

LESS IS MORE IN INTENSIVE CARE



# Less daily oral hygiene is more in the ICU: not sure

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The interest in research on oral care in intensive care unit (ICU) patients has emerged largely from the 2000s onward after years of being a rather ignored topic in health science. Since, the focus has been on its potential contribution to preventing pneumonia by eliminating contaminated oral pathogens that might invade the lower respiratory tract. Accumulating evidence of the effectiveness of oral care with chlorhexidine gluconate (CHG) in preventing ventilator-associated pneumonia (VAP) or postoperative pneumonia [1, 2] has led to adopting CHG oral care as the gold standard for intubated patients. Recently, however, potential adverse effects of CHG on the oral mucosa [3] and reduced bacterial susceptibility [4] have been reported, as well as an even more alarming potential association of CHG oral care with an increased risk of mortality [5–8]. Although the latter association results from retrospective studies or meta-analyses, righteous calls for caution and for a thorough re-evaluation of the established gold standard have been launched [9, 10].

It is not unlikely that the findings presented above could instigate questioning the safety of oral care in the ICU. Additionally, doubt could be casted on its value as the beneficial effect on the risk of VAP of other oral hygiene measures not involving CHG, such as swabbing and toothbrushing, is not supported by the evidence [11].

Oral care does, however, not need to reduce the risk of pneumonia to be pivotal. As in healthy individuals, mouth care is an indispensable basic hygiene requirement for each ICU patient, intubated or not. Appropriate oral care counters discomfort caused by xerostomia, a

sore mouth or ulcerated lips, and promotes oral health by preventing caries and decay of teeth, bacterial or candidal stomatitis, gingivitis, and periodontitis which has been associated with systemic diseases such as bacteraemia, rheumatoid arthritis and cardiovascular diseases, including stroke [12]. Oral health is therefore just as important an endpoint of oral care as VAP prevention. A potential risk reduction in pneumonia should rather be considered as a favourable side effect of oral care and not as the primary goal.

Moreover, oral care aiming at oral health does not necessarily involve CHG use. Toothpaste and an appropriate brush adequately clean teeth and gums. The oral cavity can be cleansed mechanically and/or chemically with non-CHG containing mouthwashes, and saliva substitutes, stimulants and moisturizing gels are not CHG-based [13]. There are no substantiated arguments to question the legitimacy of oral care for safety concerns due to potential CHG-associated harm.

The above plea for proper daily oral care may not seem to leave room for doubting the viewpoint that less daily oral care in the ICU could be more. However, there are no evidence-based standards available to date that define the interventions, methods and frequency to provide ICU patients with optimal oral health. In the clinical environment, this lack of evidence is reflected by a huge variety of practices that differ between, and even within, health-care facilities, and of oral care protocols that are based on expert opinion only. It seems obvious that toothbrushing is an essential component of these protocols owing to its potential to effectively decrease dental plaque reservoirs [13], but the rationale for the incorporation of some other interventions is far less obvious, e.g. the use of foam sticks and specific oral care solutions. While lacking proof of evidence of their effectiveness, these interventions are not rarely costly and labour-intensive. As such, and until solid evidence will determine best

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**Table 1 Research priorities in the field of oral hygiene for ICU patients**

Topic	Focus and outcome	Suggested approach and points of interest
Oral assessment	Oral assessment tool for ICU patients <u>Outcome</u> : separate tools for intubated and non-intubated patients, respectively	Development—reliability and validity testing. Multidisciplinary cooperation with dental professionals
Type of toothbrush	Manual versus powered Bristle size, shape and type <u>Outcome</u> : plaque reduction	Randomized controlled trial (RCT). Blinding not possible—cave performance bias, same oral care regimens in comparable groups. Independent blinded assessment of outcomes and assessment of compliance highly recommended. Consider use of split-mouth design
Mouthwashes	Chlorhexidine gluconate <u>Outcome</u> : safety	Preclinical trials on toxicity and pharmacokinetics. No RCTs given the current state of the science
	Alternatives to CHG including povidone iodine, saline, bicarbonate, triclosan and furacilin <u>Outcome</u> : effectiveness in chemically cleaning the oral cavity	Separate randomized controlled trials or multiple-armed RCTs or factorial design. Cave, the latter rely on the assumption of no interaction between treatment arms. Avoid split mouth design due to the high possibility of carry-across effects
Solutions for moistening the oral cavity	Saliva substitutes and oral moisturizers <u>Outcome</u> : effectiveness in hydrating the oral cavity and lips	Same as above
Frequency	Optimal frequency for various aspects of daily oral hygiene (teeth brushing, moisturizing, mouthwash) <u>Outcome</u> : oral health as measured through specific, valid and reliable oral assessment tools for intubated and non-intubated ICU patients, respectively	Valid and reliable oral assessment tool needs to be developed first. Then, separate randomized controlled trials or multiple armed RCTs or factorial design. Cave, the latter rely on the assumption of no interaction between treatment arms
Best practices for ICU patients with specific oral needs	Best oral hygiene practices for patients with, e.g. dental prostheses, following maxillofacial surgery, oral health problems, ...	Multidisciplinary cooperation with dental professionals

practices, many oral care protocols could benefit from critical reconsideration aiming at a rational downsizing of unsubstantiated resources without affecting the quality of care. From this perspective, less daily oral care in the ICU could indeed be more.

As a striking example, the most appropriate frequency of oral care is a well-known matter of debate. Since there is no evidence for choosing one frequency over another, intervals vary extensively among protocols, both for intubated and non-intubated patients. Protocols generally include an intervention (toothbrushing and/or swabbing and/or oral moistening) minimally twice a day. Particularly for intubated patients, the suggested regimens range widely, i.e. from two times daily up to six times daily. To change such generic, costly and demanding care routines into individualized care that is tailored to the patients' specific needs it might be suggested to use an oral assessment score to determine mouth care regimes. Most assessment tools have, however, been developed for use in the care-dependent elderly. Recently, Ames and colleagues [14] developed an assessment scale specifically for critically ill intubated and non-intubated patients that, moreover, includes an interpretation of the timing of oral care based on the score. Although the authors report no measures of reliability or validity of the instrument, their tool might be a first step towards better matching timing and frequency of oral care to the specific needs of

individual ICU patients and to turn 'more' into a 'less' of at least equal quality.

We warmly invite researchers to contribute to the acquisition of evidence-based insights in what should be recommended as optimal oral hygiene in the ICU in order to eliminate expensive but redundant interventions from daily practice and to provide patients with optimal oral health. Well-designed, appropriately sampled multicenter trials are needed to tackle what we consider to be research priorities in this field (Table 1) [15]. Additionally, we welcome all further evidence clarifying the contribution of oral care interventions to the prevention of pneumonia and the current concerns regarding the safety of CHG oral care.

In conclusion, the current state of the science does not allow to determine whether less daily oral hygiene could indeed be more. While awaiting solid evidence that will elucidate this uncertainty, we consider an individualized oral care approach that takes into account the patients' risk profile and ability to maintain oral health themselves the best option.

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### Compliance with ethical standards

### Conflicts of interest

All authors declare that they have no conflicts of interest.

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### References

1. Labeau SO, Van de Vyver K, Brusselselaers N, Vogelaers D, Blot SI (2011) Prevention of ventilator-associated pneumonia with oral antiseptics: a systematic review and meta-analysis. *Lancet Infect Dis* 11:845–854
2. Klompas M, Speck K, Howell MD, Greene LR, Berenholtz SM (2014) Reappraisal of routine oral care with chlorhexidine gluconate for patients receiving mechanical ventilation: systematic review and meta-analysis. *JAMA Intern Med* 174:751–761
3. Plantinga NL, Wittekamp BH, Leleu K, Depuydt P, Van den Abeele AM, Brun-Buisson C, Bonten MJ (2016) Oral mucosal adverse events with chlorhexidine 2% mouthwash in ICU. *Intensive Care Med* 42:620–621
4. La Combe B, Bleibtreu A, Messika J, Fernandes R, Clermont O, Branger C, Billard-Pomares T, Barnaud G, Magdoud F, Eveillard M, Kouatchet A, Lasocki S, Asfar P, Corvec S, Lakhil K, Armand-Lefevre L, Wolff M, Timsit JF, Bourdon S, Reignier J, Martin S, Fihman V, de Prost N, Bador J, Charles PE, Goret J, Boyer A, Wallet F, Jaillette E, Nseir S, Landraud L, Ruimy R, Danin PE, Dellamonica J, Cremoniter J, Frat JP, Jaureguy F, Clec'h C, Decre D, Maury E, Dreyfuss D, Denamur E, Ricard JD (2018) Decreased susceptibility to chlorhexidine affects a quarter of *Escherichia coli* isolates responsible for pneumonia in ICU patients. *Intensive Care Med* 44:531–533
5. Deschepper M, Waegeman W, Eeckloo K, Vogelaers D, Blot S (2018) Effects of chlorhexidine gluconate oral care on hospital mortality: a hospital-wide, observational cohort study. *Intensive Care Med* 44:1017–1026
6. Price R, MacLennan G, Glen J, Su DC (2014) Selective digestive or oropharyngeal decontamination and topical oropharyngeal chlorhexidine for prevention of death in general intensive care: systematic review and network meta-analysis. *BMJ* 348:g2197
7. Klompas M, Li L, Kleinman K, Szumita PM, Massaro AF (2016) Associations between ventilator bundle components and outcomes. *JAMA Intern Med* 176:1277–1283
8. Azevedo JR, Montenegro WS, Sousa CA, Silva MM, Leitao AL, Maranhao JP, Araujo RS (2017) Ventilator-associated events: prevalence, outcome, and preventability. *Intensive Care Med* 5(Suppl 2):44
9. Bouadma L, Klompas M (2018) Oral care with chlorhexidine: beware! *Intensive Care Med* 44:1153–1155
10. Bouadma L, Karpanen T, Elliott T (2018) Chlorhexidine use in adult patients on ICU. *Intensive Care Med* 44:2232–2234
11. Hua F, Xie H, Worthington HV, Furness S, Zhang Q, Li C (2016) Oral hygiene care for critically ill patients to prevent ventilator-associated pneumonia. *Cochrane Database Syst Rev* 10:CD008367
12. Seymour GJ, Ford PJ, Cullinan MP, Leishman S, Yamazaki K (2007) Relationship between periodontal infections and systemic disease. *Clin Microbiol Infect* 13(Suppl 4):3–10
13. Blot S, Vandijck D, Labeau S (2008) Oral care of intubated patients. *Clin Pulm Med* 15:153–160
14. Ames NJ, Sulima P, Yates JM, McCullagh L, Gollins SL, Soeken K, Wallen GR (2011) Effects of systematic oral care in critically ill patients: a multicenter study. *Am J Crit Care* 20:e103–e114
15. Labeau S, Blot S (2011) Research priorities in oral care for endotracheally-intubated patients. In: Vincent JL (ed) *Annual update in intensive care and emergency medicine 2011*, vol 1. Springer, Berlin, pp 144–155