



ISSN: 0976-3031

Available Online at <http://www.recentscientific.com>

CODEN: IJRSFP (USA)

International Journal of Recent Scientific Research
Vol. 8, Issue, 10, pp. 21167-21175, October, 2017

**International Journal of
Recent Scientific
Research**

DOI: 10.24327/IJRSR

Research Article

ORAL CARE IN IUC PATIENTS: WHAT ARE OUR NEW GOALS?

Kallás MS and Giovani EM

^{1,3}ICMR NTF HI Project, AiiMS Raipur, Chhattisgarh

²Speech Language Pathologist, Pgimer, Chandigarh

⁴Department of ENT & HNS, AiiMS Raipur, Chhattisgarh

DOI: <http://dx.doi.org/10.24327/ijrsr.2017.0810.1024>

ARTICLE INFO

Article History:

Received 20th July, 2017

Received in revised form 29th

August, 2017

Accepted 30th September, 2017

Published online 28th October, 2017

ABSTRACT

Aims: This study aimed to resume the available evidence about the relationship between oral care practices and conditions in patients hospitalized in intensive unit care. **Methods:** papers published from 1976 to 2014 indexed in the databases Pubmed, Scopus, BBO and LILACS were assessed with the combination of the following Medical Subject Headings (Mesh) key words : pneumonia, sepsis, intensive care, intensive care unit, critical illness, pneumonia ventilator associated, systemic inflammation response syndrome, critical care, stomatognathic diseases, mouth diseases, oral health, oral hygiene, oral sprays, oral manifestations, oral decontamination, dental focal infection, oral ulcer and oral pathology . From 352 studies, 29 were eligible and ordered according to the hierarchical strength of evidence, from the strongest level to the weakest evidence, in accordance with the principles of evidence-based dentistry, that rates studies using Oxford Centre for evidence-based Medicine (OCEBM) approach which classify studies using Grading of Recommendations Assessment, Development and Evaluation (GRADING). **Conclusion and authors key points:**

- The mouth is a reservoir of pathogens.
- Oral decontamination is an important procedure for the patient hospitalized in ICU.
- More studies on the initial oral conditions of patients admitted to ICUs are required
- There are few studies about cost benefit of the dentist's inclusion in the multidisciplinary team of UTIs.

Copyright © Preeti Sahu et al, 2017, this is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution and reproduction in any medium, provided the original work is properly cited.

INTRODUCTION

Dental caries and periodontal diseases are the most prevalent oral disorders in the world (1,2). They are characterized by a microbiological infection caused by the ecologic complex instability of the mouth system(3–5).

Even their early clinical diagnoses are easy for a trained dentist most of the times they are silent diseases without any symptom. Dental decays and periodontal diseases have chronic evolution and besides of the classic signs as pain, halitosis, dental mobility and tooth loss they easily could modify and aggravate the overall health of that whom they attack, especially when these are already immunosuppressed patients by underlying systemic disease or recovery of patients with previous kidney, liver and cardiac systemic involvement(6–11). They even could increase the length of hospital stay, treatment costs and directly affect the quality of life of patients(12–15).

Institutionalized subjects, especially those in IUCs and nursing home settings, tend to have poorer oral hygiene than those on

community, thus are at greater risk of developing dental plaque colonization by respiratory pathogens than others subjects (16). Sachved *et al* (17) investigate the microbiological changes in dental plaque following hospitalization in a Critical Care Unit (CCU) and observe that total bacterial count of dental plaque increases during hospitalization in CCU. This finding together with the colonization of dental plaque by HAP bacteria strengthens the evidence for deterioration in oral health in CCU and a risk factor for negative health and quality of life outcomes.

The link between oral health impairment and ventilator-associated pneumonia (VAP) justifies the implementation of strategies capable of controlling the amount and quality of bacteria present in the mouth, and oral care interventions are a theoretically attractive approach for reducing VAP(13,16,18–21).

In another hand, attitudes, beliefs, and knowledge of health care workers in IUCs were describing exploring the type and frequency of oral care practices. As results cleaning the oral

*Corresponding author: **Preeti Sahu**

ICMR NTF HI Project, AiiMS Raipur, Chhattisgarh

cavity was considered unpleasant as well as difficult and many cases respondents felt that despite their efforts in oral health worsens overtime in intubated patients(13,19,22,23).

We carried out a systematic review to evaluate oral care conditions and practices among intensive unit care patients and how earlier diagnostic and treatment of oral diseases could integrate the focus infectious treatment as a preventive strategy for critical ill.

Objectives

The aim of this paper is assess knowledge about oral conditions in ICUs patients and document the available evidence about the relationship between oral care practices among intensive unit care patients with systemic and microbiological outcomes.

Methods

Studies published from 1976 to 2014 and indexed in PubMed, Scopus, BBO, LILACS databases by using the following Medical Subject Headings (Mesh) key words: pneumonia, sepsis, intensive care, intensive care unit, critical illness, pneumonia ventilator associated, systemic inflammation response syndrome, critical care, stomatognathic diseases, mouth diseases, oral health, oral hygiene, oral sprays, oral manifestations, oral decontamination, dental focal infection, oral ulcer and oral pathology.

Inclusion criteria: systemic and microbiological outcomes related to oral conditions.

Exclusion criteria were publications which summaries did not include the relationship between oral conditions and systemic outcomes.

All eligible publications were ordered according to the hierarchical strength of evidence, from the strongest level to the weakest evidence, in accordance with the principles of evidence-based dentistry, that rates studies using Oxford Centre for evidence-based Medicine (OCEBM) approach(24) which classify studies using Grading of Recommendations Assessment, Development and Evaluation (GRADING)(24) (Table 1).

Table 1 GRADE Working Group grades of evidence

Evidence level	Therapy/prevention, etiology/harm	Prognosis	Type of question		
			Diagnosis	Differential diagnosis / symptom prevalence study	Economic and decision analyses
1a	Systematic review of RCT	Systematic review of cohort studies	Systematic review of level 1 diagnosis studies	Systematic review of prospective cohort studies	Systematic review of level 1 economic studies
1b	Individual RCT with narrow confidence intervals	Individual inception, cohort study with > 80% follow up	Validating cohort study with good reference standards	Prospective cohort study with good follow up	Analysis based on clinically sensible costs or alternatives; systematic review of the evidence. Multiway sensitivity analysis included
2a	Systematic review of cohort studies	Systematic review of either retrospective cohort studies or untreated control groups in RCT	Systematic review of level >2 diagnostic studies	Systematic review of level >= 2b studies	Systematic review of level > 2 economic studies
2b	Individual cohort study (including low quality RCT; eg, < 80 % follow up)	Retrospective cohort study or follow up of untreated control patients in RCT	Exploratory cohort study with good reference standards	Retrospective cohort study or poor follow up	Analysis based on clinically sensible costs or alternatives; limited review of the evidence, or single studies. Multiway sensitivity analysis included
2c	'Outcomes' research; ecological studies	'Outcomes' research		Ecological studies	Audit or 'outcomes' research
3a	Systematic review of case-control studies		Systematic review of level >= 3b studies	Systematic review of level >= 3b studies	Systematic review of 3b >= studies

RCT, Randomized controlled trial
 *Full version available from Oxford Centre for Evidence-based Medicine website (www.cebm.net/levels_of_evidence.asp)

RESULTS

The first search yielded 352 articles among which 82 showed criteria that included in the required eligibility and 29 were related with the research as it showed in figure 1.

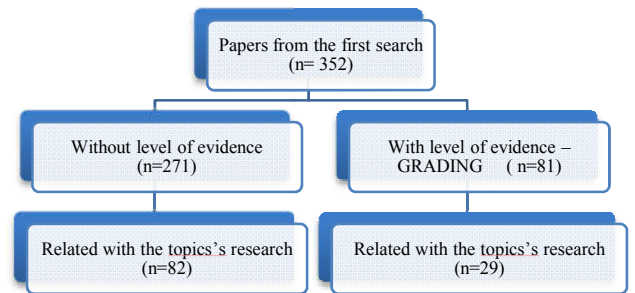


Figure 1 Study flow diagram

The included papers were first classified according to oral themes and frequency (Table 2):

Table 2 Number of eligible papers, distributed by oral themes and GRADING scale

GRADING	Oral Categories				Total
	Oral decontamination	Oral care practices	Oral signs	Microbiological changes	
1a	3	0	0	0	3
1b	15	0	1	0	16
2a	1	0	0	0	1
2b	1	1	0	2	4
2c	0	5	0	0	5
Total	20	6	1	2	29

DISCUSSION

Oral decontamination

Periodontal diseases are the most prevalent oral affections associated with systemic diseases. A simple way to prevent these conditions is the removal of the oral biofilm through daily tooth brushing and cleaning of oral mucosas, including tongue, lips and cheeks. Prendergast *et al* show that it is a safe procedure even in intubated and unconscious patients. (41)

Table 3: Eligible papers distributed by GRADING scale, oral categories, orofacial intervention, systemic outcome and conclusion

Grading	Authors	Oral Categories	Orofacial Intervention	Systemic outcome	Conclusion
1a	Alhazzani, W. et al (2013). (25)	Oral Decontamination	Toothbrushing for critically ill	VAP in critically ill mechanically ventilated patients	Toothbrushing did not significantly reduce the risk of VAP, mortality or length of stay. Electric and manual toothbrushing seem to have similar effects.
1a	Price, R., G. MacLennan and J. Glen (2014).(26)	Oral Decontamination	Effectiveness of SOD and SDD	Effect on mortality of SDD, SOD, and topical oropharyngeal chlorhexidine in adult patients in general intensive care units and to compare these interventions with each other in a network meta-analysis	Both SDD and SOD are superior to chlorhexidine, and there is a possibility that chlorhexidine is associated with increased mortality.
1a	Shi, Z. et al (2013). (27)	Oral Decontamination	Oral hygiene that includes either chlorhexidine mouthwash or gel	VAP	Effective OHC is associated with a 40% reduction in the odds of developing VAP in critically ill adults.
1b	Bopp, M. et al (2006).(28)	Oral Decontamination	Twice-daily oral hygiene care with 0.12% chlorhexidine gluconate and standard oral care.	Nosocomial pneumonia rates for intubated critical care unit (CCU) patients	This application requires further testing.
1b	de Smet, A. M. et al (2009).(29)	Oral Decontamination	Effectiveness of SDD and SOD	Mortality in IUC	Mortality rate associated with standard care was 27.5% at day 28, the rate was reduced by an estimated 3.5 percentage points with SDD and by 2.9 percentage points with SOD.
1b	de Smet, A. M. et al (2011).(30)	Oral Decontamination	Effectiveness of SOD and SDD	Prevention of respiratory tract colonization and bacteremia with highly resistant microorganisms acquired in intensive-care units	Acquired respiratory tract colonization with Gram-negative bacteria or cefotaxime-resistant and colistin-resistant pathogens was lowest during SDD.
1b	Fields, L. B. (2008). (31)	Oral Decontamination	Timed tooth brushing, combined with the VAP bundle	VAP of mechanically ventilated patients on a 24-bed stroke, neurologic, and medical ICU.	The study was so successful that the control group was dropped after 6 months, and all intubated patients' teeth were brushed every 8 hours, maintaining the zero rate until the end of the study.
1b	Fourrier, F. et al (2005). (32)	Oral Decontamination	Antiseptic decontamination of gingival and dental plaque with a 0.2% chlorhexidine gel or a placebo gel, three times a day, during the entire ICU stay.	Nosocomial infections - The primary efficacy end point was the incidence of bacteremia, bronchitis, and ventilator-associated pneumonia, expressed as a percentage and per 1000 ICU days	Gingival and dental plaque antiseptic decontamination significantly decreased the oropharyngeal colonization by aerobic pathogens in ventilated patients. However, its efficacy was insufficient to reduce the incidence of respiratory infections due to multiresistant bacteria.
1b	Garcia, R. et al (2009).(33)	Oral Decontamination	Oral and dental care system and protocol	Rate of VAP	Significantly reduce rates of ventilator-associated pneumonia and associated costs.
1b	Kim, E. K. et al (2014).(8)	Microbiological Changes	Tooth brushing with an interdental brush and tongue cleaner and cleaning with chlorhexidine was administered to patients by one dentist once per day during admission in the ICU (mean, 2.2 weeks).	Plaque index, gingival index, and colonization degree of candida albicans in saliva	Significant decrease
1b	Koeman, M. et al(2006).(34)	Oral Decontamination	Oral decontamination with either chlorhexidine (CHX, 2%) or CHX/colistin (CHX/COL, 2%/2%) would	Reduce and postpone development of VAP, and oral and endotracheal colonization.	Topical oral decontamination with CHX or CHX/COL reduces the incidence of VAP.
1b	Lorente, L. et al (2012). (35)	Oral Decontamination	Role of toothbrush	VAP	Adding manual tooth brushing to chlorhexidine oral care does not help to prevent VAP in critical care patients on mechanical ventilation.
1b	Melsen, W. G. et al (2012). (36)	Oral Decontamination	SDD and SOD effects in surgical and non-surgical patients	28-day mortality rate. Duration of mechanical ventilation, duration of intensive care unit (ICU) and hospital length of stay, and bacteremia rates were secondary outcomes	Subgroup analysis found similar effects of SDD in reducing mortality in surgical and non-surgical ICU patients, whereas SOD reduced mortality only in non-surgical patients. The hypothesis-generating findings mandate investigation into mechanisms between different ICU populations
1b	Munro, C. L. et al (2009).(37)	Oral Decontamination	Effects of mechanical (toothbrushing), pharmacological (topical oral chlorhexidine), and combination (toothbrushing plus chlorhexidine) oral care	VAP in critically ill patients receiving mechanical ventilation.	Chlorhexidine, but not toothbrushing, reduced early ventilator-associated pneumonia in patients without pneumonia at baseline
1b	Ozçaka, O. et al (2012).(38)	Oral Decontamination	Oral swabbing with 0.2% chlorhexidine gluconate (CHX).	VAP	Oral care with CHX swabbing reduces the risk of VAP

1b	Ozden, D. et al(2014).(39)	Oral Decontamination	5% sodium bicarbonate, 0-2% chlorhexidine and saline solution,	Oral mucous membrane integrity	It was found that there was no difference between patient groups receiving saline solution, sodium bicarbonate and 0-2% chlorhexidine for mouth care in terms of oral mucous membrane integrity; oral mucosa of all patients was found to be mildly dysfunctioning.
1b	Pobo, A. et al (2009). (40)	Oral Decontamination	The impact of adding electric toothbrushing to oral care	in order to reduce ventilator-associated pneumonia (VAP) incidence	Our findings suggest that the addition of electric toothbrushing to standard oral care with 0.12% chlorhexidinedigluconate is not effective for the prevention of VAP.
1b	Prendergast, V., P. Hagell and I. R. Hallberg (2011). (41)	Oral Decontamination	Evidence is needed to support the safety of toothbrushing during oral care	ICP and cerebral perfusion pressure (CPP) during oral care with a manual or electric toothbrush in intubated patients in a neuroscience intensivecare unit (ICU).	In the absence of preexisting intracranial hypertension during oral care, tooth brushing, regardless of method, was safely performed in intubated neuroscience ICU patients.
1b	Prendergast, V. et al (2012).(42)	Oral signs	Standard or a comprehensive oral care protocol	Changes in oral health during intubation until 48 hours after extubation in neuroscience intensivecare unit (ICU) patients enrolled	Ratings on tongue, mucous membranes, gingiva, and teeth did not deteriorate significantly over time. A comprehensive oral care protocol, using a tongue scraper, an electrical toothbrush, and pharmacological moisturizers, was more effective for oral hygiene throughout intubation and after extubation
2a	Berry, A. M. et al (2007). (15)	Oral Decontamination	Oral hygiene has been proposed as a key intervention	VAP	High-level evidence from rigorous randomized controlled trials or high-quality systematic reviews that could inform clinical practice is scarce
2b	Benus, R. F. et al (2010). (43)	Microbiological changes	SDD and SOD	By means of a prospective clinical trial in which faecal samples were collected from ICU patients for intestinalmicrobiotaanalysis	The Enterobacteriaceae were significantly suppressed during SDD compared to both SOD and SC; enterococci increased in SDD
2b	Bingham, M. et al (2010). (44)	Oral Decontamination	Unit-specific education intervention that emphasized hand hygiene, head-of-the-bed elevation, and oral care.	VAP rates and number of ventilator days.	Patient outcomes and staff compliance did not improve significantly
2b	Cabov, T. et al (2010). (45)	Microbiological Changes	Oral health	Rate of nosocomial infections in patients in a surgical intensive-care unit (ICU) / Effects of oral antiseptic decontamination on oral colonization	Oral decontamination with chlorhexidine significantly decreased oropharyngeal colonization, the incidence of nosocomial infections, length of ICU stay, and mortality
2b	Yeung, K. Y. and Y. Y. Chui (2010). (46)	Oral Care Practices	Factors that affect Hong Kong intensive care unit nurses in providing oral care	Their perceptions of the purpose of oral care; their fears about providing it; the priority of oral care; and inadequate support for oral care.	Study findings indicate that present oral care training should be revised / influence of ward culture on nurses' priorities in providing oral care. Appropriate materials, adequate staffing levels and the establishment of an evidence-based oral care protocol may facilitate the provision of oral care in the intensive care unit.
2c	Chan, E. Y. et al (2011). (47)	Oral Care Practices	Best available evidence to improve oral care practices / 0.2% chlorhexidine solution as the main oral cleaning solution, and standardizing oral care documentation	Evidence-based project heightened nurses' awareness and knowledge on oral care, and led to nurses providing practices based on best available evidence.	These have translated to improvements in patients' oral health
2c	Ganz, F.D. et al (2013). (48)	Oral Care Practices	Survey instrument was used for both periods of data collection. This questionnaire included questions about demographic and personal characteristics and a checklist of oral care practices	Descriptive comparison of ICU nurses in 2004-2005 and 2012	The national effort was partially successful in improving evidence-based oral care practices; however, increased awareness to EBP also might have come from other sources.
2c	Johnson, K. et al (2012). (49)	Oral Care Practices	Descriptive pre and post test design of oral hygiene protocol in two critical care units in a Level One Trauma Community Hospital.	VAP and nurse's attitudes, beliefs post implementation of an evidence based practice (EBP) oral hygiene protocol	Nurses' attitudes, beliefs are important, and staff adherence considered when initiating EBP changes
2c	Szabo, C. M. (2011). (50)	Oral Care Practices	To appraise the best evidence for providing oral care to patients with ICP monitoring,	Key terms ICP monitoring, intracranial hypertension, oral care, mouth care, hygiene, nursing interventions, nursing care, intensive care, and critical care.	Only four specifically tested or described the effect of oral care on ICP. There is a need for more knowledge about the effect of oral care on ICP so that evidence-based oral care practices in this patient population can be defined.
2c	Westwell, S. (2008). (51)	Oral Care Practices	Department of Health staff were visiting the hospital recommended that the frequency of audit activity should be increased to facilitate the rapid identification of areas of poor compliance, which could then be rectified	Prevention of VAP	Daily care bundle audits showed a positive impact on compliance. However, without a robust method to collect data on prevalence of VAP, the impact of the care bundles on improving outcomes for this aspect of care is unknown.

Alhazzani *et al* (25) found in their study significant reduction in the risk for VAP (Ventilator Associated Pneumonia) or length of stay in patients on mechanical ventilation when comparing the oral decontamination done through electric and manual brushing. Lorente *et al* (35) have also shown that the role of brushing has no significance in the VAP rates. Munro *et al* (52) compared three procedures of oral hygiene: only tooth brushing, only chlorhexidine use and brushing with chlorhexidine. They concluded that chlorhexidine and not brushing is collaborating in reducing VAP. Corroborates with this study Pobo *et al* (40), which also showed no impact on VAP rates by the use of electric mouth brushes.

Fourrier *et al* (53) and Price *et al* (26) showed the efficiency of respiratory diseases by selective oral decontamination (SOD) and selective digestive decontamination (SDD). However, SOD isolated action is inefficient when the presence of multi-resistant bacteria. Price *et al*, even considering the limitations of the lack of prospective studies in their meta-analysis corroborates with Fourrier *et al*, concluding that there is a greater effectiveness of SDD and SOD on the local chlorhexidine and there is still possibility of increased mortality when applying only this.

Melsen *et al* (36) showed that SOD and SDD reduce mortality in non-surgical patients compared with surgical treatment. Also does Smet *et al* in 2009 (29) who have demonstrated that SDD resulted in a 3.5 points reduction of mortality rate in the ICU when it was compared with SOD. The same research group showed in 2011 decreased colonization of the respiratory tract by gram negative bacteria or cefotaxime-resistant and colistin-resistant pathogens with SDD (30).

Although not focused on multidrug-resistant bacteria, studies by Shi *et al* (27), Bopp *et al* (28) Koeman *et al* (34), Munro *et al* (37), Ozçaka *et al* (38) and Ozden *et al* (39) confirmed that oral decontamination reduces the incidence of VAP 40%. They also studied the oral hygiene in the prevention bundles group Berry *et al* (15) Bingham *et al* (44) and Garcia *et al* (33).

In an attempt to standardize the practice of oral decontamination in critically ill patients and reduce VAP rates, Garcia *et al* (33) conducted a prospective study of 48 months compared 779 patients before the protocol with 759 patients with oral hygiene protocol which was inserted an educational program for the multidisciplinary team, tooth brushing 2 times a day with antiseptic agent Cetylpyridinium 0.5% in a tooth brush attached to a sucker, oropharyngeal suction every 6 hours and cleaning of the mouth and gums with swab sucking with hydrogen peroxide 1.5% every 4 hours or as necessary. They had a favorable outcome with a reduction of 61% in VAP rates. Koeman *et al* (34) used CHX (chlorhexidine) and CHX / Colestin and both reducing VAP. Changing the chlorhexidine concentration to 0.2% chlorhexidine gluconate to decrease the efficiency of VAP continues. According Ozçaka *et al* (38) and Ozden *et al* (39) further compares mucosal integrity when comparing the use of CHX with 5% sodium bicarbonate. There was no difference for the 2 groups and in all patients there was a slight disorder of the mucosa.

The publications about the importance of oral care in ICU patients, guidelines were developed and described. CDC (Center for Disease Control) established that oral decontamination in the VAP prevention bundle is a

recommendation with level B of evidence. However, there is still no consensus on the optimal concentration of chlorhexidine and the optimum frequency of application (54). There are oral hygiene protocols in ICU published in Brazil. The Dentistry department of Faculty of Medicine in University of São Paulo, published in 2014 how they performed the oral decontamination in their patients by hygiene with 0.12% chlorhexidine gluconate 2 times a day (55). Also published the same protocol researchers of AMIB (Intensive Medicine Association of Brazil) (56).

Oral care practices

Binkley *et al* in 2004 (23) reported the following rates about oral care in ICUs in the United States: 66% of the nursing staff found that oral hygiene is important, 31.7% said it is an unpleasant activity, 46% reported being difficult to accomplish this task while 65.3% report having had proper training.

In 2007, Relo *et al* (22) conducted similar study and described oral care performed by nursing teams in 59 European ICUs. Oral hygiene with chlorhexidine is usually performed once a day, 81% of centers have the necessary supplies, 63% related that the use of suitable toothbrushes can improve their processes and 27% preferred electric toothbrushes. With regard to attitudes 88% think that oral care is a priority, 10% related it is an unpleasant activity, 25% found it difficult and 66% report having had proper training.

Szabo *et al* (50) led a systematic review to assess the best evidence of oral care in patients with intracranial pressure and also concluded that there is need for more knowledge about the effects of oral hygiene in these patients in addition to establishing evidence-based protocols.

Westell S *et al* (51) described the positive benefits of a daily audit in regard to realization of proposed activities even needing a robust method of data collection for the evaluate the impact of the bundles in preventing VAP.

Ganz *et al* (48) and Johnson *et al* (49) showed similar results. Johnson K *et al* (49) conducted a pre and post descriptive study after and before the introduction of an oral hygiene protocol in two critical care units of a hospital trauma and also showed that the nurses' attitudes are important and that the adherence of the support staff should be considered when initiating changes in oral care protocol and evidence-based practices.

In our research, the study with evidence level selected was the Yeung *et al* (46) group, who described the factors influencing the nurses in the ICU of Hong Kong on offer oral hygiene to their patients. They indicated the need for training review in oral care, the establishment of a protocol and materials suitable for this activity.

Ames *et al* in 2011 (57) measured the impact of oral care protocols in a multicenter study. In three North American ICUs they showed that the standardization of oral care across a range of oral plaque scores conditions could be effectively and guide the nursing team offer well this intervention in intubated patients. The program consisted of instructions performed by a dentist and oral health technical and it decreased VAP rates and improves oral health status.

The same was shown by Chan *et al*, in 2011 (47): the standardization of the oral care documentation added to best

evidence for Realizer this procedure and use of chlorhexidine to 0.12% as a main hygiene solution brought improvements in health Oral patients.

Oral signs

According to the methodology used in our study only the publication of Prendergast *et al* in 2012 (42) was classified by name the oral amendments in ICU patients. During the intubation, and 48 hours after extubation they showed alterations of tongue coating rates, mucous membranes, teeth and gums. A protocol with electric toothbrush, tongue scraper and chlorhexidine 0.12% was used to improve the score of these conditions and shown

Brazilian studies in ICUs of cancer patients corroborate this result. Silva *et al* (58) evaluated the procedures performed by dentists on patients admitted to a unit of intensive cancer therapy. They attended 116 patients and performed 329 procedures including clinical evaluations and prescriptions. Their findings indicated the prevalence of candidiasis in 16.6% of patients, oral mucositis in 20.3% and xerostomia in 7.8%. They shown how evaluations can prevent painful symptoms such as mucositis, infectious as oral candidiasis and uncomfortable for food as dry mouth caused by medication treatment. Pires *et al* (59) showed the same as Silva *et al* and highlighted the positive changes in the conditions of coating and mucositis when early intervention is done.

Bellissimo *et al* (60) showed positive impact in reducing infection rates lower respiratory tract when performing the oral hygiene protocol and added to this procedures dental removal of infectious foci (extraction of broken teeth, removal of caries and dental calculus). They corroborated with other studies reporting how the oral flora changes during the ICU stay and studies show that this is a reservoir of respiratory pathogens.

Microbiological changes

Periodontal diseases are local pathological processes involving the periodontium, including the gingiva, alveolar bone (alveolar process), dental cementum and periodontal ligament. It has established its relationship with systemic diseases such as diabetes, kidney disease, heart disease and osteoporosis. (13,21,41,42).

As regards the debilitated by their systemic condition that's more relevant, as these are more susceptible hosts the foci of infection often chronic and asymptomatic (21,61,62).

In our study we included three studies that reported positive microbiological changes when oral hygiene. Cabov *et al* (45) showed reduction of oropharyngeal colonization with the use of oral antiseptic chlorhexidine base.

The group of Kim *et al* (8) showed a significant reduction in colonization by *Candida* in the oral cavity with tooth brushing, interdental brushing, tongue cleaning and sanitizing with clorexinia. Since Benus *et al* (43) used the selective decontamination oral with topical applications cefotaxime, colistin, amphotericin B and associated with gastrointestinal selective decontamination of the same composition intravenous cefotaxime for 4 days and the other components orally.

Clinical practice implications

The "gap" found is that few studies have reported the importance of include removing of dental infections procedures added to report the oral conditions that patients are admitted in IUCs.

In 2013 Prendergast *et al* described an illustrated protocol of oral diseases that may be used by the entire multidisciplinary team. Mouth is divide in 7-segment to note: reflexes of swallowing, tongue, lips, saliva, mucous membrane, gums, teeth or dentures and odor. According to each score of all the aspects, a score is given and the final score indicates three levels of risk (mild, moderate and severe) with their hygiene roadmaps (13).

In 2014 Belissimo-Rodrigues *et al* (60) published a study in which addition to the benefits of routine oral hygiene with chlorhexidine, described the importance of the removal of foci of infection and fractured teeth, dental calculus scraping, atraumatic restorations of cavities and tooth brushing. The study included 254 patients in control groups and the results indicated that in addition to mouth brushing, dental procedures aimed at the removal of local infection foci are effective in the control of lower respiratory tract infections.

In 1963 the National Library of Medicine indexed the description of intensive care units. They are hospital units that provide continuous monitoring and care for acutely ill patients (63). In 1971, 1970 and 1982 respectively were created the Respiratory Care Units terms, Cardiological Care Unit and the Burn Care Unit.

All these services units must have a hospital rapid response team. This term was introduced in 2010, meaning a multidisciplinary team often consists of people available 24 hours a day, 7 days a week, to assess patients who developed clinical signs and symptoms of severe deterioration (63). Doctors, nurses, nursing technicians, physical therapists, speech therapists, nutritionists, occupational therapists and psychologists occupy their spaces separately and work together to provide comprehensive care.

Thus, it should be actively included in this process Dentistry (64), which can start publishing papers on the prevalence of oral diseases in patients admitted to intensive care units. Also important are reports of dental interventions that aim to complement the oral decontamination, either by removing clusters of infections, or the prevention of major diseases, correlated with the underlying disease of the patients.

Authors conclusion

- The mouth is a reservoir of pathogens.
- Oral decontamination is an important procedure for the patient hospitalized in ICU.
- More studies on the initial oral conditions of patients admitted to ICUs are required
- There are few studies about cost benefit of the dentist's inclusion in the multidisciplinary team of UTIs.

References

1. World Health Organization. What is the burden of oral disease? [Internet]. [cited 2014 Jul 23]. Available from:

- http://www.who.int/oral_health/disease_burden/global/en/
- El Attar MM, Zaghloup MZ, Elmenoufr HS. Role of periodontitis in hospital-acquired pneumonia. *East Mediterr Health J Rev Santé Méditerranée Orient Al-Majallah Al-Şihhiyah Li-Sharq Al-Mutawassit*. 2010 May;16(5):563–9.
 - Marsh PD. Microbial ecology of dental plaque and its significance in health and disease. *Adv Dent Res*. 1994 Jul;8(2):263–71.
 - He X-S, Shi W-Y. Oral microbiology: past, present and future. *Int J Oral Sci*. 2009 Jun;1(2):47–58.
 - Gendron R, Grenier D, Maheu-Robert L. The oral cavity as a reservoir of bacterial pathogens for focal infections. *Microbes Infect Inst Pasteur*. 2000 Jul;2(8):897–906.
 - Pizzo G, Guiglia R, Russo LL, Campisi G. Dentistry and internal medicine: from the focal infection theory to the periodontal medicine concept. *Eur J Intern Med*. 2010 Dec;21(6):496–502.
 - Weireter LJ, Collins JN, Britt RC, Reed SF, Novosel TJ, Britt LD. Impact of a Monitored Program of Care on Incidence of Ventilator-Associated Pneumonia: Results of a Longterm Performance-Improvement Project. *J Am Coll Surg*. 2009 May;208(5):700–4.
 - Kim E-K, Jang S-H, Choi Y-H, Lee K-S, Kim Y-J, Kim S-H, et al. Effect of an Oral Hygienic Care Program for Stroke Patients in the Intensive Care Unit. *Yonsei Med J*. 2014;55(1):240.
 - Ruby J, Barbeau J. The buccale puzzle: The symbiotic nature of endogenous infections of the oral cavity. *Can J Infect Dis J Can Mal Infect*. 2002 Jan;13(1):34–41.
 - Wilkin K. A critical analysis of the philosophy, knowledge and theory underpinning mouth care practice for the intensive care unit patient. *Intensive Crit Care Nurs Off J Br Assoc Crit Care Nurses*. 2002 Jun;18(3):181–8.
 - Yamashita Y, Takeshita T. Oral Flora Composition and Its Connection to Oral Health. *J Oral Biosci*. 2011 Jan;53(3):206–12.
 - Kuo L-C, Polson AM, Kang T. Associations between periodontal diseases and systemic diseases: A review of the inter-relationships and interactions with diabetes, respiratory diseases, cardiovascular diseases and osteoporosis. *Public Health*. 2008 Apr;122(4):417–33.
 - Prendergast V, Kleiman C, King M. The Bedside Oral Exam and the Barrow Oral Care Protocol: Translating evidence-based oral care into practice. *Intensive Crit Care Nurs*. 2013 Oct;29(5):282–90.
 - Sona CS, Zack JE, Schallom ME, McSweeney M, McMullen K, Thomas J, et al. The Impact of a Simple, Low-cost Oral Care Protocol on Ventilator-associated Pneumonia Rates in a Surgical Intensive Care Unit. *J Intensive Care Med*. 2008 Nov 25;24(1):54–62.
 - Berry AM, Davidson PM, Masters J, Rolls K. Systematic literature review of oral hygiene practices for intensive care patients receiving mechanical ventilation. *Am J Crit Care Off Publ Am Assoc Crit-Care Nurses*. 2007 Nov;16(6):552–62; quiz 563.
 - Scannapieco FA, Stewart EM, Mylotte JM. Colonization of dental plaque by respiratory pathogens in medical intensive care patients. *Crit Care Med*. 1992 Jun;20(6):740–5.
 - Sachdev M, Ready D, Brealey D, Ryu J, Bercades G, Nagle J, et al. Changes in dental plaque following hospitalisation in a critical care unit: an observational study. *Crit Care*. 2013;17(5):R189.
 - Berry AM, Davidson PM, Masters J, Rolls K, Ollerton R. Effects of three approaches to standardized oral hygiene to reduce bacterial colonization and ventilator associated pneumonia in mechanically ventilated patients: A randomised control trial. *Int J Nurs Stud*. 2011 Jun;48(6):681–8.
 - Kusahara DM, Peterlini MAS, Pedreira MLG. Oral care with 0.12% chlorhexidine for the prevention of ventilator-associated pneumonia in critically ill children: Randomised, controlled and double blind trial. *Int J Nurs Stud*. 2012 Nov;49(11):1354–63.
 - Garcia R. A review of the possible role of oral and dental colonization on the occurrence of health care-associated pneumonia: Underappreciated risk and a call for interventions. *Am J Infect Control*. 2005 Nov;33(9):527–41.
 - Prendergast V, Hallberg IR, Jahnke H, Kleiman C, Hagell P. Oral Health, Ventilator-Associated Pneumonia, and Intracranial Pressure in Intubated Patients in a Neuroscience Intensive Care Unit. *Am J Crit Care*. 2009 Jul 1;18(4):368–76.
 - Rello J, Kourenti D, Blot S, Sierra R, Diaz E, Waele JJ, et al. Oral care practices in intensive care units: a survey of 59 European ICUs. *Intensive Care Med*. 2007 May 24;33(6):1066–70.
 - Binkley C, Furr LA, Carrico R, McCurren C. Survey of oral care practices in US intensive care units. *Am J Infect Control*. 2004 May;32(3):161–9.
 - Richards D. GRADING – levels of evidence. *Evid Based Dent*. 2009;10(1):24–5.
 - Alhazzani W, Smith O, Muscedere J, Medd J, Cook D. Toothbrushing for Critically Ill Mechanically Ventilated Patients: A Systematic Review and Meta-Analysis of Randomized Trials Evaluating Ventilator-Associated Pneumonia*. *Crit Care Med*. 2013 Feb;41(2):646–55.
 - Price R, MacLennan G, Glen J, SuDDICU Collaboration. Selective digestive or oropharyngeal decontamination and topical oropharyngeal chlorhexidine for prevention of death in general intensive care: systematic review and network meta-analysis. *BMJ*. 2014;348:g2197.
 - Shi Z, Xie H, Wang P, Zhang Q, Wu Y, Chen E, et al. Oral hygiene care for critically ill patients to prevent ventilator-associated pneumonia. *Cochrane Database Syst Rev*. 2013;8:CD008367.
 - Bopp M, Darby M, Loftin KC, Broscious S. Effects of daily oral care with 0.12% chlorhexidine gluconate and a standard oral care protocol on the development of nosocomial pneumonia in intubated patients: a pilot study. *J Dent Hyg JDH Am Dent Hyg Assoc*. 2006;80(3):9.
 - De Smet AMGA, Kluytmans JAJW, Cooper BS, Mascini EM, Benus RFJ, van der Werf TS, et al. Decontamination of the Digestive Tract and Oropharynx in ICU Patients. *N Engl J Med*. 2009 Jan;360(1):20–31.

30. De Smet AMGA, Kluytmans JAJW, Blok HEM, Mascini EM, Benus RFJ, Bernards AT, *et al.* Selective digestive tract decontamination and selective oropharyngeal decontamination and antibiotic resistance in patients in intensive-care units: an open-label, clustered group-randomised, crossover study. *Lancet Infect Dis.* 2011 May;11(5):372–80.
31. Fields LB. Oral care intervention to reduce incidence of ventilator-associated pneumonia in the neurologic intensive care unit. *J Neurosci Nurs J Am Assoc Neurosci Nurses.* 2008 Oct;40(5):291–8.
32. Fourrier F, Cau-Pottier E, Boutigny H, Roussel-Delvallez M, Jourdain M, Chopin C. Effects of dental plaque antiseptic decontamination on bacterial colonization and nosocomial infections in critically ill patients. *Intensive Care Med.* 2000 Sep;26(9):1239–47.
33. Garcia R, Jendresky L, Colbert L, Bailey A, Zaman M, Majumder M. Reducing ventilator-associated pneumonia through advanced oral-dental care: a 48-month study. *Am J Crit Care Off Publ Am Assoc Crit-Care Nurses.* 2009 Nov;18(6):523–32.
34. Koeman M, van der Ven AJAM, Hak E, Joore HCA, Kaasjager K, de Smet AGA, *et al.* Oral Decontamination with Chlorhexidine Reduces the Incidence of Ventilator-associated Pneumonia. *Am J Respir Crit Care Med.* 2006 Jun 15;173(12):1348–55.
35. Lorente L, Lecuona M, Jiménez A, Palmero S, Pastor E, Lafuente N, *et al.* Ventilator-associated pneumonia with or without toothbrushing: a randomized controlled trial. *Eur J Clin Microbiol Infect Dis Off Publ Eur Soc Clin Microbiol.* 2012 Oct;31(10):2621–9.
36. Melsen WG, de Smet AMGA, Kluytmans J a. JW, Bonten MJM, Dutch SOD-SDD Trialists' Group. Selective decontamination of the oral and digestive tract in surgical versus non-surgical patients in intensive care in a cluster-randomized trial. *Br J Surg.* 2012 Feb;99(2):232–7.
37. Munro CL, Grap MJ, Jones DJ, McClish DK, Sessler CN. Chlorhexidine, Toothbrushing, and Preventing Ventilator-Associated Pneumonia in Critically Ill Adults. *Am J Crit Care.* 2009 Sep 1;18(5):428–37.
38. Özçaka Ö, Başoğlu OK, Buduneli N, Taşbakan MS, Bacakoğlu F, Kinane DF. Chlorhexidine decreases the risk of ventilator-associated pneumonia in intensive care unit patients: a randomized clinical trial. *J Periodontal Res.* 2012 Oct;47(5):584–92.
39. Özden D, Türk G, Düger C, Güler EK, Tok F, Gülsoy Z. Effects of oral care solutions on mucous membrane integrity and bacterial colonization. *Nurs Crit Care.* 2014 Mar;19(2):78–86.
40. Pobo A, Lisboa T, Rodriguez A, Sole R, Magret M, Trefler S, *et al.* A randomized trial of dental brushing for preventing ventilator-associated pneumonia. *Chest.* 2009 Aug;136(2):433–9.
41. Prendergast V, Hagell P, Hallberg IR. Electric versus manual tooth brushing among neuroscience ICU patients: is it safe? *Neurocrit Care.* 2011 Apr;14(2):281–6.
42. Prendergast V, Jakobsson U, Renvert S, Hallberg IR. Effects of a standard versus comprehensive oral care protocol among intubated neuroscience ICU patients: results of a randomized controlled trial. *J Neurosci Nurs J Am Assoc Neurosci Nurses.* 2012 Jun;44(3):134–46; quiz 147–8.
43. Benus RF, Harmsen HJ, Welling GW, Spanjersberg R, Zijlstra JG, Degener JE, *et al.* Impact of digestive and oropharyngeal decontamination on the intestinal microbiota in ICU patients. *Intensive Care Med.* 2010 Aug;36(8):1394–402.
44. Bingham M, Ashley J, De Jong M, Swift C. Implementing a Unit-Level Intervention to Reduce the Probability of Ventilator-Associated Pneumonia: *Nurs Res.* 2010 Jan;59(Supplement):S40–7.
45. Cabov T, Macan D, Husedzinović I, Skrlin-Subić J, Bosnjak D, Sestan-Crnek S, *et al.* The impact of oral health and 0.2% chlorhexidine oral gel on the prevalence of nosocomial infections in surgical intensive-care patients: a randomized placebo-controlled study. *Wien Klin Wochenschr.* 2010 Jul;122(13-14):397–404.
46. Yeung KY, Chui YY. An exploration of factors affecting Hong Kong ICU nurses in providing oral care: Factors affecting provision of oral care. *J Clin Nurs.* 2010 Nov;19(21-22):3063–72.
47. Chan EY, Lee YK, Poh TH, Ng IHL, Prabhakaran L. Translating evidence into nursing practice: oral hygiene for care dependent adults. *Int J Evid Based Healthc.* 2011 Jun;9(2):172–83.
48. Ganz FD, Ofra R, Khalaila R, Levy H, Arad D, Kolpak O, *et al.* Translation of oral care practice guidelines into clinical practice by intensive care unit nurses. *J Nurs Scholarsh Off Publ Sigma Theta Tau Int Honor Soc Nurs Sigma Theta Tau.* 2013 Dec;45(4):355–62.
49. Johnson K, Domb A, Johnson R. One evidence based protocol doesn't fit all: Brushing away ventilator associated pneumonia in trauma patients. *Intensive Crit Care Nurs.* 2012 Oct;28(5):280–7.
50. Szabo CM. The effect of oral care on intracranial pressure: a review of the literature. *J Neurosci Nurs J Am Assoc Neurosci Nurses.* 2011 Oct;43(5):E1–9.
51. Westwell S. Implementing a ventilator care bundle in an adult intensive care unit. *Nurs Crit Care.* 2008 Jul;13(4):203–7.
52. Munro CL, Grap MJ, Jones DJ, McClish DK, Sessler CN. Chlorhexidine, Toothbrushing, and Preventing Ventilator-Associated Pneumonia in Critically Ill Adults. *Am J Crit Care.* 2009 Sep 1;18(5):428–37.
53. Fourrier F, Dubois D, Pronnier P, Herbecq P, Leroy O, Desmettre T, *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 Aug;33(8):1728–35.
54. Tablan OC, Anderson LJ, Besser R, Bridges C, Hajjeh R, CDC, *et al.* Guidelines for preventing health-care--associated pneumonia, 2003: recommendations of CDC and the Healthcare Infection Control Practices Advisory Committee. *MMWR Recomm Rep Morb Mortal Wkly Rep Recomm Rep Cent Dis Control.* 2004 Mar 26;53(RR-3):1–36.
55. Franco JBF, Jales SM da CP, Zambon CE, Fajarra FJC, Ortogosa MV, Guardieiro PFR, *et al.* Higiene bucal para pacientes entubados sob ventilação mecânica assistida

- na unidade de terapia intensiva: proposta de protocolo. *Arq Med Hosp Fac Cienc Med St Casa São Paulo*. 2014;59(3):126–31.
56. Recomendações Para Higiene Bucal Do Paciente Adulto Em Uti – Amib. Associação de Medicina Intensiva Brasileira - Departamento de odontologia e Departamento de Enfermagem; 2013.
57. Ames NJ, Sulima P, Yates JM, McCullagh L, Gollins SL, Soeken K, et al. Effects of Systematic Oral Care in Critically Ill Patients: A Multicenter Study. *Am J Crit Care*. 2011 Sep 1;20(5):e103–14.
58. Silva AP, Caruso P, Jaguar GC, Carvalho PAG, Alves FA. Oral evaluation and procedures performed by dentists in patients admitted to the intensive care unit of a cancer center. *Support Care Cancer* [Internet]. 2014 Apr 22 [cited 2014 Jul 23]; Available from: <http://link.springer.com/10.1007/s00520-014-2233-0>
59. Juliana Rico Pires et al. Perfil bucal de pacientes oncológicos e controle de infecção em unidade de terapia intensiva. *Rev APCD - Assoc Paul Cir Dent*. 2014;68(2):140–64.
60. Bellissimo-Rodrigues WT, Meneguetti MG, Gaspar GG, Nicolini EA, Auxiliadora-Martins M, Basile-Filho A, et al. Effectiveness of a Dental Care Intervention in the Prevention of Lower Respiratory Tract Nosocomial Infections among Intensive Care Patients: A Randomized Clinical Trial. *Infect Control Hosp Epidemiol Off J Soc Hosp Epidemiol Am*. 2014 Nov;35(11):1342–8.
61. Rautemaa R, Lauhio A, Cullinan MP, Seymour GJ. Oral infections and systemic disease--an emerging problem in medicine. *Clin Microbiol Infect Off Publ Eur Soc Clin Microbiol Infect Dis*. 2007 Nov;13(11):1041–7.
62. Seppänen L, Lauhio A, Lindqvist C, Suuronen R, Rautemaa R. Analysis of systemic and local odontogenic infection complications requiring hospital care. *J Infect*. 2008 Aug;57(2):116–22.
63. PUBMED, MESH results. Intensive Care Units - Mesh PUBMED. [Internet]. PUBMED; [cited 2015 Jul 7]. Available from: <http://www.ncbi.nlm.nih.gov/mesh/?term=intensive+unit+care>
64. Amaral OF, Marques JA, Bovolato MC, Partzi AGS, Oliveira A, Straloto FG. Importância do cirurgião-dentista em Unidade de Terapia Intensiva: avaliação multidisciplinar. *Rev APCD - Assoc Paul Cir Dent*. 2013;67(2):107–11.

How to cite this article:

Preeti Sahu et al. 2017, Environmental Noise Level And Its Control In The Healthcare Setup. *Int J Recent Sci Res*. 8(10), pp. 21167-21175. DOI: <http://dx.doi.org/10.24327/ijrsr.2017.0810.1024>
