Oral Care, Ventilator-Associated Pneumonia, and Counting Cultures

There are plenty of opportunities for improvement in the field of health care–associated infection prevention. As a consequence, continuous educational efforts focused on cost-effective evidence-based strategies remain essential. This is also true for oral hygiene practice.

A study by Grap et al revealed that the primary tools for performing oral care were sponge toothbrushes, although these are ineffective for removing dental plaque. Also, oral care practices are generally poorly documented in patient’s files. According to a European survey in 59 intensive care units (ICUs), 93% of nurses perceived oral hygiene in mechanically ventilated patients to be of high priority. However, 68% of nurses find cleaning the oral cavity in such patients difficult, 40% find it unpleasant, and 73% indicated they need better supplies and equipment.

Clearly, the importance of oral hygiene to prevent ventilator-associated pneumonia should continuously be stressed by means of quality and/or research projects. Therefore, we were particularly interested in the article by Pedreira et al regarding oral care in intubated and mechanically ventilated pediatric patients. In a randomized controlled trial, these investigators compared the oropharyngeal microbiological profile between patients who received oral care with use of chlorhexidine 0.12% (n = 27) and a control group (n = 29). In both groups, strict toothbrushing was carried out. Oropharyngeal secretions were collected on days 0, 2, and 4, and at discharge, and were cultured for qualitative microbiological identification. The 2 groups did not differ significantly in the colonization of potentially pathogenic flora. These negative results are in contrast with other data that stress the added value of proper oral care and chlorhexidine as an antiseptic agent.

An important concept in the pathogenesis of pneumonia is the strong relationship between the bacterial inoculum and the hazard of infection. In other words, whereas chlorhexidine oral washes failed to significantly reduce the number of colonizations by pathogenic microorganisms, it might have been successful in decreasing the bacterial load (lower bacterial counts with an identical number of isolates detected). In the study by Pedreira et al, oropharyngeal samples were collected, transported, and incubated in a strict standardized way. However, a qualitative culturing technique was used that indicates only the presence of microorganisms (colonization or not). We assume it must have been possible to report bacterial inoculums if quantitative cultures were used. In this way the study results may have turned out positive, even if one considers the small sample size.

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Response:

We read with great interest the letter of Ms Lizy and colleagues regarding our publication on the effects of oral care interventions on oropharyngeal colonization of children receiving mechanical ventilation. We thank the authors for the favorable comments regarding the oral care protocol, for sharing their impressions concerning the negative results identified, and for the suggestion of bacteria quantification.

Our study demonstrated that mechanical intervention in oral care was statistically similar to mechanical intervention and chlorhexidine regarding the identified differences in colonization between 2 groups of children, despite the marginally significant chlorhexidine effect on bacteria overgrowth control.

Similar results were verified in a controlled trial on the effect of dental plaque antiseptic decontamination with chlorhexidine on the biofilm formation and nosocomial infections on ventilated patients. Plaque incidence was not different between groups at baseline and a few samples remained or became negative on day 5 in the treated group, but significant differences were not identified until day 10.1

Tantipong and colleagues’ identified that oral care with chlorhexidine was able to reduce the number of newly colonized patients, but our research results did not demonstrate a significant difference, and many variables can interfere with results, such as a small sample size, different number of cultures among the 4 points, chlorhexidine action on antibiotic-resistant bacteria, and contact time. Furthermore, the most effective means to eliminate matured biofilm is the interbacterial protective matrix mechanical disruption. Antiseptic agents are primarily effective in the prevention of biofilm formation and to avoid its maturation; therefore, if an appropriate mechanical intervention prevents bacteria adherence to surfaces, a small or even no effect of antiseptic agents may be noted.

Many techniques are described in the literature for microorganism recovery and quantification in the oral cavity, such as imprint, rinse, swab and biopsy.1–4 In children, the swab technique is more commonly available. Samples examined by the swab could be considered less appropriate to faithfully portray microorganism quantification in the oral cavity, because they would only reflect the colonization of a specific area.1–7 The oral cavity presents great individual variation of biofilm formation and species present in different sites. Mager et al11 collected microbial samples from 8 selected oral soft tissue surfaces of 225 subjects using a swab; 44 volunteers provided supra- and subgingival plaque samples. Samples were individually evaluated for their content of 40 bacterial species. Microbial profiles differed markedly among sample locations in the subjects, with 34 of 40 species differing significantly.

Swabs with saline solution to allow bacteria quantification is described, but the collection should be performed by a single trained professional with method, depth, and pressure standardization.7 Due to pediatric ICU practice variations that could compromise the proper application of such principles, we decided to conduct only qualitative analysis.

Despite the clarification of the facts that led to our conclusion that qualification of bacteria was the most appropriate technique for our purpose and protocol, we cannot say that the use of other methodological approaches to collect and culture oropharyngeal secretions would reveal different results from those verified in our research.

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