## Review Article

# A Recent View and Evidence-Based Approach to Oral Care of Intensive Care Patient

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**Abstract**

Stratified epithelium cells beyond from lips to oropharynx of intensive care patients can be damaged easily because of inadequate perfusion, and insufficient fluid and food intake, and toxicity of medicine. Therefore, providing and maintenance of oral care is vital for intensive care patients in order to avoid the emerging changes in oral mucosa and oral problems which caused by insufficient oral care and ventilator-associated pneumonia (VAP). The aim of this work is ensuring critical thinking of nurses by highlighting importance of oral care of intensive care patients and the points to be considered for providing and maintenance of oral mucosa and evidence-based approaches which can be applied to oral care methods for intensive care patients.

**Key Words:** *Oral Care, Intensive Care Patients, Evidence-Based Approach*

## Introduction

There are several reasons why tissue integrity between mouth and its periphery. The first is the medicines for treatment of intensive care patients, the second no fluid or food intake via mouth, the third is existence of endrotracheal tube, and plasters which is used for determination and the last one is mouth of patient which remaining open because of endrotracheal tube. These factors cause periodontal diseases such as foul breath, xerostomia, cracked lips, stomatitis and so on. Therefore, maintenance of oral mucosa integrity for these patients is important (Abida, 2007).

Plaques which remain in mouth more than 3 days can create hundreds of grams negative bacteria. These bacteria can cause not only infection within mouth but also systematic contamination. Also, access of bacteria to respiratory tract due to endrotracheal tube becomes easier especially for patients in intensive care who are associated with ventilation. That cause to spoils cough reflex, mucosal activity and then, increasing of secretion happens. In this case, formation of plaque in teeth and changes in mouth flora occur because gram negative bacteria take place of gram positive bacteria which creates normal flora of mouth. Change in mouth flora of patients in intensive care who are associated with ventilation increases risk of ventilator-associated pneumonia (VAP) (Atar, 2014). According to researches, VAP takes first place among reason of death caused by nosocomial infections.

Mortality changes between %33 and %50. According to recent researches on intensive care patients, progress of VAP is an important problem which increase maintenance cost and duration of hospital stay (Atay & Karabacak, 2014; Munro & Grap, 2004). One of the solution offers to avoid progress of VAP is that apply a good oral care to patients especially who are associated with ventilation (Palloş & Sendir, 2011).

Consequently, oral care management of intensive care patients in order to maintain oral health needs awareness. In order to apply this enhancive

work to increase patient's standard of care nurses should apply oral care elaborately.

**Oral Care Management**

Oral care management includes four elements which are, an efficient mouth assessment, choosing proper equipment for oral care, oral care solutions and frequency of oral care.

**a) Oral Assessment**

Effective oral health care requires decent diagnosis. Assessment of in-mouth gives important information to the health care team in terms of efficient treatment and process of complications. In literature, there is an emphasis on nurses' usage of oral care guides and organizing regular educations (Cutler & Davis, 2005).

One of the tools created for oral assessment, "Eliers oral assessment guide" which is created by Eliers (1998), is commonly used in clinics. Oral assessment tool which is created by Eliers in 1987 has 8 categories which are voice, swallowing, lips, tongue, saliva, mocuos membrane, gingiva and teeth. Every category graded as normal, light and complete (Eliers et al., 1987). Validity of oral assessment guide proved by Anderson in 1999 in terms of determination of changes in-month and needs of oral care (Anderson et al., 1999). However, because we cannot test voice and swallowing of patients who are intubated, assessment is made without these categories (Ames et al., 2011).

In addition to this tool, "Beck in-mouth assessment guide" and "Jenkins oral assessment tool" can be used as oral assessment tools as mentioned in literature. Oral assessment tool which is created by Becks in 1979 patients are evaluated in terms of lip, gingival, oral mucosa, tongue, teeth and saliva. This assessment system grades from one to four points. Beck's oral assessment tool is given in Table 1 in details. It is suggested that nurses in intensive care units use this guide for complete assessment of oral mucosa as a diagnosis tool. There are some assessment guidance parts including trials and applications of handling oral problems whose intensive care patients. According to the study made by Prendergast and his/her friends (2013), this guide has oral care protocols, and by using this guide on intensive care patients, it is stated that rates of VAP, and the costs decreased to a some important point (Prendergast, Kleiman & King, 2013).

According to the literature again, usage of these oral care protocols in intensive care units leads to more effective feedbacks of treatments done by nurses. There is a following example for nurses how to use these oral care protocols.

**b) Materials Used for Oral Care**

Oral care materials should be assessed in terms of benefits, harms, conveniences and features (removing plaques) of usage. Materials used for oral care are summarized at Table 3.

**c) Solutions that are used for oral care:**

Solutions that are used for oral care should be evaluated considering not irritating the mucosa, not to dry it, and to remove plaques while choosing them (Miller & Kearney, 2001). Comparisons of the solutions that can be used for oral care in Table 4.

**d) What should be the frequency of oral care practice?**

There is no evidence in literature about frequency of oral care practice. However, in the study of Berry and his/her friends (2011) suggest that oral care with tooth brush should be made twice a day. However conducted studies show that nurses mostly practice oral care in every four hours (Berry et al., 2011). In addition, daily assessment of oral mucosa is important to intensive care patients' oral care frequency. Therefore, data which is obtained by assessment of daily assessment of oral mucosa will guide nurses to determine oral care frequency.

**Evidence-Based Approach for Oral Care**

If the nursing care is based on evidence, some important facts like improvement of care quality and care results, making a difference clinical practices, standardization of care, increasing pleasure of nurses will bring about. Level of evidence in can be put in order like below;

1)       Evidence A: Strong evidence which is obtained by at least one systematic research from well-designed randomized controlled trials (RCT).
2)       Evidence B: Strong evidence which is obtained from at least one RCT.
3)       Evidence C: Evidence which is obtained by time series and case control studies which are well-designed but not randomize, including pre-post evaluation, cohort, and made with single group.

4)        Evidence D: Evidence which is obtained by designs which are not experimental and made by couple of research centers or groups.

5)        View of authorities (Brown et al., 2009).

After reviewing the literature and compiling the researches about oral care, evidence-based practices are summarized at Table 5.

**Table  1: Beck's Oral Assessment Tool**

| CATEGORIES | POINTS | | | |
|---|---|---|---|---|
| | **1** | **2** | **3** | **4** |
| **Lips** | Smooth, moist and not cracked | Red, somewhat dry | Dry, swollen, slim pocks | Edematous, inflamed pocks |
| **Gums and mucosa** | Smooth, moist and not cracked | Faint, dry, isolated lesions | Swollen , red | Inflamed, very dry and edematous |
| **Tongue** | Smooth, moist and not cracked | Dry, visible papilla | Dry, swollen, red with papilla lesions | Very dry, edematous, swollen lesions |
| **Teeth** | Clean, no debris | Small amount of debris exists | Moderate amount of debris exists | Full of debris |
| **Saliva** | Light, succulent and abundant | Increasing on its amount | Insufficient and a bit dense | Very dense and sticky |
| **Total  Points** | **5 points**<br>**No disfunctions**<br><br>**At least every 12 hours oral care** | **6-10 points**<br>**Slight disfunction**<br><br>**At least every 8-12  hours  oral care** | **11-15 points**<br>**Moderate amount of disfunction**<br><br>**At least every 8 hours oral care** | **16-20 points**<br>**Serious amount of disfunction**<br><br>**At least every 4 hours oral care** |

*Explanations:*

 *0–5 points= Do the oral assessment once a day. Perform the systematically prepared oral care protocol twice a day.*

 *6–10 points= Do the oral assessment twice a day. Moisturize the lips and mucosa every 4 hours. Perform the systematically prepared oral care protocol at least twice a day.*

 *11–15 points= Do the oral assessment every 8-12 hours. Perform the systematically prepared oral care protocol at least every 8 hours. Use a soft toothbrush. Moisturize the lips and mucosa every 2 hours.*

 *16–20 points= Do the oral assessment and the oral care protocol every 4 hours If you can't brush your teeth, use a wrapped up gauze pad. Moisturize the lips and mucosa every 1-2 hours.(Beck, 1979).*

**Table 2: Guide to Solve Problem: Oral Assessment**

| Problem | Possible reasons | Repression | Suggested Attempts |
|---|---|---|---|
| **Vestibule of mouth (all sections, especially tongue)** Colonization by microorganisms, especially Candida albicans (generally known as Aphtae). Candidada (mushroom) typically presents in oral mucosa and over tongue a white layer. | Defected immunity system Not taking food from mouth | Mousturizing the oral mucosa regularly | Registration Managing the given prescription of anti-microbial treatment. (Candida is generally treated with Nystatin. 1ml is applied 4 times per a day. It should be used after mouth cleaning.) |
| **Labrum** Ulceration (split) | Dryness, giving un-moisturized Oxygen via face-mask The damage by endotracheal tube | Applying soft and yellow greasers like paraffin Giving moisturized Oxygen via face-mask Controlling the possible tools that may cause to ulcer (like endotracheal tube) | Registration Increasing the times of lips care. |
| **Teeth** Damaged (like broken) Bruises | Trauma Bad mouth hygiene | Cleaning with toothpaste and toothbrush (generally twice a day) | Registration-including check-out planning from the hospital. |
| **Gingiva** Bleeding | Trauma Bad mouth hygiene | While cleaning teeth, toothbrush should be used with an angle of 45 degree. | Registration-including check-out planning from the hospital. |
| **Saliva** Excessive Absence Over concentration/density | Oral tools (like endotracheal tube) Dehydration | In case of oral dryness, moisturizing the oral mucosa. | Increasing the times of moisturizing the oral mucosa |
| **Tongue** Dark color Dry | Bad perfusion Dehydration | Bad perfusion and dehydration are systemic problems that must be treated. | Registration and reporting. |
| **Rigorous uraniscus** Bleeding Ulceration | Trauma | - | Registration and reporting. |
| **Mild tissue** Necrosis | Bad perfusion | - | Registration and reporting. |

**Table 3: Materials Used for Oral Care**

| MATERIAL | USAGE | ASSESSMENT |
|---|---|---|
| **Toothbrush** | Intensive care patients usually use pediatric tooth brushes. | By minimizing remains of plaque, mucus and bacteria by accessing all areas of the mouth |
| **Toothbrush with Oral Aspiration Tool** | It makes aspiration and brushing teeth possible and keeps oral mucosa healthy For Patients are associated with mechanical ventilation. | It provides patency of the airway and keeps bacteria out by removing plaques, mucus and bacteria in mouth. Therefore, the risk of pneumonia aspiration and infection is minimized. Conducted researches show that Toothbrush with Oral Aspiration Tool is important to avoid process of VAP for the patients who are associated with mechanic ventilator (Fields, 2008; Pearson &  Hutton, 2002). |
| **Sponge-stick** | It used for the purpose of cleansing and moisturizing of oral mucosa. | It should be use once in two hour but it is not efficient to remove plaques. Although there is no certain evidence in literature, while oral care practicing with sponge-stick, the patient can bite off sponge side. Then, safety of the patient can be under risk (Berry &  Davidson, 2006). |
| **Sponge-stick with Oral Aspiration Tool** | It is effective for evocation of In-mouth mucosal tissue. | Sponge-stick with Oral Aspiration Tool ensures hygiene of mouth by making aspiration. |
| **Tongue depressor** | A single use small piece of wood for oral care | It cannot clean plaques in mouth, but it is used for cleansing and moisturizing the oral mucosa. |

*Source: (Atar, 2014;  Ozveren, 2010; Abidia, 2007).*

**Table 4: Compare of Solutions Used in Oral Care**

| Solutions | Advantages | Counter-indications |
|---|---|---|
| **Normal saline** | Powerful, economic, do not harm oral mucosa, ensure healing | Further investigations are needed |
| **Hydrogen peroxide** | Anti-bacterial effective. It helps to clean effectively, and to remove dental plates in mouth. | It mustn't be applied over granulation tissue. It leads to mushroom infections because it defects normal flora.<br>It makes oral mucosa dry and burn.<br>The taste of it is not good.<br>It leads to burn of mouth, feel pain and superficial burns. |
| **Sodium bicarbonate** | Provides incision. | May cause irritation.<br>May cause bacteria procreation.<br>Taste is not good.<br>May cause oral mucosa burns.<br>Evidences are not sufficient for the usage of palliative care. |
| **Chlorheksidin** | It has a wide spectrum, and it is anti-microbial effective.<br>Effective anti-plate feature<br>It prevents to form oral mucosa. | It may cause color changes on teeth with a long-term usage.<br>It may cause oral mucosa peeling.<br>It may cause gingiva bleeding.<br>Taste is not good.<br>It may cause oral mucosa burning and disturbing. |
| **Prepared mouth churning solutions (commercial products)** | It is easy to get because no prescription is needed. | It mustn't be used the solutions including glycerin and alcohol-lemon due to the cause of irritation, superficial burns, and mucosal dry. |
| **Water** | It is a solution that decreases oral dryness to lowest point, and it is cheap. | Sterilized water should be used because tap water at hospitals leads to grow Pseudomonas up (Yoneyama et al., 2002). |
| **Green tea** | It prevents erosion and abrasion over the surface of teeth.<br>It significantly reduces the rate of pathogenic effects of Streptococcus and lactobacil. | There is no any investigation on counter-indications. So, further researches are needed (Lin , 2014). |

**Table 5: Evidence Based Practices for Oral Care**

| EVIDENCE-BASED PRACTICES | LEVEL OF EVİDENCE | RESEARCHES |
|---|---|---|
| Efficient health care avoids VAP | Evidence C | Bingham et al., 2010 Houston, 2002 Koeman et al., 2006 |
| Efficient and proper usage of oral care protocols increases quality of oral care. | Evidence D | Cason et al, 2007 Garcia et al, 2009 |
| Intensive care patients' assessment of oral care should include teeth, gingiva, tongue, mucous membrane and lips. | Evidence D | Garcia et al., 2009 |
| Usage of soft tooth brush cleans plaques and food remains and decreases amount of germs | Evidence C | Needleman, 2011 |
| There is no evidence about supremacy among oral care solutions. Usage of chlorhexidine gluconate is an exception at rate of %0.12 among patients undergoing cardiac surgery. | Evidence A | Genuit et al., 2001 Houston et al., 2002 |
| Tap water should not be used for oral care to intensive care patients.. | Evidence C | Anaissie, Penzak & Dignani, ,2002; Muscarella et al., 2004 |
| Using aspirin from hypoglossal avoids process of VAP during oral care. | Evidence A | Tablan et al., 2004 |
| Tooth brush should be used at least twice in a day for oral care. | View of authorities | Garcia et al., 2009 |
| Time of brushing teeth should made with tooth brush which can be all-inclusive around at least 3-4 minutes. | View of authorities | Fields, 2008 |

## Conclusion

In intensive care units oromucosal integrity is important in order to avoid process of periodontal illness, foul breath, xerostomia, cracked lips and stomatitis. Also, an efficient oral care which is a nursing care is really important to avoid VAP. However, there is no standardization to assess oral care. There is no standardization about frequency of oral care, proper solution and material. Practical guides which are efficient and proper to time management in order to achieve positive results should be created and improved to be applied by nurses. Also, there is a need of experimental and high evidence valuable researches about oral care materials, solutions and frequency for efficient oral care.

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