

# Oral decontamination with chlorhexidine reduced ventilator associated pneumonia in patients needing mechanical ventilation for $\geq 48$ hours

Koeman M, van der Ven AJ, Hak E, *et al.* Oral decontamination with chlorhexidine reduces the incidence of ventilator-associated pneumonia. *Am J Respir Crit Care Med* 2006;**173**:1348–55.

**Q** In patients requiring mechanical ventilation for  $\geq 48$  hours, is oral decontamination with chlorhexidine (CHX) or CHX plus colistin (COL) effective for reducing ventilator associated pneumonia (VAP)?

## METHODS

**Design:** randomised placebo controlled trial.

**Allocation:** {concealed}.\*

**Blinding:** blinded (clinicians, patients, {outcome assessors, data collectors, data analysts, monitoring committee, manuscript writers, and pharmacists of participating centres}\*).

**Follow up period:** up to diagnosis of VAP, death, or extubation.

**Setting:** 2 mixed and 2 surgical intensive care units (ICUs) in 2 university hospitals and mixed ICUs in 3 general hospitals in the Netherlands.

**Patients:** 385 patients  $>18$  years of age (mean age 62 y, 60% men) requiring mechanical ventilation for  $\geq 48$  hours. Exclusion criteria were preadmission immunocompromised status (defined as leucopenia  $<3 \times 10^9/L$ , cumulative dose of corticosteroids  $>750$  mg/y, or human immunodeficiency virus), pregnancy, or inability to take oral medication.

**Intervention:** 2% CHX (n = 127), 2% CHX plus 2% COL (n = 128), or placebo (n = 130). All medications were mixed with petroleum jelly (Vaseline) FNA to form a paste, and 0.5 g was applied 4 times/day to each side of the buccal cavity.

**Outcomes:** incidence of VAP. Secondary outcomes were all cause ICU mortality and oral and endotracheal tube (ETT) colonisation.

**Patient follow up:** 100% (intention to treat analysis). Follow up for the outcomes of oral and ETT colonisation was  $<80\%$ .

\*Information provided by author.

## MAIN RESULTS

The CHX and CHX plus COL groups had lower incidences of VAP than the placebo group (table). The CHX and CHX plus COL groups did not differ from placebo for all cause ICU mortality (hazard ratio

1.12, 95% CI 0.72 to 1.17 and 1.02, CI 0.66 to 1.59, respectively). Results for oral and ETT colonisation are not reported here because  $<80\%$  of patients were included in the analysis.

## CONCLUSION

In patients requiring mechanical ventilation for  $\geq 48$  hours, oral decontamination with chlorhexidine reduced ventilator associated pneumonia.

*A modified version of this abstract appears in ACP Journal Club.*

## Commentary

Oropharyngeal colonisation with potential pathogens is central in the pathogenesis of VAP. Preventing VAP using oral decontamination with non-absorbable antibiotics is not widespread because of concerns about emergence of antibiotic resistance. Koeman *et al* used orally applied CHX or CHX plus COL as alternative agents and found both treatments to be effective in VAP prevention.

This placebo controlled trial was methodologically rigorous because it was adequately powered, randomised, blinded, and concealed; had explicit inclusion and exclusion criteria and outcomes; and had complete follow up for the primary end point. It also had standard protocols regarding head elevation to minimise confounders.

In this trial, besides the treatment, normal tooth brushing and saline cleansing of the oral cavity were administered to all patients.\* Combining oral hygiene with CHX decontamination may have enhanced the removal of oral micro-organisms. Additionally, the concentration of CHX (2%) and the site (buccal cavity) and frequency of application (4 times/d) might be important considerations as another well designed trial differing in these aspects failed to find CHX effective.<sup>1</sup>

Based on the trial by Koeman *et al*, CHX decontamination is promising for patients mechanically ventilated for  $\geq 48$  hours, although its routine use for all ICU patients should probably await studies on the acquisition of long term resistance. This strategy to modulate oropharyngeal colonisation is simple, inexpensive, and minimally labour intensive. Its use should complement rather than replace basic oral hygiene, an integral aspect of nursing. Other strategies such as semirecumbent positioning should also be used whenever possible.

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\*Information provided by author.

1 Fourrier F, Dubois D, Pronnier P, *et al.* Effect of gingival and dental plaque antiseptic decontamination on nosocomial infections acquired in the intensive care unit: a double-blind placebo-controlled multicenter study. *Crit Care Med* 2005;**33**:1728–35.

## Chlorhexidine (CHX) or CHX plus colistin (COL) v placebo in mechanically ventilated patients\*

| Outcome†                        | CHX | CHX + COL | Placebo | RRR (95% CI)   | NNT (CI)     |
|---------------------------------|-----|-----------|---------|----------------|--------------|
| Ventilator associated pneumonia | 10% | –         | 18%     | 63% (19 to 83) | 10 (7 to 30) |
|                                 | –   | 13%       | 18%     | 52% (7 to 76)  | 11 (8 to 83) |

\*Abbreviations defined in glossary; RRR, NNT, and CI calculated from control event rates and hazard ratios in article.

†Follow up to diagnosis of ventilator associated pneumonia, death, or extubation.