

# Dental Management for Patients in ICU

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## ABSTRACT

The essence of multi disciplinary is that professionals from different areas acting on the same patient in intensive care do not rely on the environment or special equipment but on the decision making process, based on the full understanding of the patient's physiological, psychological conditions and of new therapies. It is mandatory that ICU patients receive sufficient oral hygiene care during their stay, for the purpose of preventing oral pathologies and possible complications of already existing oral diseases.

There is real need for the effective participation of dentists and the nursing staff in the instructions, professional qualification, and motivation of health professionals working in the ICU in order to create specific routines to promote oral health in ICU patients. Multifaceted interventions to improve oral care nursing practices are required to reduce the incidence of life threatening conditions in mechanically ventilated patients, thereby improving patient safety

**Key Words :** Pneumonia, Oral hygiene, COPD, Chronic Renal Insufficiency

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## INTRODUCTION

Intensive care units (ICU) were created based upon the need to care for patients in critical conditions, requiring continued attention and observation from physician and nurses as well as the need to improve and concentrate material and human resources for the care of critically ill patients, however considered recoverable, also for constant surveillance have centralized patients in a specialized center. Interdisciplinary teams (professionals from related areas) and multidisciplinary (together with professionals from specialized areas) are part of these unit's day-by-day. Patients in the ICU require excellent care not only directed towards the physio pathological issues, but also to the psycho-social, environmental and family member issues that become closely connected with the physical disease. The essence of multi disciplinary is that professionals from different areas acting on the same pa-

tient in intensive care do not rely on the environment or special equipment but on the decision making process, based on the full understanding of the patient's physiological, psychological conditions and of new therapies. It is mandatory that ICU patients receive sufficient oral hygiene care during their stay, for the purpose of preventing oral pathologies and possible complications of already existing oral diseases.

Pathogens commonly responsible for nosocomial pneumonia are found colonizing the dental plaque and oral mucosa of inpatients. However, good hygiene techniques may prevent progress of oral cavity infection towards the respiratory tract. After about 24 hours, without cleaning of the oral cavity, a layer of dental plaque may be clinically detected. Absence of it or adopted technique of oral hygiene will be closely related to the number and species of microorganisms found in the

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oral cavity. The tracheal colonization route was observed in the development of ventilation associated pneumonia and it was found that 80 out of 100 patients were colonized in the first day of endotracheal ventilation.

Moreover, the oral cavity is the first source of pathogens that cause this pathology.

The peculiarity in the patients admitted in ICU and special oral care need for them must be taken care of. The administration of ice chips is one way to reduce mouth dryness, make patients more comfortable, and keep down bacterial overgrowth. Use of oral chlorhexidine (0.12% solution) as an antimicrobial mouth rinse is encouraged, but the agent should be administered as a spray every 12 hours to reduce total volume. Use of low-intensity suctioning is also helpful and protective against aspiration during mouth care. Older patients, especially those who are in a supine position and sedated, tend to become mouth breathers and snorers. Their oxygen saturation decreases when the jaw and tongue fall backward and compromise the airway. The presence of a nasogastric tube interferes with cough and swallowing mechanisms and often leads to aspiration and ventilator-associated pneumonia. Although it may seem obvious, the presence of loose teeth, large deposits of calculus (tartar), and infected gingiva with easy bleeding require consultation with a dentist. A better designed procedural approach for oral care for patients in the intensive care unit is needed. The objectives of the review include special oral care system

considerations for patients in ICU.

### **DENTAL MANAGEMENT OF VENTILATOR ASSOCIATED PNEUMONIA**

Pneumonia is the second most common nosocomial infection and patients who receive mechanical ventilation are at the highest risk for acquiring the infection(1). Studies show that patients

who develop ventilator-associated pneumonia (VAP) can have as high as a 7-fold increase in the number of days on mechanical ventilation, a 2- to 5-fold increase in the length of stay in the Intensive Care Unit (ICU) and a doubling of the overall hospital stay(2,3). The identification and modification of patient risk factors have led to the development of preventive strategies aimed at reducing VAP. These strategies address the causes of VAP, its treatment, and infection control-related measures that have contributed to the decrease of VAP rates nationally(4). Multiple risk factors in the critically ill patient and the emergence of antibiotic resistant organisms require an aggressive approach toward prevention strategies to decrease VAP. Ultimately, implementation of such practices will improve the quality of patient care and contribute to reducing costs. Oral and dental care have been identified as preventative measures against acquiring VAP (1-3).

Risk factors affected by oral and dental care are bacterial colonization of the oropharyngeal area, aspiration of subglottal secretions and colonization of dental plaque with respiratory pathogens. The implementation of a comprehensive oral care procedure, including oral suctioning and cleansing, may contribute to decreasing a patient's risk of acquiring VAP(5). However, studies that establish evidence-based practices by defining the type and frequency of oral care are lacking and neglected.

The following best practices were identified:

- A daily assessment should be performed to evaluate the level of oral dysfunction and provide the most appropriate care to keep the patient comfortable and prevent complications (6-8) .
- Brushing a patient's teeth should occur at a frequency of every 2 to 4 hours and as needed to
- prevent the formation of plaque,

which can be a reservoir for respiratory pathogens (6-8,9).

- Alcohol-free, antiseptic oral rinse should be used to prevent bacterial colonization of the oropharyngeal area(8,10).
- Suctioning of oral secretions in both the oral cavity and the oropharyngeal area should be performed to prevent the aspiration of microorganisms(8,9).
- Application of a water-based mouth moisturizer should be used to maintain the integrity of the Oral mucosa(6-8).

### **Procedure Followed in Ventilated Patients**

- The oral cavity is assessed initially and daily by the Registered Nurse.
- Unconscious or intubated patients are provided oral care every 2–4 hours.
- Intubated patients will be assessed to determine the need for removal of oropharyngeal secretions every 8 hours as well as prior to repositioning the tube or deflation of the cuff.

### **DENTAL MANAGEMENT OF COPD PATIENTS**

The primary objective for the dental surgeon in the management of a patient with a medical condition is to prevent any complications related to that condition as a result of dental treatment. The COPD patient can be treated for his or her dental needs when the dental health practitioner has developed a risk assessment that is individualized for the patient. This assessment begins with an appropriate understanding of the patient's medical history. The health history questionnaire and a comprehensive interview by the dental surgeon is the foundation of the risk assessment process. The reduction of stress and avoidance of any procedures that may depress a patient's respiratory function are essential in the management of patients with moderate to severe chronic obstructive pulmonary disease.

### DENTAL MANAGEMENT IN RENAL FAILURE ON DIALYSIS

Patients with chronic renal insufficiency or with progressive loss of kidney function have spontaneous bleeding in gingiva and mucosa due to blood platelet dysfunction, a fact that contributes to the poor wound healing and stronger sensitivity to future injuries in the oral cavity (11,12). Dental care in patients with chronic renal insufficiency must be performed in the days they do not undergo dialysis, in order to avoid bleeding. Therefore, the use of heparin (anticoagulant) in these clinical activities is suggested. It is important to emphasize that, specifically in this case, the dental procedure was not performed because, according to the doctor, it was not necessary in the ICU (13,14).

In cases of invasive procedures, such as supra gingival scaling, the antibiotic prophylaxis must be carried out, especially vancomycin that has less toxicity compared to other antibiotics. Vancomycin cannot be eliminated by conventional dialysis methods, is a great application of drug and convenience for patients in substitution therapy of renal function by dialysis and used in performing dental actions in critically ill patients in the ICU, according to the case report (15). Oral health procedures, depending on the patient's clinical complexity, must be done only by dentists and health professionals who were trained to work in hospitals, mainly in intensive care units (16,17). The oral hygiene and the dental plaque mechanical removal are very important to prevent oral cavity diseases and systemic association. Thus, the oral hygiene involving fluoride toothpaste, tongue coating removal, and the participation of oral care professionals may contribute to significant pneumonia reduction in compromised patients in hospital (ICU) and home environments (18,19). The correct use of 0.12% chlorhexidine – a bactericidal and bacteriostatic agent – used daily 12 in 12 h, after oral hygiene (mechanical

action) in the ICUs would prevent the formation of biofilm and tongue coating, and improve the oral hygiene conditions in bedridden and ICU patients by reducing oral colonization by gram-negative bacteria and consequently eliminating respiratory infections. It must be always used in combined clinical conducts, in other words, prior to mechanical interventions (16, 20). The use of chlorhexidine 0.12% is the standard protocol of oral hygiene used in ICUs (21–23,24,25) to reduce the biofilm and respiratory diseases associated with mechanical ventilation. It is a microbial agent of broad-spectrum activity against gram-negative bacteria and has no colaterais effects for the patients (26,27) as discussed in the report.

Dental conducts of minimal intervention, such as the proper oral hygiene using appropriate techniques for a short period of time, should be emphasized and oriented to the nursing staff who spends more time in intensive care units and is able to routinely perform these activities in ICU patients (27,28). Therefore, there is real need for the effective participation of dentists and the nursing staff in the instructions, professional qualification, and motivation of health professionals working in the ICU in order to create specific routines to promote oral health in ICU patients (27,28). The clinical procedures to promote oral health in patients with chronic renal failure have specific features and their planning should be done jointly with the entire health professional team working in the ICU. Respecting the schedules and the patient's routine in the hospital is very important (12, 14, 15).

Given this multidisciplinary health context, the dental surgeon should be a member of the team working on the promotion of health and quality of life of critically ill patients hospitalized in intensive care units, thus directly contributing to the possible recovery and/or improvement of the patients'

clinical condition (13,16,17,27). Dental procedures, especially those requiring minimal intervention such as the correct oral hygiene protocol, must be performed at the ICUs by a trained dentist and nursing staff in order to help eliminating the potential microbial reservoirs (biofilm and tongue coating) that compromise the patients' clinical condition, as previously reported. Trained and prepared dentists must join the multidisciplinary team working in hospitals, especially in intensive care units, in order to perform clinical training and help diagnosing hospital infections, such as nosocomial pneumonia, which is responsible for high mortality rates in ICUs.

### DENTAL MANAGEMENT IN UNCONSCIOUS PATIENTS

An unconscious patient requires frequent and meticulous oral hygiene to prevent oral health problems from developing. Because these patients usually breathe through their mouth and are unable to take in anything by mouth, sordes can easily accumulate on the lips, teeth, and tongue causing additional health concerns. Because unconscious patients are at risk for aspirating during oral hygiene, you must always have suction set up at the bedside and ready to be used before you begin providing oral hygiene. Proper positioning can help reduce the risk of aspiration. For an unconscious patient, the best position is side-lying with the patient's head turned toward you in either a semi-Fowler's position or with the head of the bed flat. Placing the patient in one of these positions allows fluid and any oral secretions to collect in the dependent side of the mouth and drain out. Use a soft-bristled toothbrush and toothpaste to brush your patient's teeth gently to remove any debris, then brush the patient's tongue. Use a syringe and water to rinse the teeth and tongue. Then use foam swabs moistened with diluted hydrogen peroxide or other facility-approved solution to remove

crusts and secretions from the mucous membranes of the mouth. Be sure to suction any oral secretions that pool in the patient’s mouth during the procedure. Oral care should be performed at least every four hours.

**Stepwise procedure to provide Mouth Care to an Unconscious Patient**

**Step 1- Put a towel**

Cover the patient’s chest with a clean cloth or a small towel in the beginning of this activity.

**Step 2- Set the bed level**

Bring the patient’s bed at a level, where you can get in touch with the patient to conduct the entire process comfortably. Take care that the patient’s head should not be brought higher than 30 degrees.

**Step 3- Turn the head and open the mouth**

A soft toothbrush or gauze-padded tongue blade may be used to clean the teeth and mouth.

Now, you have to turn the patient’s head to your side very gently. If you are doing the oral care of a conscious person, then you can ask the patient to open the jaws by self. In case of an unconscious person, you have to open the oral cavity of the patient by using a tongue depressor. Hold the tongue depressor in one hand and open the oral entrance slowly.

**Step 4 Ask the amount of Paste**

If the patient is conscious, you should

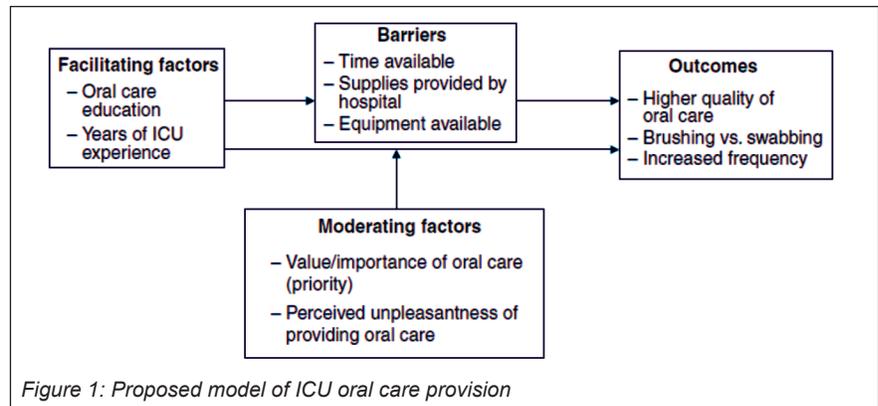


Figure 1: Proposed model of ICU oral care provision

ask, whether he/she likes to have more or less tooth paste for brushing. However, in case of insentient patient, you must take a little paste on the tooth brush, as chances are the patient might swallow the extra paste inside. You may also use the tooth cleaning agents in liquid form for the insentient patient.

**Step 5-Clean Gently**

Take a soft toothbrush and start the mouth cleaning process gently. You may also clean the patient’s teeth by dipping the brush into the liquid cleaning agent and applying it on the teeth.

**Step 6- Clean all the oral areas**

You have to clean the gums, teeth and the tongue respectively in the cleaning course.

**Step 7-Suction of toothpaste and saliva**

Make sure you do the suction of toothpaste and saliva from the patient’s oral area immediately after the brushing, so to avoid any chemical damage of the teeth. In the situation of a conscious person, you may tell him/her to do the suction properly and splutter it on the water basin given to them.

**Step 8- Wipe the extra water**

wipe out the extra water on the mouth with a clean small towel.

**Step 9- Bring the patient back to a comfortable level**

Now, you can bring the client back to a restful position by adjusting the bed level appropriately.

**Step 10- Dispose the Gloves**

Once, the oral cleaning activity gets over, you need to take off your gloves immediately to dispose it.

**Step11- Rinse your hands thoroughly.**

**CARE OF DENTURES**

The care of dentures is an area often neglected by nurses (28). Sweeney and Bagg recommend thorough cleaning at least once a day and preferably rinsing after every meal (29). Dentures should be removed at night and soaked in a dilute solution of Milton (for acrylic dentures). Jagger and Harrison found that a large number of people do not know how to clean dentures satisfactorily (30). This finding is complicated by nurses attitudes towards handling a patient’s dentures. Eadie and Shou

**Table 1: Adequate Oral hygiene procedures and level of dependence**

Independent patient	Patient able to walk	Walk to a sink and performs own hygiene Encourage and orient regarding the correct techniques
	Patient unable to displace himself	Offer a bowl for oral hygiene in the bed
Partially dependent patient	Patient with motor difficulty	Support devices such as brushes with adjustable handles, electric brushes
Dependent patient	Patient with motor disability	Hygiene performed by a healthcare provider or nurse with normal brushes or electric brushes

found that caretakers in their study considered oral care unpleasant, unrewarding and problematic, whereas Boyle also suggests that the majority of nursing staff in his study found mouth care unpleasant and disliked handling dentures(31,32). There is a clear need to provide adequate training for nurses in evidence based oral health care, both in their initial and post basic education. Theory and practice need to be more closely integrated so that ritualised practices are discouraged. Nurses need mechanisms for assessing patient’s oral care needs on an individual basis and be provided with adequate tools to enable them in this task. This requires a commitment to changing practice at manager level. Further research is required into the efficacy, safety and cost effectiveness of commonly used oral hygiene products and the frequency of oral health care delivery. The barriers to changing ineffective nursing practices are also worthy of further investigation. This review confirms that current practice largely ignores the research evidence and is inadequate for ensuring optimum care. There is

a clear need to develop and evaluate oral care protocols for hospitalized patients and to support nurses in their implementation.

**ROLE OF NURSING STAFF FOR MAINTENANCE OF ORAL HYGIENE IN ICU PATIENTS**

A patient in the intensive care unit may be intubated, have a nasogastric tube in place, be heavily sedated, or be febrile—all of which lead to dehydration and breathing through the mouth. These, in turn, cause a change in flora and bacterial overgrowth, with the loss of salivary effectiveness. The administration of antihypertensive and anticholinergic medications also impairs salivary functions and promotes xerostomia.

Oral hygiene performed by a nurse or aide is difficult, especially in patients who are semiconscious and non cooperating. To some caregivers, entering a patient’s mouth is considered an invasion of privacy and even may have psychosexual undertones. Nevertheless, a soft, pediatric bristle

brush properly used can be effective in removing microorganisms and debris. Partial removable dentures are best taken out and thoroughly cleaned to facilitate mouth care. The administration of ice chips is one way to reduce mouth dryness, make patients more comfortable comfortable, and keep down bacterial overgrowth. Use of oral chlorhexidine (0.12% solution) as an antimicrobial mouth rinse is encouraged, but the agent should be administered as a spray every 12 hours to reduce total volume. Use of low-intensity suctioning is also helpful and protective against aspiration during mouth care. Older patients, especially those who are in a supine position and sedated, tend to become mouth breathers and snorers. Their oxygen saturation decreases when the jaw and tongue fall backward and compromise the airway. Humidified nasal oxygen is indicated. The presence of a nasogastric tube interferes with cough and swallowing mechanisms and often leads to aspiration and ventilator-associated pneumonia. Although it may seem obvious, the presence of loose teeth, large deposits of calculus (tartar), and infected gingivae with easy bleeding require consultation with a dentist(33).

There is a strong evidence for the use of a small, soft toothbrush, this is still not common practice. Even though it could be presumed that nurses use a toothbrush for their personal oral

**Table 2: Guide to oral assessment**

Teeth/dentures	Plaque, debris or dental caries Ill-fitting dentures
Mucous membranes	Coating, redness, ulceration or bleeding
Tongue	Coating, cracking/blisters or areas of redness
Lips	Cracking, bleeding or ulceration
Saliva	Consistency and quantity
Gums	Redness, ulceration and bleeding

**Table 3: Agents used in oral care**

Agent	Advantages	Disadvantages
Toothpaste	Loosens debris Fluoride prevents dental caries	Dries oral mucosa if not rinsed properly
Hydrogen peroxide	Anti-plaque effect	If incorrectly diluted can cause pain and burns to oral mucosa Predisposition to candida
Sodium bicarbonate	Causes mucus to become less sticky	Can cause superficial burns
Lemon and glycerine	Effective saliva stimulant	Lemon can decalcify enamel Glycerine causes reflex exhaustion of the saliva process
Chlorhexidine	Prevents plaque accumulation	Unpleasant taste Discolours teeth
Water	Non-irritant	Not effective at plaque removal
Hypochlorite solution	Bactericidal and fungicidal Controls plaque formation	Not an adjunct to brushing

care. Similarly, there is evidence for the benefits of chlorhexidine (for plaque control), fluoride and water mouthwashes and against the use of lemon and glycerine swabs and hydrogen peroxide mouthwashes, yet the latter are still in frequent use. Several studies have assessed nurse's knowledge of basic oral hygiene practice. Peate suggests there is a theory-practice gap in relation to nurse administered oral hygiene(34).

There is a clear need to provide adequate training for nurses in evidence based oral health care, both in their initial and post basic education. Theory and practice need to be more closely integrated so that ritualised practices are discouraged. Nurses need mechanisms for assessing patient's oral care needs on an individual basis and be provided with adequate tools to enable them in this task. This requires a commitment to changing practice at manager level. Further research is required into the efficacy, safety and cost effectiveness of commonly used oral hygiene products and the frequency of oral health care delivery. The barriers to changing ineffective nursing practices are also worthy of further investigation.

This review confirms that current practice largely ignores the research evidence and is inadequate for ensuring optimum care. There is a clear need to develop and evaluate oral care protocols for hospitalised patients and to support nurses in their implementation.

A better designed procedural approach for oral care for patients in the intensive care unit is needed.

## CONCLUSION

The existence of various oral care practices indicates that there is a need of a standardized oral care protocol that includes tooth brushing and use of chlorhexidine mouthwash. Furthermore, having chlorhexidine mouthwash and proper toothbrushes available in the unit's stock may assist in implementing evidence-based practice and help to

improve patients' outcome. oral care provision for mechanically ventilated patients can be improved by providing oral care education, providing nursing staff with adequate time, reducing the perception that oral care is unpleasant, and making oral care a priority in nursing care in ICUs. Multifaceted interventions to improve oral care nursing practices are required to reduce the incidence of pneumonia in mechanically ventilated patients, thereby improving patient safety.

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