Homes Journal
Hospital Managament Studies Journal

EFFECTIVENESS OF ORAL HYGIENE INTERVENTION WITH HONEY IN PREVENTING VENTILATOR-ASSOCIATED PNEUMONIA (VAP) IN PATIENTS WITH MULTIPLE FRACTURES

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ARTICLE INFORMATION

Received	: Maret 20th, 2024
Revised	: June 8th, 2024
Available online	: September 21th, 2024

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KEYWORDS

Oral Hygiene, Honey, Ventilator, Associated Pneumonia

DOI 10.24252/hmsj.v5i3.48904

ABSTRACT

Background: *Fracture is the discontinuity of bone, caused by trauma or force. According to the World Health Organization (WHO), fractures have been increasing from 2020 to 2022. In 2020, fractures occurred in 2.7% (13 million people), in 2021 it was 3.8% (20 million people), and in 2022, the incidence rose to 4.2% (21 million people). Most patients diagnosed with fractures are treated in the ICU with mechanical ventilator support through an endotracheal tube (ETT). Prolonged treatment can lead to Ventilator Associated Pneumonia (VAP), which is the most susceptible type of nosocomial infection in the Intensive Care Unit.*
Objective:*This research aims to examine the effectiveness of oral hygiene using honey in patients with multiple fractures and self-care deficit issues in preventing Ventilator Associated Pneumonia (VAP) in the ICU of Wahidin Sudirohusodo Makassar Hospital.*
Method*:The method used was a case study employing observation sheets and documentation.*
Result: *After the intervention was given for 3 consecutive days, the patient experienced oral health improvement, assessed by the BOAS score and MPS score. For the BOAS score, there was a significant change from moderate dysfunction (BOAS score 15) to mild dysfunction (BOAS score 8). For the MPS score, there was a significant change from poor (MPS score 7) to good (MPS score 4).*
Conclusion: *Based on the evaluation results, it was found that the implementation of oral hygiene using honey can help.*

INTRODUCTION

After coronary heart disease and tuberculosis, fractures are referred to as the third leading cause of death in Indonesia. Fractures are usually caused by accidents, abnormal bone weakness, or repetitive bone pressure (Noorisa, et al. 2020).

The incidence of fractures worldwide has seen a significant increase, according to the *World Health Organization* (WHO). The incidence of fractures has continued to rise from 2020 to 2022. In 2020, the incidence of fractures was 2.7% (13 million people), in 2021 it was 3.8% (20 million people), and in 2022 the incidence rate reached as high as 4.2% (21 million people).

Based on data from the Ministry of Health of the Republic of Indonesia, it is estimated that around 1.4 million people have experienced fractures. According to the Basic Health Research (Riskesdas) data from 2018, the national prevalence of injuries reached 8.2%. The highest prevalence was found in South Sulawesi, with a rate of 12.8%. Patients with multiple fractures are given priority in treatment in the Intensive Care Unit (ICU).

Intensive Care Unit (ICU) is a part of a hospital that operates independently (an installation under the director of services) with specialized staff and equipment intended for the observation, care, and therapy of patients suffering from life-threatening diseases, injuries, or complications Chua MLK, et al. (2019). One of the standard equipment in the ICU is mechanical ventilation, which is used to support the breathing needs of patients through an Endotracheal Tube (ETT) or tracheostomy. The placement of ETT provides a direct pathway for bacteria to enter the lower respiratory tract, leading to increased production and secretion of secretions, which can then pool and become a medium for bacterial growth, causing Ventilator Associated Pneumonia (VAP). This depends on the independent actions of nurses in providing oral hygiene care while patients are being treated in the ICU (Nur Rizki Amalia, et al. 2021).

As nurses, it is crucial to implement oral care protocols for ventilated patients to prevent Ventilator-Associated Pneumonia (VAP), the second leading cause of death from prolonged ventilator use. Preventive measures include elevating the patient's head of the bed, using in-line suctioning, administering H2 blockers or sucralfate, maintaining proper hand hygiene, and providing comprehensive oral care as recommended by the CDC Foglia et al., (2007). These strategies must be integrated systematically to effectively mitigate the risk of VAP.

Oral hygiene measures are crucial for reducing the colonization of oral pathogens, so research related to interventions in reducing the incidence of VAP, especially in oral hygiene, continues to be developed.

Considering that oral hygiene is a nursing independent action, its impact is significant in the successful prevention of VAP in ventilated patients. Oral hygiene is a preventive action by nurses in preventing cases of VAP in ventilated patients Chunjie Li, et al. (2020).

In line with the statistical findings presented by Singh et al., (2022), adherence to oral care protocols has shown significant results in reducing Ventilator-Associated Pneumonia (VAP) in ventilated patients. Oral care using chlorhexidine has been highly effective in reducing mortality and the length of hospital stays for patients in the ICU.

The study conducted by Shi et al., (2010) highlights that maintaining oral hygiene and reducing dental plaque colonization are crucial in preventing Ventilator-Associated Pneumonia (VAP) in critically ill patients.

The study by Ory et al., (2018) reviewed the cost-effectiveness of Ventilator-Associated Pneumonia (VAP) prevention, where 2,030 patients benefited from oral care. The incidence of VAP decreased significantly over two periods, with a p-value of 0.002. The costs allocated for patient care also decreased after the implementation of oral care for ventilated patients.

The study conducted by Scalco et al., (2019) demonstrates that oral care using disposable brushes with suction and ultrasoft bristles, along with 3 grams of 0.12% chlorhexidine gel, led to a 43.49% reduction in the incidence of Ventilator-Associated Pneumonia (VAP) with the implementation of the oral care protocol.

The use of honey in oral hygiene measures is beneficial for reducing the risk of VAP occurrence. Honey is a food product derived from flower nectar, containing sweet liquid that is sucked by bees and then collected in beehives as a food supply for the bees themselves. Honey can be used for oral hygiene care because it contains flavonoids that function as antibacterial agents. In addition to being antibacterial, honey also acts as an antioxidant (to counteract toxins), antitumor, anti-inflammatory, and antiviral agent. Honey also contains high levels of minerals, which can change the acidic pH of saliva to alkaline in the oral mucosa, thereby maintaining oral health (Qurrata A'yun, et al. 2021).

The use of honey in oral hygiene is effective in reducing the risk of bacterial growth by stabilizing the pH of the mouth. In a study by Mariyam and Alfiyanti in 2021, before oral hygiene was performed, saliva samples were collected, and the results showed acidity. After oral hygiene was performed, normal saliva pH was achieved. The benefits of honey include its antibacterial, antioxidant, antitumor, anti-inflammatory, and antiviral properties. Honey is effective in combating gram-negative, gram-positive, anaerobic, and aerobic bacteria. One of the bacteria that causes dental caries is Streptococcus mutans Ramsay, et al. (2019). This is further supported by a study conducted by Dera Alfiyanti and

Titi Nur Hidayanti in 2018, which indicated a reduction in the amount of candida fungus before and after oral hygiene was performed using pure honey at a 30% concentration.

Based on various data that has been presented, related issues, previous research findings, and the phenomena observed during practical fieldwork, as well as the Evidence Based Practice In Nursing (EBPN) that has been discovered, the author is interested in conducting a case study on the application of oral hygiene intervention using honey for self-care deficit in patients with multiple fractures with ETT placement in the ICU of Dr. Wahidin Sudirohusodo Hospital.

METHODS

The type of research used in this study is a case study. The subjects used in this case study are individuals or clients who meet the inclusion and exclusion criteria. The inclusion criteria are patients with a diagnosis of fracture, patients with decreased consciousness, patients with a mechanical ventilator with ETT placement, and patients with oral hygiene problems. The exclusion criteria are patients with unstable hemodynamics and patients with a history of diabetes. The instruments used in this study are the Beck Oral Assessment Scale (BOAS) and the Mucosal-Plaque Score (MPS). Data collection, observations, and interviews with the patients' families were conducted from March 4th to 9th, 2024, in the ICU of Dr. Wahidin Sudirohusodo Hospital in Makassar. This research has also undergone an ethical process where the patients' families have been informed and have signed an informed consent for the procedure.

RESULT

After completing the nursing care stages from March 4th to 9th, 2024, from the assessment stage to the evaluation stage, significant results were obtained before and after the intervention of oral hygiene using honey. The initial assessment results using the BOAS and MPS tools are as follows:

Table 1. Initial Assessment of Oral Health Using BOAS

Area	Score			
	1	2	3	4
Lips			√	
Gums and oral mucosa			√	
Tongue			√	
Teeth			√	
Saliva			√	
Total	15 (Moderate Dysfunction)			

NB:
5 : No dysfunction
6-10: Mild dysfunction
11-15: Moderate dysfunction
16-20: Severe dysfunction

Table 2. Initial Assessment of Oral Health Using MPS

Area	Score			
	1	2	3	4
Mucosa			√	
Teeth Plaque				√
Total	7 *(Poor oral hygiene Score)*			

NB:
2-4: Good oral hygiene score
5-6: Fair oral hygiene score
7-8: Poor oral hygiene score

The case experienced by Mr. H is due to the installation of respiratory aids, namely the installation of a mechanical ventilator and an ETT. A mechanical ventilator can cause dry mouth because the patient cannot naturally swallow saliva. Saliva is important for cleaning the mouth, neutralizing acid, and preventing bacteria in the respiratory tract, which is further facilitated by the absence of cough reflex and excessive mucus secretion in patients with mechanical ventilation (Yunita & Rondhianto, 2018).

In addition, patients with mechanical ventilators often receive sedative drugs to help them relax and reduce anxiety. Sedative drugs can cause dry mouth and slow down saliva production, thus worsening oral hygiene (Centers for Disease Control and Prevention, 2016).

The risk of VAP in intubated patients with mechanical ventilation is increased due to the invasive endotracheal tube allowing the entry and growth of bacteria. The antibacterial, antibiotic, and disinfectant contents found in natural honey are very effective in inhibiting the growth of pathogenic bacteria in the mouth.

The largest component of honey is fructose and glucose (70%), which are monosaccharides easily absorbed by the mucosa. Honey also contains oxidase enzymes, which function to convert glucose into gluconolactone, producing gluconic acid and hydrogen peroxide. Hydrogen peroxide acts as an antibacterial agent. Oral hygiene is performed to kill these bacteria, thus reducing the risk of oral cavity infections (Nurjannah, 2023). The assessment results with BOAS and MPS are based on the intervention findings.

Table 3. BOAS Implementation Assesment Day-1

Area	Score			
	1	2	3	4
Lips		√		
Gums and oral mucosa		√		
Tongue		√		
Teeth			√	
Saliva		√		
Total	15 (Moderate Dysfunction)			

NB:
5 : No dysfunction
6-10 : Mild dysfunction
11-15: Moderate dysfunction
16-20: Severe dysfunction

Table 4. BOAS Implementation Assesment Day-2

Area	Score			
	1	2	3	4
Lips	√			
Gums and oral mucosa		√		
Tongue		√		
Teeth		√		
Saliva		√		
Total	9 (Mild Dysfunction)			

NB:
5 : No dysfunction
6-10 : Mild dysfunction
11-15: Moderate dysfunction
16-20: Severe dysfunction

Tabel 5. BOAS Implementation Assesment Day-3

Area	Score			
	1	2	3	4
Lips	√			
Gums and oral mucosa	√			
Tongue		√		
Teeth		√		
Saliva		√		
Total	8 (Mild Dysfunction)			

NB:
5 : No dysfunction
6-10 : Mild dysfunction
11-15: Moderate dysfunction
16-20: Severe dysfunction

Table 6. Initial Assessment of Oral Health Using MPS Day-1

Area	Score			
	1	2	3	4
Mucosa			√	
Teeth Plaque			√	
Total	*6 (Poor oral hygiene Score)*			

NB:
2-4 : Good oral hygiene score
5-6 : Fair oral hygiene score
7-8 : Poor oral hygiene score

Table 7. Initial Assessment of Oral Health Using MPS Day-2

Area	Score			
	1	2	3	4
Mucosa		√		
Teeth Plaque			√	
Total	*5 (Poor oral hygiene Score)*			

NB:
2-4 : Good oral hygiene score
5-6 : Fair oral hygiene score
7-8 : Poor oral hygiene score

Table 8. Initial Assessment of Oral Health Using MPS Day-3

Area	Score			
	1	2	3	4
Mucosa	√			
Teeth Plaque			√	
Total	*4 (Good oral hygiene Score)*			

NB:
2-4 : Good oral hygiene score
5-6 : Fair oral hygiene score
7-8 : Poor oral hygiene score

DISCUSSION

Currently, there are several types of oral care for patients in the ICU to prevent the occurrence of pneumonia, The study conducted by Shi et al., (2013) shows that oral health care, such as the use of chlorhexidine in the form of mouthwash or gel, can reduce the risk of pneumonia in critically ill patients. The data showed a decrease from 25% to 19%. Various types of oral care, whether natural or chemical, have been proven effective in reducing and preventing pneumonia.

The literature review conducted by Gershonovitch et al., (2020) indicates that there are various oral care methods for preventing Ventilator-Associated Pneumonia (VAP). Furthermore, the literature shows no

significant difference between the intervention and control groups regarding oral care with different methods, highlighting the importance of oral care in reducing the incidence of Ventilator-Associated Pneumonia (VAP).

From the literature review conducted by Khezri et al., (2014), the importance of oral hygiene care in preventing Ventilator-Associated Pneumonia (VAP) is highlighted. This includes oral care methods such as tooth brushing, subglottic suctioning, the use of chlorhexidine mouthwash, and herbal mouthwashes.

The study presented by Azi zah & Ali, (2020) explains that the prevention of Ventilator-Associated Pneumonia (VAP) can be achieved through gastrointestinal (GI) prophylaxis and oral care. However, overall nurse compliance with VAP prevention strategies reached 83.1%, with compliance specifically for providing oral care still below 80%.

The study conducted by Rezaeinasab & Rad, (2008) demonstrated that implementing an oral care protocol effectively reduces the incidence of Ventilator-Associated Pneumonia (VAP) by using two groups: an experimental group and a control group. The experimental group followed a standardized oral care protocol for 20 minutes, using an electric toothbrush and moisturizing the oral cavity twice a day. The control group applied a 20-minute protocol using a moisturizer. The assessment results, based on the Oral Assessment Guide (OAG) and plaque index, were compared between the two groups, both showing significant results with a p-value of <0.05.

From the literature review conducted by Atay & Karabacak, (2014), it is explained that there are 18 studies emphasizing that oral care controls the occurrence of pneumonia, specifically Ventilator-Associated Pneumonia (VAP).

The literature review by Buković & Kurtović (2019) reveals four articles that support the idea that oral care is an active preventive measure against the occurrence of Ventilator-Associated Pneumonia (VAP) and plays a significant role in reducing its incidence.

Based on the presentation of the table above, it can be concluded that after implementing oral hygiene using honey for 3 consecutive days, significant changes were observed. The oral assessment for Mr. H using BOAS showed a value of 15 on the first day, interpreted as moderate dysfunction, a value of 11 on the second day, also interpreted as moderate dysfunction, and a final score of 8 on the third day, interpreted as mild dysfunction.

Similarly, significant changes were observed in the assessment of oral mucosa and dental plaque using MPS. The initial score on the first day was 7, categorized as poor, the score decreased to 6 on the second day, categorized as fair, and on the third day, a final score of 4 was obtained, categorized as good. Based on this intervention, there was a significant decrease in the oral hygiene

intervention based on oral health status assessment tools, with a 53% decrease using the BOAS indicator and a 57% decrease using the MPS indicator.

Appropriate oral care is a self-care measure for nurses in reducing the incidence of Ventilator-Associated Pneumonia (VAP). According to a study conducted by Gershonovitch et al., (2020), it is stated that there should ideally be a protocol for the oral care of patients, for example, the use of 0.12% chlorhexidine, the use of povidone iodine, and the use of a toothbrush, which can reduce the mortality of ICU patients due to the occurrence of Ventilator-Associated Pneumonia (VAP).

The assessment of oral health status is highly determined by proper assessment. In a literature study conducted by (Musdalifah et al., 2021), 3 assessments were used, namely the Oral Assessment Guide, Beck Oral Assessment Scale, and Mucosal-Plaque Score. Comprehensive assessment will improve oral health in ventilated patients with appropriate intervention to prevent Ventilator-Associated Pneumonia (VAP).

The findings above are in line with related research on the "Effect of Oral Care Intervention on Oral Health Status in Intubated and Intensively Treated Patients," conducted by Anggraeni et al. (2022). This study indicates an increase in the oral health status score of respondents after oral hygiene intervention. These results are similar to the study by Untari et al., (2019), which showed an increase in the Beck Oral Exam (BOE) scores between the initial Pre-Oral hygiene measurement and Post-Oral hygiene measurement using honey. Therefore, the use of honey in oral hygiene can prevent an increase in the risk of aspiration pneumonia in stroke patients with decreased consciousness.

In line with the research conducted by Nurjannah et al., (2023), which demonstrates a significant difference before and after performing oral hygiene with honey on the oral health status of intubated pneumonia patients in the ICU of Siti Fatimah Hospital, South Sumatra Province, with the results of a parametric statistical test (Independent T-Test) showing a p-value of 0.000.

The study presented by Kearns & Booth (2009) involving 24 ICU units in Scotland found that the key to successfully preventing Ventilator-Associated Pneumonia (VAP) is providing oral care to ventilated patients, with a focus on maintaining the health of the teeth, gums, and oral mucosa. Nurses were trained to administer oral care more than once a day, with each session lasting 1-5 minutes.

These findings are further supported by the research on "Oral Hygiene Using Honey Reduces the Risk of Oral Bacterial Growth Through Salivary pH Neutralization," conducted by Mariyam & Dera Alfiyanti (2021). The results indicate a significant difference in the mean saliva pH between the initial measurement (pre-test) and post-test in respondents who underwent oral hygiene with honey (p value = 0.005).

In addition to being used in oral care, several studies have also revealed that the use of honey is very effective in inhibiting the colonization of Staphylococcus aureus and Pseudomonas aeruginosa, as shown in the study Amiri et al., (2020) conducted on mechanically ventilated patients. In addition to ventilator patients, the use of honey is effective as a mouthwash in improving oral health status and reducing symptoms in cases of stomatitis in cancer patients, as shown in the study conducted by (Mohammad et al., 2020).

From the journal analysis through literature review conducted by Febriyeni Cindy (2023) states that the use of honey is very effective in the treatment of otitis media in cancer patients with minimal chemical impact in the healing process.

Researchers assume that one of the influential factors in improving oral health in patients is the content of honey used during implementation. Honey possesses properties as a direct antimicrobial action obtained in two ways: peroxidative antibacterial and non-peroxidative antibacterial. Honey exhibits peroxidative antibacterial properties because it contains hydrogen peroxide produced by the enzyme glucose oxidase. Hydrogen peroxide effectively kills microbes, enhances cutaneous blood flow in ischemic tissue, stimulating the formation of new tissue and generating free radicals that activate anti-inflammatory responses.

The presence of the enzyme catalase in honey is not harmful to the body, making honey very safe to use as an antimicrobial agent. Additional components in honey, such as lysozyme, phenolic acid, and flavonoids, also act as antioxidants and anti-inflammatory agents. Research has proven that honey can function as an antibacterial agent, as well as an antifungal and antiviral agent (Adini et al., 2018).

This research is in line with the theory propos ed by nursing expert Dorothea Elizabeth Orem, who presented her theory on "self-care deficit theory," stating that the nursing care process must be based on the belief that every individual has the ability to care for themselves, thereby assisting individuals in meeting their life needs. In this self-care theory, there is a theory related to the research conducted, namely the Therapeutic Self-Care Nursing Agency theory. Based on this view, it is argued that nursing activities or actions are aimed at stimulating the ability to self-care, and with the assistance of a nurse, individuals can fulfill their needs for self-care.

The use of honey to reduce the risk of pneumonia due to ventilator use emphasizes the importance of oral care, as explained in the study by Bassan et al., (2018). This study highlights the necessity of oral care for patients of all age groups, including adults, neonates, and pediatric patients. Adhering to protocols for preventing Ventilator-Associated Pneumonia (VAP) is crucial. Oral care contributes to reducing the risk of this condition.

CONCLUSSION

The administration of oral hygiene intervention using honey brings about significant changes in the oral health of patients. There is a change in the oral health value using the BOAS tool from a score of 15 (moderate dysfunction) to 8 (mild dysfunction), and for the MPS tool from a score of 7 (poor) to 4 (good). After the intervention, the patient's oral health is maintained, dental plaque is reduced, and patient comfort is improved.

SUGGESTION

Before carrying out this oral hygiene intervention, it is advisable to pay attention to the indications and contraindications for performing this intervention. Then, the client's surroundings should be considered so that the patient's privacy is maintained during the intervention, and attention should be given to the patient's breathing condition. For future researchers, it is recommended to pay more attention to other factors that influence the administration of this intervention.

REFERENCE

Adini, S., Santoso, B., Sarkum, S., & Sudirman, S. (2018). The Comparison of The Effect of Honey and Chlorhexidine in Preventing Ventilator Associated Pneumonia in Patiens on Mechanical Ventilaton. Belitung Nursing Journal, 4(2). https://doi.org/10.33546/bnj.355

Anggraeni, D. T., Hayati, A. T., & Nur'aeni, A. (2022). The effect of oral care using honey as an additional topical agent on oral health status of intubated patients in the intensive care unit. Enfermeria Intensiva, 33(4).

Atay, S., & Karabacak, kke. (2014). Oral care in patients on mechanical ventilation in intensive care unit: literature review. *International Journal of Research in Medical Sciences*, *2*(3), 822. https://doi.org/10.5455/2320-6012.ijrms20140876

Azizah, N., & Ali, M. (2020). *An epidemiological study of ventilator-associated pneumonia (VAP) and ventilator-associated events (VAE) surveillance and preventative strategies in critically ill children RN BHSc (Nursing) (Hons) MNSc Cert (Teaching)*. https://doi.org/10.14264/UQL.2020.186

Bassan, L. T., Peres, M. P. S. de M., & Franco, J. B. (2018). Oral care in prevention of ventilator-associated pneumonia in neonatal and pediatric intensive care unit: protocol proposal. *Revista Brasileira de Odontologia*, *75*, 1. https://doi.org/10.18363/rbo.v75.2018.e1183

Buković, E., & Kurtović, B. (2019). The importance of oral hygiene in reducing the incidence of ventilator-associated pneumonia. *Croatian Nursing Journal*, *3*(1), 103–111. https://doi.org/10.24141/2/3/1/9

CDC, 2016. Centers of Disease Controls and Prevention. [Online] Available at: https://www.cdc.gov/obesity/childhood/causes.html.

Chua MLK, Wee JTS, Hui EP, Chan ATC (2019). Nasopharyngeal Carcinoma. Lancet. 2016;387 (5):1012-4.

Chunjie Li, et al. (2020) Oral hygiene care for critically ill patients to prevent ventilator-associated pneumonia. Cochrane Database Syst Rev.2020; 2020(12): CD008367

Dera Alfiyanti & Titi Nur Hidayanti (2018) Decrease Level of Candida Albicans In Children With The Practice of "Pure Honey" Oral Hygiene. Media Keperawatan Indonesia, Vol 1 No 1, February 2018/ page 35-41

Amiri, H., Ramezani-Badr, F., Sigari, N., & Nasseri, K. (2020). Comparative

efficacy of honey 12.5% and chlorhexidine 0.2% mouthwashes on the oropharyngeal bacterial colonization in mechanically- ventilated patients: a randomized controlled trial. *Journal of Traditional Chinese Medicine*, *40*(3), 440–446. https://doi.org/10.19852/j.cnki.jtcm.2020.03.012

Febriyeni Cindy, M. D. (2023). Perbandingan Efektifitas Madu dan Permen Karet Terhadap Oral Mukositis (OM) Pada Anak Kanker. *Jurnal Ilmiah STIKES Kendal*, *13 No 4*, 1291–1298.

Foglia, E., Meier, M. D., & Elward, A. (2007). Ventilator-associated pneumonia in neonatal and pediatric intensive care unit patients. *Clinical Microbiology Reviews*, *20*(3), 409–425. https://doi.org/10.1128/CMR.00041-06

Gershonovitch, R., Yarom, N., & Findler, M. (2020). Preventing Ventilator-Associated Pneumonia in Intensive Care Unit by improved Oral Care: a Review of Randomized Control Trials. *SN Comprehensive Clinical Medicine*, *2*(6), 727–733. https://doi.org/10.1007/s42399-020-00319-8

Kearns, R., & Booth, M. (2009). Oral Hygiene Practices in Scottish Intensive Care Units – a National Survey. *Journal of the Intensive Care Society*, *10*(2), 155–157. https://doi.org/10.1177/175114370901000224

Khezri, H. D., Zeydi, A. E., Firouzian, A., Baradari, A. G., & Mahmoodi, G. (2014). The Importance of Oral Hygiene in Prevention of Ventilator-Associated Pneumonia: A Literature Review. *International Journal of Caring Sciences*, *7*(1), 12–23. www.internationaljournalofcaringsciences.org

Mohammad, I. R., Ahmed, N. M., & Magbool, F. R. (2020). *Effect of Honey mouth wash on the health outcome of patient with stomatitis*. *7*(3), 210–219.

Musdalipah, M., Syam, Y., & Tahir, T. (2021). Risk Prevention of Ventilator-Associated Pneumonia Thorough Oral Hygiene: A Literature Review. *The Journal of Experimental Life Sciences*, *11*(1), 21–25. https://doi.org/10.21776/ub.jels.2021.011.01.05

Mariyam, & Alfiyanti, D. (2021). Oral Hygiene Menggunakan Madu Menurunkan Resiko Pertumbuhan Bakteri Di Mulut Melalui Netralisasi Ph The 4 th Univesity Research Coloquium 2016. The4th University Research Colequium, 379–385

Nurjannah, et al. (2023). Pengaruh penggunaan madu dalam *oral hygiene* terhadap status Kesehatan mulut pada pasien pneumonia yang terintubasi. Jurnal kesehatan dan pembangunan, Vol. 13, No. 26, Juli 2023

Nur Rizki Amalia, et al. (2021), Implementasi Oral Care Hygiene untuk Mengurangi Risiko Ventilator Associated Pneumonia (VAP) di Ruang Intensive Care Unit (ICU) Rumah Sakit Prof. Dr. Margono Soekarjo: Case Study. Jurnal of Bionursing VOL. 3, NO. 2, 113-121

Noorisa R, Apriliwati D, Aziz A, Bayusentono S. (2020) The characteristics of patients with femoral fracture in Department of Orthopaedic and Traumatology RSUD Dr. Journal of Orthopaedic & Traumatology Surabaya. 2020;6(1):1-11.

Ory, J., Mourgues, C., Raybaud, E., Chabanne, R., Jourdy, J. C., Belard, F., Guérin, R., Cosserant, B., Faure, J. S., Calvet, L., Pereira, B., Guelon, D., Traore, O., & Gerbaud, L. (2018). Cost assessment of a new oral care program in the intensive care unit to prevent ventilator-associated pneumonia. *Clinical Oral Investigations*, *22*(5), 1945–1951. https://doi.org/10.1007/s00784-017-2289-6

Qurrata A'yun, dkk (2021). Penerapan Oral Hygiene Dengan Madu Pada Anak Usia Sekolah Dasar Dengan Evaluasi pH (Potential Of Hydrogen) Saliva. Prosiding Seminar UNIMUS Vol.4, 2021.

Ramsay, E. I., Rao, S., Madathil, L., Hegde, S. K., Baliga-Rao, M. P., George, T., & Baliga, M. S. (2019). Honey in oral

health and care: A mini review. Journal of Oral Biosciences, 61(1), 32–36.

Rezaeinasab, M., & Rad, M. (2008). Analytical survey of human rabies and animal bite prevalence during one decade in the province of Kerman, Iran. *Critical Care*, *12*(Suppl 2), P1. https://doi.org/10.1186/cc6222

Untari, D., Kariasa, I. made, & Adam, M. (2019). Efektivitas Perawatan Mulut Menggunakan Madu Terhadap Risiko Pneumonia Aspirasi Pada Pasien Stroke Yang Mengalami Penurunan Kesadaran Dan Disfagia. Journal Education of Nursing (JEN), 2(2).

World Health Organization. (2023). The Global Burden of Disease 2020: Estimates of Incidence, Prevalence, and Disability by Cause, Age, Sex, and Region. Geneva, Switzerland: World Health Organization.

Yunita & Rondhianto, (2018). Pengaruh Open Suction System terhadap Kolonisasi Staphylococcus aureus pada Pasien dengan Ventilator Mekanik di Ruang Intensive Care Unit (ICU) RSD dr. Soebandi Jember. Jurnal Pustaka Kesehatan, vol.3, No.1