopes or similar), description of dropouts (classified as adequate if recorded according to allocation to treatment) and intention-to-treat analysis. Disagreements were resolved through discussion with the third reviewer.

Data extraction and analysis
Data on study population, interventions and outcomes were extracted by both reviewers independently and crosschecked. Only trial data, which were related to the question posed in the review, were considered. For the categorical outcomes VAP and sinusitis we calculated the overall relative risk with a 95% confidence interval. When trials were methodologically, clinically and statistically homogeneous, meta-analyses were undertaken using a random-effects model to calculate pooled estimates and their 95% confidence intervals.

Results
Selection
By judgement of abstracts, seven studies appeared to fulfil the selection criteria ( ). Out of the seven studies, one paper was excluded because another question was addressed [Holzapfel, 1999 #1375] and another paper because of double publication [Michelson, 1991 #1188]. The reason for exclusion was that the study investigated another question than posed in the review. Five parallel-group randomised controlled trials were included [Holzapfel, 1993 #1136; Michelson A., 1992 #1374; Bach, 1992 #1189; Salord, 1990 #1187; Rouby, 1994 #1190]. No eligible systematic review or meta-analysis of randomised or quasi-randomised trials was found.

Quality assessment
See Table II

Data extraction and analysis
See Table I and Figure I and Figure II

Table I: Study population, interventions and outcome definitions

	Participants	Interventions	Definition of
Holzapfel et al. 1993	Incl: general adult ICU patients, > 15 years, predicted time on the ventilator > 7 days Excl: precedent history of sinusitis, nosocomial pneumonia, tracheostomy, intubation for > 24 hrs during the last 30 days Mean ventilator days: not reported	Treatment (149): nasotracheal intubation Sinusitis: T: 29/149 VAP: T: 17/149 Mortality: 55/149 Control (151): orotracheal intubation Sinusitis: C: 25/151 VAP: T: 9/151 Mortality: 62/151 Notes: gastric intubation was performed via the same route as endotracheal intubation End of the study protocol: sinusitis	Nosocomial maxillary sinusitis was defined as T >38^{o}C and positive CT scan and purulent sinus puncture with 10^3 cfu/ml. VAP was defined by radiological and clinical criteria, which were confirmed by protected specimen brush (PBS) ≥ 10^3 cfu/ml.
Michelson et al. 1992	Incl: surgical ICU patients ventilated for more than 24 hrs Excl: not reported Mean ventilator days: 7 (2 – 19)	Treatment (20): nasotracheal intubation Sinusitis: 19/20 Control (24): orotracheal intubation Sinusitis: 15/24 Notes: gastric intubation was always via nostrils End of the study protocol: 1) sinusitis? (unclear) 2) extubation 3) tracheotomy 4) death 5) transfer	Nosocomial maxillary sinusitis was defined as pathologic maxillary sinus findings by a positive ultrasonography
Bach et al. 1992	Incl: post-surgical ICU patients ventilated for more than 4 days Excl: pathological radiological findings in the sinuses, infection, < 18 years old,	Treatment (36): nasotracheal intubation Sinusitis: 15/36 Control (32): orotracheal intubation Sinusitis: 2/32	Nosocomial maxillary sinusitis was defined as a positive reversed Waters'view (radiological finding) confirmed by a positive microbiological transantral needle puncture and leukocytosis and fever

	immunosuppressive therapy Mean ventilator days: T: 10.9 (8.7); C: 12.1 (9.5)	Notes: gastric intubation was always via nostrils End of the study protocol: 1) discharge from the ICU 2) death 3) sinusitis? (unclear)	
Salord et al. 1990	Incl: ICU patients ventilated for more than 48 hrs Excl: head trauma, < 18 years old, sinusitis Mean ventilator days: T: 14.5 (12); C: 17 (12)	Treatment (58): nasotracheal intubation Sinusitis: 25/58 Control (53): orotracheal intubation Sinusitis: 1/53 Notes: gastric intubation was always via nostrils End of the study protocol: 1) extubation 2) sinusitis? (unclear)	Nosocomial maxillary sinusitis was defined as a positive reversed Waters'view (radiological finding) at the bedside
Rouby et al. 1994	Incl: ICU patients with normal aspects of their maxillary sinuses on CTscan within 48 hrs of admission to the ICU and predicted ventilation period > 7 days, gastric tube Excl: critically ill patients making transportation impossible, nasal or oral intubation impossible, coagulation disorders Mean ventilator days: not reported	Treatment (22): nasotracheal intubation and nasogastric intubation Sinusitis: 21/22 Control (18): orotracheal intubation and orogastric intubation Sinusitis: 4/18	Sinusitis was defined by radiological criteria: presence of either an air fluid level of the maxillary cavity on the paranasal CT scan.

Table II: Data on quality assessment

Holzapfel et al. 1993	*Generation of allocation sequence:* *Concealment of allocation:* *Description of dropouts:* *Analysis by intention-to-treat:*	Not reported Unclear Inadequate Unclear
Michelson et al. 1992	*Generation of allocation sequence:* *Concealment of allocation:* *Description of dropouts:* *Analysis by intention-to-treat:*	By even / odd numbered days Inadequate Inadequate Unclear
Bach et al. 1992	*Generation of allocation sequence:* *Concealment of allocation:* *Description of dropouts:* *Analysis by intention-to-treat:*	Not reported Unclear Inadequate Unclear
Salord et al. 1990	*Generation of allocation sequence:* *Concealment of allocation:* *Description of dropouts:* *Analysis by intention-to-treat:*	Not reported Unclear Inadequate Unclear
Rouby et al. 1994	*Generation of allocation sequence:* *Concealment of allocation:* *Description of dropouts:* *Analysis by intention-to-treat:*	Not reported Unclear Inadequate Unclear

Figure I: Summary estimates of associations between treatment (nasotracheal tubes) and control group (orotracheal tubes) expressed as relative risk (RR) and 95% confidence interval (CI) using a random effects model

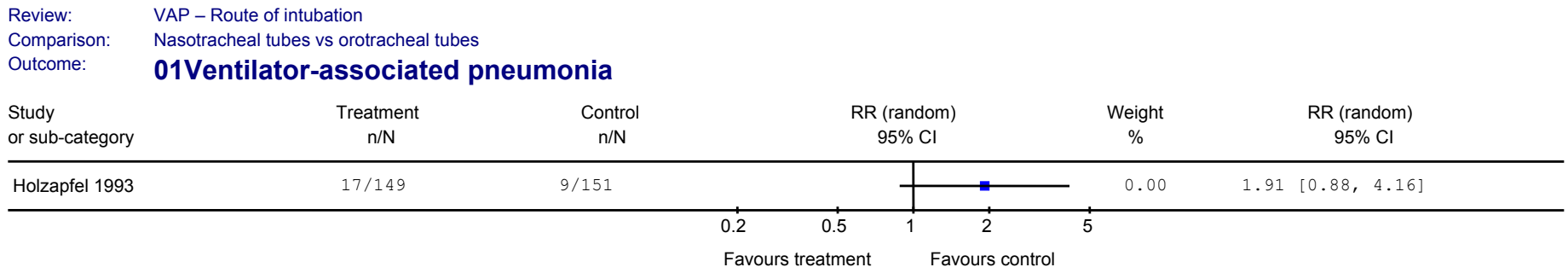
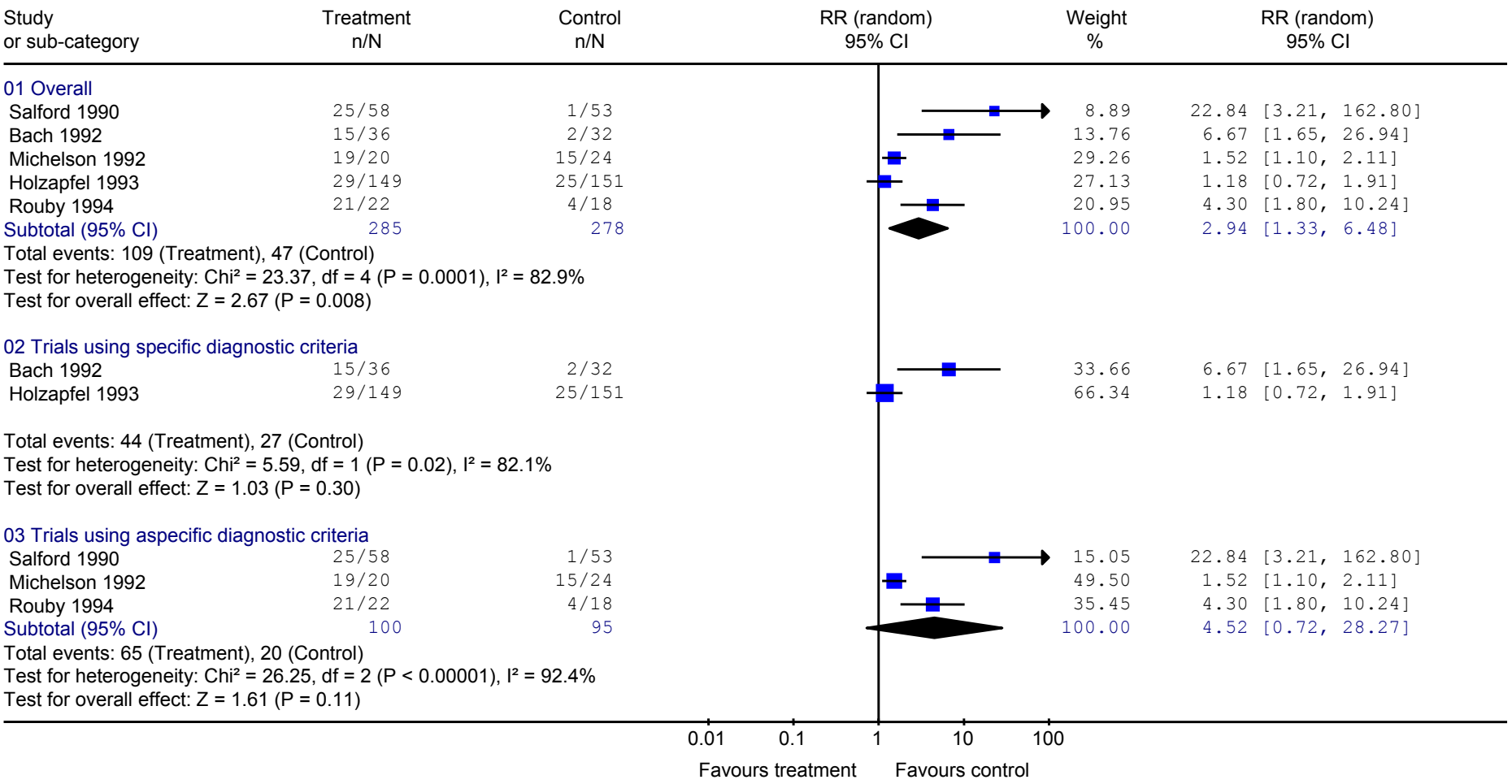


Figure II: Summary estimates of associations between treatment (nasotracheal tubes) and control group (orotracheal tubes) expressed as relative risk (RR) and 95% confidence interval (CI) using a random effects model

Review: VAP – Route of intubation
Comparison: Nasotracheal tubes vs orotracheal tubes
Outcome: **02 Maxillary sinusitis**



Conclusion

A) For VAP as outcome measure

The evidence available whether nasal or oral endotracheal intubation 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, and **found a non** significant difference in favour of orotracheal intubation.

Aanbeveling WIP:
Uit het oogpunt van preventie van pneumonie geeft de WIP geen voorkeur aan nasale of orale intubatie.

Motivatie:
De wetenschappelijke argumenten dat de frequentie van longontsteking minder is bij orale dan bij nasale intubatie zijn van een zeer laag betrouwbaarheidsgehalte.

B) For maxillary sinusitis as outcome measure

Five low quality trials indicate that orotracheal intubation is associated with a lower incidence of maxillary sinusitis compared with nasotracheal intubation.

Subgroupanalysis according to specificity of definitions of sinusitis:

Two low quality trials used specific diagnostic criteria (radiological findings and clinical criteria and a positive culture of sinus puncture) and showed inconsistent findings.

Three low quality trials used aspecific diagnostic criteria (only by radiological findings) and showed results in favour of oral intubation.

Aanbeveling WIP:
Uit het oogpunt van preventie van maxillaire sinusitis geeft de WIP geen voorkeur aan nasale of orale intubatie.

Motivatie:
De resultaten van twee gerandomiseerde onderzoeken van lage kwaliteit, die een adequate definitie van sinusitis handhaafden, waren tegenstrijdig. De resultaten van drie gerandomiseerde onderzoeken van lage kwaliteit, die een inadequate definitie van sinusitis handhaafden, waren in het voordeel van orale intubatie. Op dit ogenblik zijn er wetenschappelijk onvoldoende argumenten om orale intubatie de voorkeur te geven.

References