



**Implementation of Oral Nursing Care Guideline for Intubated
Patients With Mechanical Ventilator in an ICU in Indonesia**

Isti Haniyatun Khasanah

**A Thesis Submitted in Partial Fulfillment of the Requirements for
the Degree of Master of Nursing Science (International Program)**

Prince of Songkla University

2018

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ชื่อวิทยานิพนธ์	การใช้แนวปฏิบัติการดูแลช่องปากของผู้ป่วยที่ใส่ท่อช่วยหายใจและใช้เครื่องช่วยหายใจในหออภิบาลผู้ป่วยหนักแห่งหนึ่งในประเทศอินโดนีเซีย
ผู้เขียน	นางอิสติ ฮานียาตุน ฮาซานะ (Isti Haniyatun Khasanah)
หลักสูตร	พยาบาลศาสตร์ (หลักสูตรนานาชาติ)
ปีการศึกษา	2560

บทคัดย่อ

การวิจัยเชิงพัฒนาครั้งนี้มีวัตถุประสงค์เพื่อทดสอบประสิทธิผลของแนวปฏิบัติการดูแลช่องปากของผู้ป่วยที่ใส่ท่อช่วยหายใจและใช้เครื่องช่วยหายใจในหออภิบาลผู้ป่วยหนักแห่งหนึ่งในประเทศอินโดนีเซีย ผู้เข้าร่วมวิจัยคือพยาบาลจำนวน 28 ราย และผู้ป่วยที่ใส่ท่อช่วยหายใจและใช้เครื่องช่วยหายใจ จำนวน 47 ราย การวิจัยครั้งนี้ใช้ทฤษฎี Roger's Diffusion of Innovation เป็นกรอบแนวคิดการนำแนวปฏิบัติการดูแลช่องปากของผู้ป่วยที่ใส่ท่อช่วยหายใจและใช้เครื่องช่วยหายใจไปใช้ ผลลัพธ์ที่ศึกษาประกอบด้วย ผลลัพธ์ด้านพยาบาลและผลลัพธ์ด้านผู้ป่วย ผลลัพธ์ด้านพยาบาล ได้แก่ ความถูกต้องของการปฏิบัติพยาบาลตามแนวปฏิบัติการดูแลช่องปากและความพึงพอใจของพยาบาลต่อการใช้นโยบายการดูแลช่องปาก ผลลัพธ์ด้านผู้ป่วย คือ สุขภาวะของช่องปาก ความถูกต้องของการปฏิบัติพยาบาลตามแนวปฏิบัติการดูแลช่องปากประเมินโดยแบบสังเกตการปฏิบัติพยาบาลตามแนวปฏิบัติการดูแลช่องปาก ความพึงพอใจของพยาบาลต่อการใช้นโยบายการดูแลช่องปาก ประเมินโดยแบบสอบถามความพึงพอใจ สุขภาวะของช่องปาก ประเมินโดยแบบประเมิน Mucosal-Plaque Score เครื่องมือทั้ง 3 ชุดผ่านการประเมินความตรงของเนื้อหา โดยมีค่าเท่ากับ 1.0 ค่าความเที่ยงระหว่างผู้สังเกตของแบบประเมินความถูกต้องของการปฏิบัติพยาบาลตามแนวปฏิบัติการดูแลช่องปาก และแบบประเมิน Mucosal-Plaque Score ด้วยสถิติค้ำปา (Kappa) มีค่าเท่ากับ .96 และ .92 ตามลำดับ และค่าความเที่ยงของแบบประเมินความพึงพอใจของพยาบาล ได้ค่าสัมประสิทธิ์แอลฟาของครอนบาค เท่ากับ .93 วิเคราะห์ข้อมูลโดยใช้สถิติเชิงพรรณนา

ผลการศึกษาแสดงให้เห็นว่าพยาบาลมีความพึงพอใจต่อการนำแนวปฏิบัติการดูแลช่องปากไปใช้อยู่ในระดับสูง ($M = 92.54$, $SD = 7.58$) ความถูกต้องของการใช้แนวปฏิบัติอยู่ระหว่างร้อยละ 88 ถึงร้อยละ 100 และผู้ป่วยส่วนใหญ่ ($n = 46$) มีสุขภาวะของช่องปากอยู่ในระดับที่ยอมรับได้ คิดเป็นร้อยละ 97.87

ผลการศึกษาครั้งนี้แสดงให้เห็นว่า การใช้แนวปฏิบัติการดูแลช่องปากของผู้ป่วยที่ใส่ท่อช่วยหายใจและใช้เครื่องช่วยหายใจในหออภิบาลผู้ป่วยหนักแห่งหนึ่งในประเทศอินโดนีเซียประสบความสำเร็จและมีประสิทธิผล

Thesis Title	Implementation of Oral Nursing Care Guideline for Intubated Patients with Mechanical Ventilator in an ICU in Indonesia
Author	Mrs. Isti Haniyatun Khasanah
Major Program	Nursing Science (International Program)
Academic Year	2017

ABSTRACT

The purpose of this developmental research was to implement and test the effectiveness of oral nursing care guideline for intubated patients with mechanical ventilators in an ICU, Indonesia. Twenty-eight nurse participants were recruited, and 47 patient participants were involved in this study. Roger's Diffusion of Innovation Theory guided in implementing an oral nursing care guideline for intubated patients with mechanical ventilators. Outcomes of this study include nurses' satisfaction on implementing oral nursing care guideline and accuracy of oral nursing care practice as nurses' outcomes, while the patients' outcome mainly observed the oral integrity. The accuracy of oral nursing care practice was assessed using Accuracy of Oral Nursing Care Practice Checklist (AONCPC). The nurses' satisfaction was assessed using self-reported Nurses' Satisfaction Questionnaires (NSQ). The patient's oral integrity status was assessed using Mucosal-Plaque Score (MPS). The validity test showed that the S-CVI of all above tools were 1.0 each, while the inter-rater reliability using Kappa statistics of AONCPC and MPS were .96 and .92, respectively, and the internal reliability reported with Cronbach Alpha Coefficients of NSQ was .93. Descriptive statistics were used to analyze data.

The result of the study showed that the nurses' satisfaction on implementing oral nursing care guideline was at very high level ($M = 92.54$, $SD = 7.58$), the accuracy of practice ranged between 88% – 100% and the patient's oral integrity was mostly in acceptable status ($n = 46$, 97.87%).

These results indicated that the implementation of oral nursing care guideline for intubated patients with mechanical ventilators in an ICU in Indonesia was successful and effective.

ACKNOWLEDGMENT

In the name of Allah, the Most Gracious, the Most Benevolent. First of all, I would like to dedicate this work and all of the struggle before and after it to Allah, the Almighty God, of whom I fully submit and surrender before Him and Him only.

Secondly, my highest appreciation goes to my major advisor, Assist. Prof. Dr. Wipa Sae-Sia who tirelessly supports me via her wonderful guidance, passionate advice, constructive comments, valuable encouragement, and emotional strength throughout this study. Only with her full support that I could finally complete this study and her contribution toward it is indeed invaluable. Also, my sincere appreciation goes to my co-advisor Dr. Jintana Damkliang whose advice and co-supervision during this study has been proven to be fruitful.

Thirdly, I appreciate the Graduate School, Prince of Songkla University (PSU) support in awarding me the Thailand Education Hub for ASEAN Countries (TEH-AC) and the thesis grant of which this study and work were only possible with. I would like to thank all lecturers at the Faculty of Nursing, PSU, for their guidance during my study. I am truly grateful and extend my deepest appreciation to all experts who validated instruments in this study, Assist. Prof. Dr. Hathairat Sangchan, Assist. Prof. Dr. Supitcha Talungchit, Drg. Eva Sutyowati Permatasari SpBM. MARS, Dr. Suhartini Ismail, and Mrs. Supattra Uppanasikorn, MNS. I would also like to thank all examining committee members for their valuable comments and suggestions.

I am deeply grateful to everyone who has contributed to my study including all participants, nurses, dental nurses, patients, patient's family, head nurse, doctors

and hospital management at the Dr. Moewardi Hospital which have provided me opportunity and support during this study.

I also want to give thanks to all my classmates, colleagues, and friends. Special thanks, tribute, and appreciation to all, who their names do not appear here, who have contributed to the successful completion of this study.

Finally, I am forever indebted to my family. To my husband Alam Surya Wijaya and my daughter Ayunindita Sofia Wijaya, my beloved parents (Budi Ismail and Sumiyah) and also my dear brother Ikhsan Akhmad Rifai. Without whom this study would haven't been possible. Their names are always in my prayers and mine is always in their prayers too.

Isti Haniyatun Khasanah

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CHAPTER 1

INTRODUCTION

This chapter presents the background and significance, objectives, research questions, conceptual framework, definition of terms, scope, and the significance of the study.

Background and Significance

Oral health is a vital condition to the wellbeing of the critically ill patients, particularly those in Intensive Care Unit (ICU). The main purpose of oral care is to increase oral hygiene, to reduce microbial colonization in the oropharyngeal area, to reduce dental plaque, and to reduce the aspiration of contaminated saliva (Feider, Mitchell, & Bridges, 2010). In addition, oral care also helps to promote holistic patient care to increase patient comfort (Adib-Hajbaghery, Ansari, & Azizi-Fini, 2013), and to prevent halitosis (Coker, Ploeg, Kaasalainen, & Fisher, 2013). On the other hand, poor oral health has been recognized to have consequences of some systemic diseases including respiratory diseases (Coker et al., 2013), specifically ventilator-associated pneumonia (VAP) (Yurdanur & Yagmur, 2016). VAP was experienced by 8-28% of intubated patients with mechanical ventilator (Cirillo et al., 2015). The mortality rate of VAP was found between 24% and 60.90% and can reach to 84.3% (Ganz et al., 2013; Inchai et al., 2015). Microbes in the oral cavity, such as *A. baumannii* causing VAP can be controlled by regular oral care (Feider et al., 2010; Safdar, Crnich, & Maki, 2005). The delivery of the oral care must be managed to

prevent these microbes to re-colonize the mouth especially for critically ill patients admitted to ICU.

Intubated patients need specific oral care compared to patients without intubation and a consideration should be given to technique, equipment, solution, and frequency of oral care. Intubation has several consequences to oral health. The hazard from VAP had been increased by intubation since the primary reflects of the human body to dissipate aspirated microbes has been reduced by the intubation (Khan et al., 2017). Furthermore, the endotracheal tube may inhibit in swallowing, and may result in debris accumulation in the mouth, thus, creating an ideal growing environment for oral microorganisms. Oral intubation forced the oral cavity to be open continuously and may have several consequences such as: drying of the mucous membrane, xerostomia, dental plaque accumulation, and the decrease in saliva distribution (Blot, Vandijck, & Labeau, 2008). The endotracheal tube may also cause oral inspection to be difficult and may limit oral care effectiveness. It may stimulate an excessive amount of salivary flow by a hyperactive gag reflex induction (Blot et al., 2008).

Several factors influence oral care delivery to intubated patients including those arising from nurses (Ibrahim, Mudawi, & Omer, 2015), patients (Yildiz, Durna, & Akin, 2013), and the up-to-date evidence-based oral nursing care guideline (A.-M. Batiha et al., 2015). First, the nurses' factor includes nurses' knowledge, attitude and practice. It was found that 44% - 65% of hospitalized patients did not receive sufficient oral care (Stout, Goulding, & Powell, 2009). In addition, only 57% of nurses documented their oral care services (Ganz et al., 2013). Furthermore, nurses often lacked the evidence-based knowledge to deliver appropriate oral care for

intubated patients (Chan, Lee, Poh, Ng, & Prabhakaran, 2011). The knowledge was important to maintain the adherence of the regular oral care of patients, which was related to the healthcare outcomes (Feider et al., 2010). A good policy or guideline might not result in the improvement of the outcome without the commitment of nurses on implementing the guideline (Feider et al., 2010).

The patient condition is another factor that may also hinder the delivery of oral assessment and care. Patients' conditions that might hinder the delivery of oral care include facial trauma or fracture affecting oral cavity and unstable cervical fracture (Yildiz et al., 2013). Most of ICU patients received mechanical ventilator to aid respiration due to critical condition, which was used to save patients' life (AlBashtawy, Batiha, Tawalbeh, Tubaishat, & AlAzzam, 2015). However, the patients' defense mechanism was compromised due to intubation, which bypassed airway to the epiglottis (A.-M. Batiha et al., 2015). It is suggested that oral care in intubated patients should be addressed using a comprehensive approach such as toothbrushing, tongue scraping, and moisturizing oral cavity (Prendergast, Jakobsson, Renvert, & Hallberg, 2012). Therefore, intubated patients with mechanical ventilator require specific oral care to maintain their oral and overall health.

Finally, the up-to-date evidence-based oral nursing care guideline is also associated with effective oral care. The lack of evidence-based practice created important barriers to an effective oral care. Those barriers included the presentation and accessibility of research to public, research qualities, setting limitation, organizational barriers, as well as nurses' reliance on customary practice and skills (Ganz et al., 2013). A guideline provides a method for nurses to deliver the oral care

to the patients. A good guideline must contain the most recent update supported by evidence with the strongest confidence level. To make sure that the guideline is still up to date, a regular update must be maintained (National Health and Medical Research Council, 2002).

American Association of Critical Care Nurses (AACN) provides a standard procedure on endotracheal tube and oral care procedures for intubated patients, which is one of the most current available evidence-based oral care protocol utilized widely in many studies (A.-M. Batiha et al., 2015). It was found that AACN procedure implementation could reduce VAP incidence by 50% (A.-M. Batiha et al., 2015). The AACN guideline mentions about activities related to oral care, which are: 1) brushing teeth, gums, and tongue using soft pediatric or adult toothbrush at least twice a day; 2) clean mouth every 2 to 4 hours using oral swab with 1.5% hydrogen peroxide solution; and 3) rinsing mouth using oral antiseptic (chlorhexidine, Cetylpyridinium chloride, povidone iodine (Wiegand, 2011). In addition, other studies suggested to elevate the head of bed 30 – 45 degrees before performing oral care (Pobo et al., 2009; Yao, Chang, Maa, Wang, & Chen, 2011). The evidence from recent studies stated that oral care delivery must be started with oral assessment and equipment preparation, continued with oral care procedure, and followed by oral re-assessment, monitoring of patients' condition and documentation (Ames et al., 2011).

The purpose of guideline implementation is to improve the quality of healthcare and to reduce the use of healthcare interventions, which may be unnecessary, ineffective, or even harmful to patients (National Health and Medical Research Council, 2002). Guidelines are important and become one of the critical

points between current best evidence and good clinical practices. Guidelines are basic components of the quality health care as an integral system. Therefore, every health care provider must provide updated guidelines to ensure delivery of quality health care (National Health and Medical Research Council, 2002). Oral nursing care guideline would be adopted from existing oral care guideline and would be implemented on improving the oral health of patients. The guideline would assist nurses in delivering the oral care to the patients. The effectiveness of guideline implementation could be evaluated in terms of compliance rate of guideline adoption, nurses' satisfaction, or patients' outcome as oral integrity.

The Roger's Diffusion Innovation Theory is considered as a model for guiding technological change where an innovation will be introduced to adopters for adoption (Kaminski, 2011). In this theory, diffusion is described as a process where an innovation is transmitted through communication channels over certain period of time among social system members. The theory gives benefits to the target of change due to respect and consideration to all stakeholders involved in the process of diffusion of innovation (Kaminski, 2011). Roger's Diffusion of Innovations Theory has been used in many studies related to nursing practices to introduce new innovations. It was used to introduce delirium screening test in mechanically ventilated patients (Bowen, Stanton, & Manno, 2012) which showed that Roger Diffusion of Innovation Theory was effective on guiding the implementation process of the Confusion Assessment Method for Intensive Care Unit (CAM-ICU) and the frequency of the use. It was also effective for adoption of other adjustments incorporating Evidence-Based Practice (EBP). Furthermore, there was another study using Roger Diffusion of Innovation

theory in the adoption of Peripheral Nerve Block (PNB) for orthopedic ambulatory surgery (Leggott et al., 2016). In the study, the innovation of PNB was successfully adopted and improved for quality, safety, and efficiency of the procedure. A similar study of evaluation of Braden Scale implementation has also been done in Bangladesh. The study showed that nurses were capable of using Braden Scale to assess risk of pressure ulcer which could be incorporated into their work protocol (Banu, Sae-Sia, & Khupantavee, 2014). This proposed study hopes to introduce oral nursing care guideline as an innovation to be diffused to nurses with a purpose of making a change in nurses' knowledge, skill, and practice so nurses as well as provide quality oral care to intubated patients with mechanical ventilators. Therefore, Roger's Diffusion of Innovation Theory will be useful in guiding the implementation of oral nursing care guideline.

In Dr. Moewardi hospital, Indonesia, there is a protocol for oral care delivery to all patients and not specific to intubated patients with mechanical ventilators. However, it has been developed based on the hospital's policy and lacked reference to update evidence-based recommendations. Furthermore, there is no oral assessment tool currently in use in Dr. Moewardi hospital. Oral care delivery is inconsistent in frequency and highly varied from one nurse to another. Some nurses deliver once a day in the morning, while other nurses deliver twice a day in the morning and evening. Oral care practice is based on tradition or custom of senior nurses. The current technique for oral care uses sponge swab with NaCl 0.9% and oral antiseptic solution. Interdisciplinary collaboration is not present (Kushananto, personal communication, May 10, 2017). Bayu Kushananto is a Case Manager in ICU in Dr.

Moewardi Hospital. In addition, outcomes of the oral care such as dental plaque and mucosal condition are not monitored, and the documentation of oral care delivery is not complete. Furthermore, nurses' commitment to the protocol is also not monitored and thus, the information about the effectiveness of the current oral care practice is limited (Sutarmi, personal communication, May 15, 2017). Sutarmi is the Patient Control Nurse in critical care Dr. Moewardi hospital. Intubated patients with mechanical ventilators need a specific oral nursing care guideline. Therefore, it is necessary to implement an oral nursing care guideline for intubated ICU patients with mechanical ventilators.

The purpose of the study was to implement oral nursing care guideline in intubated ICU patients with mechanical ventilators. The benefit was the availability of information about oral nursing care guideline effectiveness in intubated ICU patients with mechanical ventilators.

Objectives of the Study

To implement and test the effectiveness of oral nursing care guideline for intubated patients with mechanical ventilators in an ICU in Indonesia.

Research Questions

1. What was the effectiveness of oral nursing care guideline in intubated patients with mechanical ventilators in ICU in terms of nurses' outcomes and patients' outcomes?

- 1.1 What was the level of nurses' satisfaction in implementing oral nursing care guideline?
- 1.2 What percentage of oral care practices were correctly performed?
- 1.3 What percentage of patients are having good oral integrity?

Conceptual Framework

The conceptual framework of this study was based on Roger's Diffusion of Innovation Theory (Rogers, 2003), AACN, and oral care related literature. Roger's theory was used to explain the adoption of innovation in the oral care technique based on current evidence. Roger's theory explained diffusion as a process to deliver a new thing, which is referred to as innovation to an organization. He identified four integrated key elements that contribute to the process of adopting an innovation that includes innovation, time, communication channels, and social system.

Innovation is something new to people or organization, which can be an idea, practice, or object. People may develop a favorable or unfavorable attitude towards it. Communication channel is the second element, by which members of the social system introduce and share with one another about the innovation. It requires good relationship among the participants to achieve a mutual understanding. The third element is time that is needed in process of innovation-decision. Rogers (2003) stated that there is a time-ordered sequence for the adopter to pass through the following steps: knowledge, persuasion, decision, implementation, and confirmation. Finally, the last element, social system, which influences the acceptance or rejection of the innovation. A social system refers to the member of an organization, who are engaged

in the diffusion process to solve the problem in order to accomplish an acceptance of the innovation.

The innovation-decision process in adoption has five stages: knowledge, persuasion, decision, implementation and confirmation. Knowledge is a stage when an individual revealed an innovation and understands how it works. In this study, the knowledge stage occurred when the nurses attended workshop, read printed presentation slide and booklet. Persuasion stage is when an individual has a positive or negative attitude towards the innovation. In this study, the persons in charge were chosen for persuasion who were selected among senior nurses in each shift to motivate and inspire other nurses to follow the oral care guideline in their shift. Then, the decision comes when an individual choose to accept or reject the innovation. The decision stage in this study included discussion and consultation session for nurses about oral care guideline, particularly on the technical aspect of oral care in intubated patients provided by the researcher. Oral care checklist and worksheet were used in this study at implementation stages. At the confirmation stage, usually, an individual search for support to the already made decision, but he or she may refer to the decision with positive or negative comment about the innovation. In this study, the confirmation stage included feedback from nurses and support from researcher to affirm nurse's decision to implement oral care guideline in intubated patient.

In this proposed study, oral nursing care guideline as innovation was introduced to nurses through persons in authority including Director of hospital, nursing superintendent, and ward in charge. The oral nursing care guideline which includes oral assessment, preparation of equipment and patients, oral care procedure,

oral re-assessment, patient monitoring, and documentation, was introduced to nurses via the social system in the hospital through communication channels, such as workshop, printed presentation slide, booklet, discussion, and demonstration of delivering oral care based on current evidence. The introduction period was two months. The outcome of the oral nursing care guideline implementation had two indicators. The first indicators under nurses' outcomes, were nurses' satisfaction on using oral nursing care guideline, and accuracy of oral nursing care practice. The second outcome on oral integrity under patients' outcome. The framework of this study is illustrated in Figure 1.

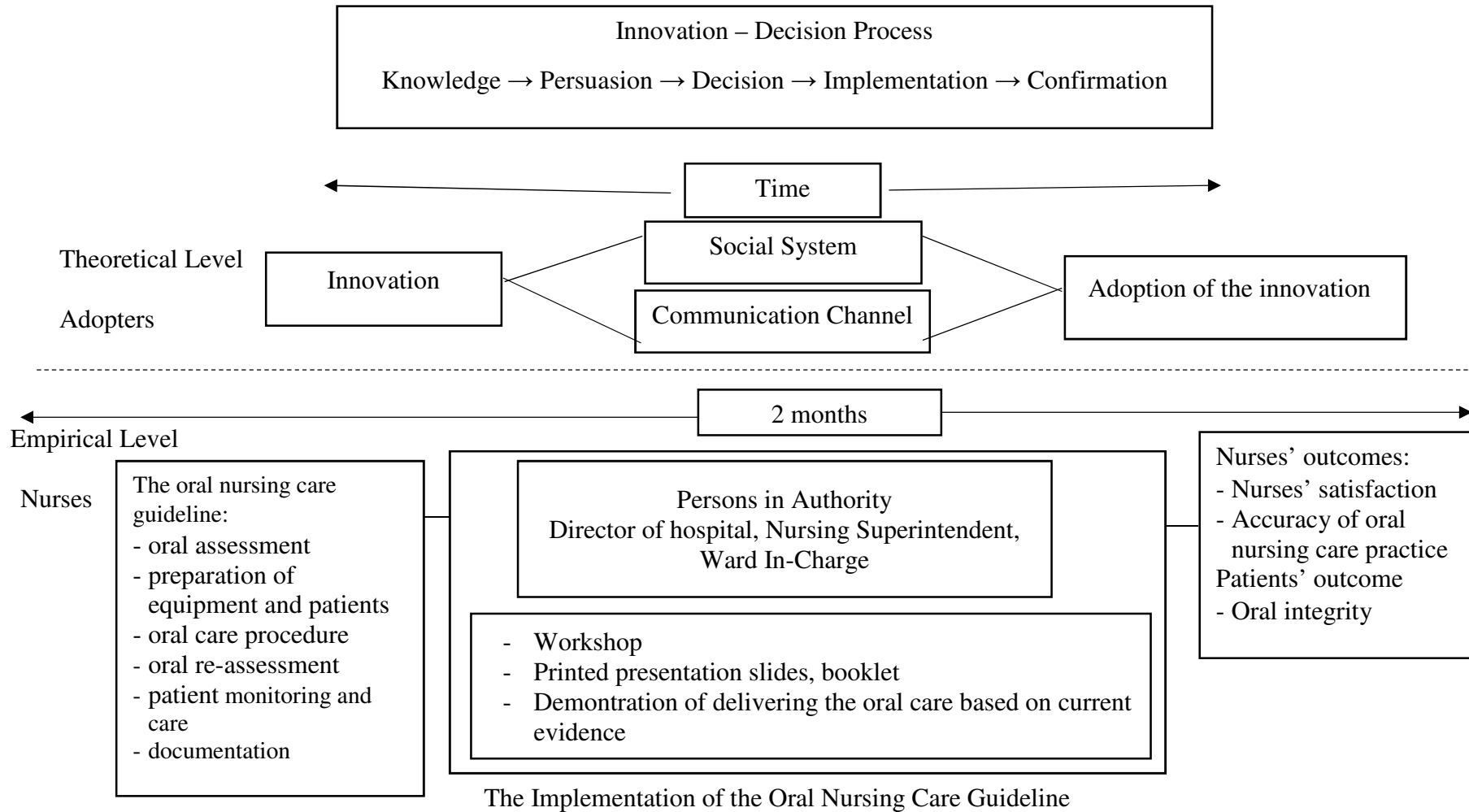


Figure 1. Conceptual Framework of the Implementation of the Oral Nursing Care Guideline

Definition of Terms

Oral Nursing Care Guideline. Oral nursing care guideline is a set of statements to be followed by nurses during oral care delivery in ICU patients with mechanical ventilators. Oral nursing care guideline was originally developed by AACN and supplemented with current evidence consisting 6 steps: oral assessment, preparation of equipment and patients, oral care procedure, oral re-assessment, patient monitoring and care, as well as documentation.

Nurses' satisfaction. Nurses' satisfaction refers to nurses' personal feelings of fulfilling their task or duty when following the oral nursing care guideline. The satisfaction was measured using modified Satisfaction Questionnaire from Banu, Sae-Sia, and Khupantavee (2014). The dimensions of determining nursing satisfaction cover the usefulness of oral assessment tools, the confidence of using the tools, and being proud to be part of the team on improving the quality of nursing care. A higher score indicates higher satisfaction level. It was measured in the eighth week.

Accuracy of oral nursing care practice. The accuracy of oral nursing care practice is defined as oral care activities that nurses correctly do based on the current evidence-based guideline for intubated patients with mechanical ventilator admitted in ICU. The measurement was done by evaluating oral care practice using observation and checklist form of oral nursing care by research assistant. The measurement was started from the fifth week through the eighth week until all nurse participants were assessed.

Patients' Outcome. Patients' outcome is determined by patients' oral integrity. The patients' oral integrity was observed by dental nurse in terms of dental plaque and oral mucosal condition. Both conditions were assessed once using Mucosal-Plaque Score (MPS) developed by Henriksen, Ambjørnsen, and Axéll (1999) after oral nursing care guideline implementation in the fifth week through the eighth week. A higher score indicates poor oral integrity status.

The Scope of the Study

Implementation of oral nursing care guideline was done between January - March 2018 in the ICU of Dr. Moewardi hospital. The participants included nurses working in ICU except the head nurse and five nurses who were recruited as research assistants. The patient participants included all patients admitted to ICU between February – March 2018, fulfilling the inclusion criteria.

The Significance of the Study

The study used developmental research design to implement oral nursing care guideline to improve patient's oral health. The oral nursing care guideline implementation was expected to contribute to health care quality improvement. It was expected that the oral nursing care guideline could be implemented in other hospitals in Indonesia.

CHAPTER 2

LITERATURE REVIEW

This chapter discusses the literature review related to oral care and the diffusion of oral care in intubated patients with mechanical ventilators in the ICU in Indonesia. The outline of the literature review is as follows:

- A. Oral Care in Intubated Patients with Mechanical Ventilators
 - 1. Overview Information Related to Oral Care
 - 1.1 Definition of oral care
 - 1.2 Problem of oral care in intubated patients
 - 1.3 Consequences of ineffective oral care
 - 1.3.1 Ventilator-associated pneumonia
 - 1.3.2 Dental plaque
 - 1.3.3 Mucous condition
 - 2. Factors Related to Oral Care
 - 2.1 Nurses' knowledge, attitude, and practice
 - 2.2 Patients' conditions
 - 2.3 Up-to-date evidence-based practice
 - 3. Evidence-based Practice of Oral Care for the Intubated Patients with Mechanical Ventilator
 - 3.1 Evidence-based review
 - 3.2 Oral care practice in intubated patients
 - 3.1.1. Equipment

3.1.2. Solution

3.1.3. Frequency

4. Related Tools for Oral Care

4.1 Oral assessment tools

4.1.1 Beck Oral Assessment Scale (BOAS)

4.1.2 Oral Assessment Tool (OAT)

4.1.3 The Holistic and Reliable Oral Assessment Tool (THROAT)

4.1.4 Brief Oral Health Status Examination (BOHSE) and Global Oral Health Scale (GOHS)

4.1.5 Revised Oral Assessment Guide (ROAG)

4.1.6 Oral Health Assessment Tool (OHAT)

4.1.7 Mucosal-Plaque Score (MPS)

4.2 Outcome measures

4.2.1 Tools to measure patients' outcome

4.2.2 Tools to measure nurses' outcome

B. Diffusion of Oral Nursing Care Guideline

1. Diffusion of Innovation Theory

1.1 Definition of diffusion of innovation

1.2 Stages of diffusion of innovations

1.3 Elements of diffusion of innovations

1.3.1 Innovation

1.3.2 Communication channel

1.3.3 Time

1.3.4 Social system

1.4 Factors related to rate of adoption

1.5 Adopters categories

1.5.1 Innovator

1.5.2 Early adopters

1.5.3 Early majority

1.5.4 Late majority

1.5.5 Laggards

1.6 Research evidence employing the Diffusion of Innovation Theory

C. Tentative Guideline for Oral Care

D. Summary

Oral Care in Intubated Patients with Mechanical Ventilators

Overview Information Related to Oral Care

Oral care is very important in healthcare because it affects the clinical result as well as wellness of intensive care patients (Atay & Karabacak, 2014). In the ICU, oral care is delivered by nurses, and thus, can be referred to as oral nursing care. It has been deemed to be of important factor with moderate-to-high level compared to other care activities (Ganz et al., 2013).

Definition of oral care. Oral care is defined as the practice to keep the patient's mouth healthy and clean by flossing and brushing to prevent gum disease and tooth decay. Patients in the ICU are mostly dependent on nurses to provide basic maintenance procedures due to their health conditions. In most cases, nurses would hold the responsibility to provide basic care procedures including oral care.

Problem of oral care in intubated patients. ICU patients are highly susceptible to being colonized by infectious pathogen in oral cavity. Oropharyngeal bacteria are key contributors of VAP. The use of an active oral antimicrobial agent with toothbrushing may reduce the risk of VAP in ICU patients (Khan et al., 2017). Providing oral care to intubated patients is vital for patients' oral health, diseases prevention, and maintaining overall systemic health (Prendergast et al., 2012). Intubated patients with mechanical ventilator which mostly admitted to ICU are in substantial risk of poor oral health. The danger from ventilator-associated infection is increased by intubation as the main reflex of the human body to dissipate aspirated microbes has been reduced by the intubation (Khan et al., 2017). Furthermore, the endotracheal tube may inhibit swallowing, thus may result in debris accumulation in

the oral cavity and may provide an ideal environment for organisms to grow. Oral intubation requires the mouth to be open continuously and leads to xerostomia, leading to drying of the mucous membrane, dental plaque accumulation, and reduced saliva distribution. In addition, the endotracheal tube may cause the oral assessment and inspection difficult and limit access to the oral care which may cause hypersalivation via the induction of a hyperactive gag reflex (Blot et al., 2008). Therefore, intubated patients need specific oral care compared to other patients due to the presence of the endotracheal tube.

Various equipment are currently used for oral care in intubated patient with a mechanical ventilator. Nurses use foam swabs or toothbrush for oral care (Alhazzani, Smith, Muscedere, Medd, & Cook, 2013). Most nurses; however, preferred to use swabs than toothbrush, despite toothbrush availability (Soh et al., 2011) due to fear of causing injury or pain to the patients (Ibrahim et al., 2015) and not sure about the effectiveness of toothbrush to remove plaque (Alhazzani et al., 2013).

Some barriers in delivering oral care in the ICU include an oral gastric tube, endotracheal tube, and bite blocks installed in patients (Prendergast et al., 2012). Manual and electric toothbrushes, moisturizing agents, dentifrices, oral swabs, and several solutions are commercially available. However, the effectiveness of these products, as well as methods on the oral health of intubated patients, is limited. Nevertheless, manual toothbrushes have been recommended as an ideal tool for delivering oral care to the intubated patients (Prendergast et al., 2012).

Consequences of ineffective oral care. There are several consequences of oral care omission or ineffective oral care. Several mechanisms have been identified

from the association of poor oral health and VAP development (Saensom, Merchant, Wara-aswapati, Ruaisungnoen, & Pitiphat, 2016). Endotracheal intubation makes the patient mouth open and may cause changes in oral condition which in turn leads to the growth of pathogens and thus, VAP increases. The oral tissues swiftly dry out and become inflamed and injured, making a desired environment for pathogens' growth. Dental plaque and oral organism grow rapidly while salivary production slowly reduced which lead to lower oral pH and create favorable condition for microbial growth and proliferation (Saensom et al., 2016). Recent studies showed that poor oral care will lead to an increased risk of VAP, the buildup of dental plaque, and the deteriorating mucosal condition.

Ventilator-associated pneumonia (VAP). In ICU patients, the mouth is a reservoir for respiratory pathogens related to nosocomial infection (Shi et al., 2013) and most of which is contained in the oropharynx (Munro & Grap, 2004). Oropharyngeal invasion by microbes is a key factor in Ventilator Associated Pneumonia (VAP) development in ICU (Atay & Karabacak, 2014). In ICU, VAP is considered as a major problem associated with nosocomial infection. The disease accounted for more than 50% of ICU infection and affected 8-28 % of mechanically ventilated patients (Cirillo et al., 2015). The mortality rate in the ICU associated with VAP was between 45.6% and 60.90% and can reach up to 84.3% for VAP caused by *A. baumannii* (Inchai et al., 2015), while another study found that the mortality rate was between 33% and 50% (Villar et al., 2016). The health burden for taking care patients with VAP will be higher because of a longer stay and expenditure used to treat pneumonia (Karataş, Saylan, Kostakoğlu, & Yılmaz, 2016). Cleaning the mouth

and teeth can prevent dental plaque or secretion and can lower the risk of nosocomial infection especially VAP (Shi et al., 2013), reduce the number of microorganism in the mouth, reduce the organism cluster available to colonize the lung (Munro & Grap, 2004).

On the other hand, endotracheal tube provides a pathway for microbial entrance from the oropharynx to the glottis, and finally ended in the lower part of the respiratory tract. Endotracheal tube also promotes colonization by reducing the gag reflex and the mucociliary function by stimulating excessive mucous secretion. Toothbrushing, mouthwash, gel, or their combination can control disease development, especially if combined with the aspiration of secretion (Shi et al., 2013).

Dental plaque. Dental plaque is colonized by gram-negative anaerobic bacteria and yields a lot of pathogenic bacteria. Colonized dental conjoined with the low flow of saliva has a relationship with prolonged endotracheal intubation and may develop mucositis (Prendergast et al., 2012). The plaque which remains in the mouth for more than three days may yield many gram-negative bacteria. These bacteria may cause infection in the mouth and systemic diseases. Plaque formation in teeth and oral microbes occur because gram-positive bacteria which create normal flora of mouth was outnumbered by gram-negative bacteria (Yurdanur & Yagmur, 2016). When the duration of oral intubation becomes longer, the dried secretion and debris become harder in the tongue and palate, thereby producing pain and halitosis. The challenge in oral care is to prevent the oral health decrease by inhibiting dental plaque development and bacterial growth (Prendergast et al., 2012).

Mucous condition. Oral mucous is subject to frequent trauma which mostly, results in micro ulcers that are asymptomatic and heal very quickly (De Tradus, 2003). The oropharyngeal cavity is the gateway to gastrointestinal and respiratory tract and is constantly become subject to attacks by antigen from air and food. Therefore, in the oropharyngeal cavity, the mucosal immune system must work hard to prevent the entry of pathogens (Wu, Zhang, Tu, Chen, & Chen, 2014). Oral care will help the mucous immune system by reducing the pathogen in the oral cavity. Therefore, oral care and oral assessment need to be done regularly to monitor mucosal condition in the patient as they represent overall oral health. Mucosal condition can be assessed using Mucosal-Plaque Score (Ames et al., 2011). Mucositis (inflammation) is highly related to dry mouth (xerostomia) in which the tissues become inflamed when the mouth dries out. Dryness and cracking oral tissues provide a region for bacterial proliferation (Feider et al., 2010). Therefore, an oral care particularly moisturizing oral cavity is very important.

Oral care is very important for intubated patients to reduce risk of nosocomial infection including VAP. Intubated patients need a special oral care due to the presence of endotracheal tube. However, several problems exist in oral care delivery to intubated patients. Nevertheless, oral care in intubated patients must be delivered effectively, otherwise several consequences may emerge, such as VAP, dental plaque, and poor mucosa condition.

Factors Related to Oral Care

The mouth is the main access for nutrition and may provide access for bacteria, viruses, fungi, and other vectors of disease. General health may suffer when oral health is altered by disease or injury. The risk factors of oral diseases include nurses' factors (knowledge, attitude, practice) and patient's factors.

Nurses' knowledge, attitude, and practice. Many barriers arising from nurses to provide quality oral care include oral care's low priority, fear of causing injury or pain to the patients, perception of unimportance of oral care, inadequate number of nurses, fear of moving or displacing endotracheal tube, lack of oral care equipment (Ibrahim et al., 2015).

Nurses' knowledge. Nurses' knowledge about the importance of oral care were recognized as significant risk factors affecting oral health (Soh et al., 2011). A lack of knowledge about oral care has caused nurses to underestimate the necessity for oral care delivery and considered only as a comfort measure. Oral care was usually considered as low priority level care with a rank of seven out of 10 nurse activities, from a study using questionnaire in 130 nurses from 6 ICUs in hospitals associated with universities in Iran (Adib-Hajbaghery et al., 2013).

Nurses' attitude. A recent study found that delivering oral care in critically ill patients is both time-consuming and stressful activity, and therefore, need a special knowledge (Drapal, 2015). Nurses' perception about barrier to oral care in patients with the mechanical ventilator is "too much writing task" followed by "lack of time" and "staff shortage"(Adib-Hajbaghery et al., 2013).

Nurses' practice. In a recent study showed that nurses based their oral care practice on customary practice of senior nurses which had various oral assessment methods, and used many different oral care techniques as well as products (Ganz et al., 2013). In addition, oral care practice by ICU nurses was not documented and was not based on the most recent evidence (Ganz et al., 2013). Another study also mentioned that delivering oral care in patients with the semiconscious or non-cooperative condition was difficult for nurses (Ibrahim et al., 2015). Furthermore, oral assessment tools for evaluating oral health and the effectiveness of oral care as well as a guide for determining the frequency of oral care were sometimes lacking (Yildiz et al., 2013). In addition, nurses do not perform oral assessment or attempt to deliver oral care during their shift (Adib-Hajbaghery et al., 2013). Moreover, the lack of oral assessment tool may relate to lack of professional training among ICU personnel, and lack of a participatory dental team, in both clinical and educational context as well as for specific protocols. Documentation of oral care is another barrier, as 44.44% of patient medical records did not show oral care delivery (Adib-Hajbaghery et al., 2013).

Patients' conditions. Patients' condition (e.g. trauma or fracture in mouth or face) may as well hinder the delivery oral assessment and care (Yildiz et al., 2013). Maintenance of oral mucosa integrity is a vital procedure in oral health. Tissue integrity of the oral cavity in intubated patients depends on several factors including patients' medical treatment, no oral food or water intake, the existence of endotracheal tube, and plasters or securing tape and opened mouth due to endotracheal tube (Yurdanur & Yagmur, 2016). Most of ICU patients received

mechanical ventilator to aid the respiratory in critical condition. It is used to save patients life (AlBashtawy et al., 2015). The patients' defense mechanism is compromised due to intubation which bypasses airway to the epiglottis (A.-M. Batiha et al., 2015). Therefore, intubated patients with mechanical ventilator require comprehensive oral care to maintain their oral and overall health. This process suggests that oral care in intubated patients should be delivered comprehensively (Prendergast et al., 2012).

Up-to-date evidence-based practice. Oral nursing care guideline may give a guide to nurses to deliver the necessary oral care to patients. A good guideline must contain the most recent update supported by evidence with the strongest confidence level. A regular update must be maintained to make sure that the guideline is still relevant to current condition (National Health and Medical Research Council, 2002). Qualities, presentation, and accessibility of research, local or organizational obstacles and limitation, as well as nurses' reliance on customary practice and skills have been identified as barriers arising due to lack of evidence-based practice (Ganz et al., 2013).

There are several factors related to oral care including nurses factor, patient factor and up-to-date evidence-based practice. Nurses factor consist of knowledge, attitude, and practice. patient condition may hinder delivery of oral assessment and care for example trauma or fracture in mouth or face. Evidence-based practice in oral care must be supported by the most recent update which has to be continually updated.

Evidence-based Practice of Oral Care for the Intubated Patients with Mechanical Ventilator

Up-to-date evidence in oral care practice for intubated patients with mechanical ventilator will be used in this study to implement oral nursing care guideline to intubated patients with mechanical ventilators.

Evidence-based review. Several evidences about oral care in intubated patient including oral care guideline and recent studies have been reviewed.

Guideline review. American Association of Critical Care Nurses (AACN) provided a standard procedure on endotracheal tube and oral care for the intubated patients, which is one of the most current available evidence-based oral care protocol utilized widely in many studies (A.-M. Batiha et al., 2015). It has been found that AACN procedure implementation can reduce VAP incidence by 50% (A.-M. Batiha et al., 2015). The AACN guideline mentions activities related to oral care, which include: 1) brushing teeth, gums, and tongue using pediatric toothbrush or soft adult toothbrush at least twice a day; 2) using oral swab with 1.5% hydrogen peroxide solution every 2 to 4 hours for mouth cleaning; 3). Using oral antiseptic for mouth rinse (chlorhexidine, Cetylpyridinium chloride, povidone iodine (Wiegand, 2011). The recommended procedure is provided in Table 1.

Table 1*AACN Procedure for Endotracheal Tube and Oral Care*

No	Activity
1.	Hand hygiene
2.	Personal equipment
3.	Ensure that endotracheal tube is connected to ventilator with a swivel adapter
4.	Support the endotracheal tube and tubing as needed
5.	If suctioning is clinically indicated, hyper oxygenate before endotracheal tube suction and between attempts
6.	If patient is nasally intubated, clean around ET tube with saline solution-soaked gauze or cotton swab. Proceed to step 7 If the patient is intubated orally, remove bite block or oropharyngeal airway (acting as bite block) before proceeding with oral hygiene.
7.	Initiate oral hygiene with a pediatric toothbrush or adult (soft) toothbrush at least twice a day. Gently brush patient's teeth to clean and remove plaque from teeth. Suction oropharyngeal secretion after brushing. Use toothpaste or a cleansing solution that assist in the breakdown of debris.
8.	In addition to brushing twice daily, use an oral swab with 1.5% (H ₂ O ₂) solution to clean mouth every 2 to 4 hours. Suction oropharyngeal secretion after cleansing. After each cleansing, apply a mouth moisturizer to the oral mucosa and lips to keep the tissue moist. (level c)
9.	Suction oral cavity and pharynx frequently (continues subglottic suctioning: level b). (intermittent suctioning: level c)
10.	Antiseptic oral rinse (chlorhexidine, Cethylperidirium chloride (CPC)) added after brushing or done in conjunction with comprehensive oral care did achieve elimination of VAP (level b)

Continued

Table 1. AACN Procedure for Endotracheal Tube and Oral Care (continued)

No	Activity
11.	Move oral tube to another side of the mouth. Replace bite-block or oropharyngeal airway (to act as bite-block) along endotracheal tube if necessary to prevent biting. If deflation of the cuff is necessary to move from one side of the mouth to the other, deep oral suctioning should be performed before deflation (level c).
12.	After oral hygiene is completed, change the ET securing device with tape, ties, or commercial device (level c)
13.	Ensure proper tube cuff inflation with minimal leak volume or minimal occlusion volume (level c)
14.	Reconfirm tube placement, and note position of tube at teeth or naris (common tube placement at teeth is 21 cm for woman and 23 cm for men)
15.	Secure the endotracheal tube in place (according to institutional standard (to prevent inadvertent dislodgement of the tube) (level c)

Patient monitoring and care

1. Keep the head of the bed elevated at least 30 degrees unless contraindicated (level c)
2. Suction endotracheal tube if clinically indicated
3. Monitor the amount, type, and color of secretion
4. If patient is nasally intubated, recommend re-intubation in the oral cavity (level c)
5. Assess the oral cavity and lips at least every 8 hours, and perform oral care (as outlined in step 7 and 10) every 2 to 4 hours and as needed (level c). Brush teeth and tongue every 12 hours.
6. With oral care, assess for buildup of plaque on teeth or potential infection related to oral abscess

Continued

Table 1. AACN Procedure for Endotracheal Tube and Oral Care (continued)

No	Activity
7.	Avoid reusing devices unless covered or protected (i.e., in-line suction or covered Yankauer)
8.	Reconfirm placement and note the position of the tube at teeth or naris. Re-tape or secure endotracheal tube every 24 hours and as needed for soiled or loose securing devices.
9.	With subglottic secretion drainage ET tube in place, if tube become clogged, irrigate with air per manufacturers instruction but do not increase suction pressure beyond what is recommended by the manufacturer (level d)

Studies review. Apart from the guideline, there are several studies that focus on oral care. There are five studies found in comprehensive literature search about oral care in intubated patients with mechanical ventilators in critical care unit. These studies differ on recommendation regarding oral care technique in practice. Some of the techniques employed by recent studies are summarized in Table 2.

Table 2*Oral Care Technique in Intubated Patients with Mechanical Ventilator*

Author	Level of evidence	Elevate bed	Cuff pressure 25-30	Moisturized oral cavity with chlorhexidine	Moisturized oral cavity with purified water	Moisturized oral cavity with mouthwash & gel	Oropharyngeal secretion aspirated	Brushing tooth	Brushing tooth with toothpaste	Brushing tooth with chlorhexidine	Palate and tongue brush	Gauze impregnated with chlorhexidine	Tongue scraping	Suction
Lorente et al., (2012)	1.c		√	√			√			√		√		
Prendergast et al., (2012)	1.c			√			√	√	√			√	√	
Yao et al., (2011)	1.c	√			√			√			√			√
Pobo et al., (2009)	1.c	√	√	√			√	√			√	√		
Munro et al. (2009)	1.c					√			√		√			√

From Table 2, it can be concluded that the best evidence-based practice for oral care should be a combination of elevating bed, measuring cuff pressure at 25 – 30 mmHg, moisturize oral cavity with chlorhexidine and rinse with pure water, oropharyngeal secretion aspirated, brushing tooth with or without toothpaste, palate and tongue brush, gauze impregnated with chlorhexidine, and suction.

There are several procedures that were not described in AACN but were mentioned in several single studies. Therefore, this procedure will be combined with AACN into oral nursing care guideline. Several procedures found in recent studies about oral care are provided in Table 3.

Table 3

Additional Procedures to be Combined with AACN into Oral Nursing Care Guideline

Component	AACN	Single study
Oral assessment	Not mentioned	Performed every morning (Ames et al., 2011; Yildiz et al., 2013)
Rinse mouth	Clorhexidine or cetylpyridinium chloride (CPC)	Rinse mouth 5-10 ml purified (Yao et al., 2011)
Cleaning with chlorhexidine 0.12%	Toothbrushing twice a day, oral swab 1.5% H ₂ O ₂ to clean mouth every 2 to 4 hours.	Toothbrushing with 0.12% chlorhexidine (Khan et al., 2017; Lorente et al., 2012; Pobo et al., 2009; Prendergast et al., 2012)
Cleaning toothbrush and gum line	Not mentioned	Clean teeth, gum, tongue, mouth, mucosa surface (Pobo et al., 2009; Prendergast et al., 2012; Yao et al., 2011)
Assess gum bleeding	Not mentioned	Assess significant gum bleeding and stop brushing if occur (Prendergast et al., 2012)

In addition, there is a study providing an explanation of intervention and rationale about oral care procedure (Pear, 2007). The rationale for each procedure incorporated in the oral nursing care guideline is presented in Table 4.

Table 4

Intervention and Rationale for Oral Care Procedure

Activities	Intervention	Rationale
Initial oral assessment	Perform an initial oral assessment and care needs at admission	Oral assessment allows for identification of problems related to oral health
Assessment of oral cavity	Conduct daily assessment of teeth, saliva, oral tissue, and tongue of each patient with mechanical ventilator	Assessment allows for initial identification of oral hygiene problem and for continue observation of oral health.
Head Elevation	Keep head elevated at least 30 degrees, and position patients so that oral secretion pool into the buccal pocket, especially important during feeding	Elevation prevent reflux and aspiration of gastric content; oral secretion may drain into the subglottic area and rapidly colonized with pathogenic bacteria
Moisturizer	Use water-soluble moisturizer to assist in the maintenance of healthy lips and gum at least one to two hours	Dry and cracking of oral tissues and lips provide a region for bacterial proliferation. Water-soluble moisturizer allows hydration

(Continued)

Table 4. *Intervention and Rationale for Oral Care Procedure (continued)*

Activities	Intervention	Rationale
Removal of dental plaque	Use a soft toothbrush to brush teeth, tongue and gum to remove dental plaque at least twice daily. Foam swab or gauze are not effective for this task and should not be used	Dental plaque, identified as a source of pathogenic bacteria associated with respiratory infection, require mechanical debridement from tooth, tongue, and gingiva surfaces.
Antiseptic mouth rinse	Use an antiseptic rinse without alcohol to prevent bacterial colonization of the oropharyngeal tract	Mouthwashes with alcohol cause excessive drying of oral tissues. Oral rinse with hydrogen peroxide and chlorhexidine gluconate are effective have been shown to assist in removing oral debris as well as provide antibacterial properties.
Oral and orotracheal suctioning	Suction patients' mouth and oropharynx, either routinely or as indicated by secretion or by patient, using either manual or continue subglottic suctioning. Do not use the same catheter for mouth and trachea suctioning	Reduce aspiration of contaminated secretion into lower airways (lungs).

Note. Adapted from "Oral care is critical care", by Pear, 2007, Virgo Publishing, 11(10).

Oral care practice in intubated patients. Management of oral care in intubated patients includes oral assessment, selection of oral care equipment, solutions, and frequency (Yurdanur & Yagmur, 2016). Oral assessment resembles diagnostic procedures which provide valuable information to nurses for effective and efficient treatment and the possibility of complication. Evidence about oral care in intubated patients is described in Table 5.

Table 5

Matrix Table for Oral Care in Intubated Patients

Citation	Solution		Frequency		Equipment		
	CHX	NSS & oral rinse	Purified water	Minimal 2 times/day	Based on oral assessment	Tooth-brush	Sponge swab
Prendergast et al. (2012)		√		√		√	
Lorente et al. (2012)	√					√	
Yao et al. (2011a)			√	√			√
Liao et al. (2015)	√			√		√	
Ames et al. (2011)	√			√	√	√	√

Note: CHX = Chlorhexidine.

In Table 5, chlorhexidine is the most commonly used solution for oral care. Oral care frequency should be delivered twice per day at minimum. Toothbrush is the most common equipment for oral care.

Equipment. The equipment for oral care must be selected based on benefit, conveniences, harms, and other features, for example, its ability to remove plaque

(Yurdanur & Yagmur, 2016). Toothbrush is the most common equipment for oral care followed by sponge swab. Toothbrush as part of standard oral care is preferred (Ames et al., 2011; Liao, Tsai, & Chou, 2015; Lorente et al., 2012; Prendergast et al., 2012) in the removal of dental plaque in the oral cavity as dental plaque is proven to be effectively removed by mechanical disruption (Needleman et al., 2011; Scannapieco et al., 2009). This is vital because dental plaque can be a reservoir for bacteria (Scannapieco et al., 2009). Based on the result of these studies, the toothbrush is more recommended than sponge swab as a result of its effectiveness in the control of dental plaque which is microbial pooling. The other studies as well provide options for oral care equipment as a shown in Table 6.

Table 6

Oral Care Equipment Commonly Used

Material(s)	Utilization	Function
Toothbrush	Pediatric or soft toothbrush for intensive care patients	Reducing plaque, bacteria, and mucous in all area of mouth
Toothbrush with oral aspiration tools	Brushing and aspiration can be done together	Patency of the airway remove plaque mucous and bacteria, minimizing infection and risk of pneumonia aspiration
Sponge stick	For cleansing and moisturizing oral mucosa	Not efficient to remove plaque. Can be bitten off by patients
Sponge stick with oral aspiration tools	Effective for removing broken mucosal tissue	Completely hygiene of mouth
Tongue depressor	Single use	Can be used for moisturizing and cleansing oral mucosa

Note. Adapted from “A recent view and evidence-based approach to oral care of intensive care patient”, by D. Yurdanur and F. Yagmur, 2016, *International Journal of Caring Sciences*, 9(3), p. 1177. Copyright 2016 by the International Journal of Caring Science

Solution. It is recommended that oral care solutions should not cause mucosal irritation or dry mouth and be able to remove plaque. Solutions for oral care may use chlorhexidine, saline solution, and purified water. Chlorhexidine has been used in clinical setting for oral care. Evidence from the previous study showed that 2% chlorhexidine could reduce VAP incidence (Villar et al., 2016). Other studies showed that even a concentration of 0.12-0.2% chlorhexidine was still effective for prevention of VAP (Ames et al., 2011; Liao et al., 2015; Needleman et al., 2011; Zuckerman, 2016). Therefore, using a small concentration of chlorhexidine for oral care is recommended because less chemical used has already effective for prevention. Normal saline solution (Prendergast et al., 2012) and purified water (Yao et al., 2011) were also used for oral care with significant results to reduce VAP incidence. However, other studies provided several types of solutions used for oral care as presented in Table 7.

Table 7

Solutions for Oral Care in Hospital Patients

Solutions	Advantages	Counter-indication
Normal saline	Powerful, economic, not harmful, ensure healing	-
Hydrogen peroxide	Effective antibacterial, effective cleaning remove dental plaque	Must not be applied over granulation tissue and may cause fungal infection due to destruction of normal flora, making oral mucosa dry and burn, bad taste, painful
Sodium bicarbonate	Provide incision	Cause irritation, bacterial procreation, bad taste, cause burn
Chlorhexidine	Effective wide spectrum anti-microbial, effective anti-plaque	Cause color change on teeth or peeling of oral mucosa, cause bleeding of gingiva, bad taste, cause oral mucosa burning

(Continued)

Table 7. *Solutions for Oral Care in Hospital Patients (continued)*

Solutions	Advantages	Counter-indication
Prepared mouthwash solutions (commercial product)	Easy to get	Must not be used with a solution including glycerin, alcohol, and lemon because may cause irritation superficial burns and dry mucosa.
Water	Can reduce oral dryness, cheap	Tap water may grow pseudomonas
Green tea	Erosion and abrasion on teeth surveys. Reduce pathogenicity of streptococcus and lactobacillus	-

Note. Adapted from “A recent view and evidence-based approach to oral care of intensive care patient”, by D. Yurdanur and F. Yagmur, 2016, *International Journal of Caring Sciences*, 9(3), p. 1177. Copyright 2016 of International Journal of Caring Sciences

Frequency. The frequency for oral care varied between different studies.

Recent study delivered oral care two times per day with the significant result of VAP reduction (Yao et al., 2011). Oral care delivery should be made twice a day according to some studies, while other study proved that oral care delivery three times a day can reduce VAP incidence (Khan et al., 2017). However, some other studies preferred oral care delivery in every six hours (four times) (Liao et al., 2015; Needleman et al., 2011; Villar et al., 2016). To increase the effectiveness of oral care, the frequency should be determined by daily oral assessment (Yurdanur & Yagmur, 2016).

Furthermore, In other studies, oral care was given every 6 hours and the result could reduce VAP incidence (Liao et al., 2015; Needleman et al., 2011; Villar et al., 2016).

From studies related to oral care frequency, oral care delivery twice daily or more is effective to reduce VAP incidence. Oral care twice daily is the minimum to maintain oral health. For VAP prevention, a minimum of four times daily is

recommended. However, oral care frequency should be determined according to the result of oral assessment (Ames et al., 2011).

AACN guideline provide standard oral care guideline for intubated patient with mechanical ventilator. Additional studies also provide information about effective and efficient oral care for intubated patient. The information includes the use of equipment, solution, and frequency of oral care.

Related Tools for Oral Care

Oral care tools are used to measure the effectiveness of oral care. This tool includes oral assessment tool and outcome measure. Oral assessment tools were obtained from various study about oral care in hospital setting. Outcome measure will be used to measure the outcome of oral care guideline implementation in patient and nurses.

Oral assessment tools. Oral assessment and oral care could play a key role in preventing the spread of infection from the mouth to the lower respiratory tract (Blot et al., 2008). Oral assessment tools at the bedside can be used as a reminder for nurses to provide oral care and allow monitoring of oral care effectiveness (Blot et al., 2008). The frequency for oral care should be delivered based on the result of oral assessment (Ames et al., 2011). The assessment can be done every day before performing the oral care procedure to determine the oral care delivery. The recommendation for oral care is minimum 2 times per day for the lowest oral assessment score and maximum every 2 hours for the highest score (Ames et al., 2011). Evidence of oral assessment tools is shown in Table 8.

Table 8*Evidence on Measurement Tools for Oral Assessment*

Citation	Assessment tool
Ames et al. (2011)	Beck Oral Assessment Scale (BOAS) and Mucosal Plaque Score (MPS)
Yildiz et al. (2013)	Oral Assessment Tool (OAT)
Chipps et al. (2014)	Revised the Holistic and Reliable Oral Assessment Tool (R-THROAT)
Relvas, Diz, Seoane, and Tomas. (2013)	Brief Oral Health Status Examination (BOHSE) and Global Oral Health Scale (GOHS)
Ribeiro, Ferreira, Vargas, and Ferreira, (2014)	Revised Oral Assessment Guide (ROAG)
Chalmers et al. (2005); Saensom et al. (2016)	Oral Health Assessment Tool (OHAT)

Six studies used different oral assessment tools. These tools, although different in form, yet resemble high degree of similarity on the assessment of oral cavity. Five tools can be used to assess the oral health status, and thus, to determine the oral care frequency: BOAS, OAT, R-THROAT, BOHSE/GOHS, ROAG, OHAT. The MPS is the tool used to determine oral condition based on mucosal and plaque condition.

Beck Oral Assessment Scale (BOAS). The upgraded BOAS consist 5 areas: lips assessment, gingiva / oral mucosa, saliva, denture, tongue. A high score indicates tissue injury or oral dysfunction. The score of BOAS is between “5” and “20”, interpreted as no dysfunction to severe dysfunction. A score of “6” or more is considered abnormal (Ames et al., 2011). BOAS is divided into 5 categories. The first category is 0-5, which means need at least once a day for oral assessment, and twice

oral care per day. The second is 6-10 which means deliver two times oral assessment each day, do mouth/lips moistening every 4 hours, and give twice per day of oral care. The third is 11-15 which means perform an oral assessment and oral care once in every shift. Toothbrush with an ultra-soft brush is recommended, the lip and mouth should be moistened every two hours. The fourth is 16-20 which means an oral assessment should be performed every 4 hours. Finger wrapped with a soft gauze is recommended if brushing is not possible. In addition, mouth and lips should be moisten every 1-2 hours (Ames et al., 2011).

Oral Assessment Tool (OAT). The OAT is designed to determine the oral assessment frequency and solution in general ICU. It includes questions about lips, moisture, swallowing, lips, palate, tongue condition, mucous membranes, and saliva. It has been verified for use in ICU patients. Its minimum score is “7”, while its maximum score is “21”. A Higher score means worse condition and problematic membranes in the mouth. Good condition with the healthy oral mucous membrane is scored “7”, while good condition with the unhealthy oral mucous membrane is scored 8-14, and poor oral condition with unhealthy oral mucous membranes is scored 15-21. An oral score of “7” indicates an oral care of twice or three times a day, a score of 8-14 needs four or five times a day, and a score of 15-21 needs six times a day or more for oral care (Yildiz et al., 2013). The value of Cronbach alpha coefficient of OAT was .72, applicability has been tested in ICU (Yildiz, 2013).

The Holistic and Reliable Oral Assessment Tool (THROAT). The THROAT has nine areas of assessment: lips, teeth, gingiva/gums, mucosal membrane, tongue, palate, the mouth’s floor, smell, and saliva. Each area is scored between 0 – 3 and

thus the total score is between 0 – 21. A Higher score indicates severity.

Consequently, the scoring is “0” for normal, “1” for mild, “2” for moderate, and “3” for severe in each area of assessment (Chipps et al., 2014).

Brief Oral Health Status Examination (BOHSE) and Global Oral Health Scale (GOHS). The BOHSE evaluates ten categories: lips, pairs of teeth in occlusion, mucosa of the cheek-floor of the mouth-palate, lymph nodes, interdental gums-under prostheses, tongue, saliva, natural teeth, artificial teeth, and oral care. The score for each category ranges from 0 – 2 with “0” being the best condition, and “2” being the worst condition (Relvas et al., 2013).

The GOHS is designed in the grade of 0 – 3 in each area of assessment, with “0” means a healthy mouth and “3” means a very unhealthy mouth. Two categories are assessed in the GOHS: dental and periodontal health. The dental health includes supragingival plaque (using Greene and Vermillon index), caries, and abscess or periapical foci. The periodontal health includes Calculus (using Ramfjord index), gingival inflammation (using Loe and Silness index), periodontal pockets, and tooth mobility (using Ramfjord index). The GOHS is designed for people older than 15 years old and the presence of 24 or more teeth in the oral cavity (Relvas et al., 2013).

Revised Oral Assessment Guide (ROAG). The ROAG assesses eight categories: voice, lips, mucous membrane, tongue, gums, teeth and dentures, saliva, and swallowing. Each category is given a score of 1 – 3 with the score of “1” indicates a normal condition, “2” means minor changes, and “3” for severe alterations. It has been tested for validity and reproducibility in elderly populations

(Ribeiro et al., 2014). The value of Cronbach alpha coefficient of ROAG was .69 (Ribeiro et al, 2012).

Oral Health Assessment Tool (OHAT). The OHAT includes questions about tongue, lips, gums and tissues, saliva, natural teeth, denture, dental pain, and oral cleanliness. Its minimum score is “0”, and maximum score at “2” for each category. A Higher score indicates unhealthy oral condition. The scoring system is sub-divided into 3 categories: 0: Healthy, 1-6: Poor, 7-12: Unhealthy. The first category is “0” meaning the need to perform oral care twice a day. The second category between 1-6: means oral care should be performed every shift/three time a day. The third category 7-12 means performance oral care every four hours (Chalmers et al., 2005). The reliability and validity of OHAT were tested for ICU patients and had high level of reliability with interclass correlation coefficient (ICC) was .94.

Mucosal-Plaque Score (MPS). The oral cavity will be measured using Mucosal-Plaque Score (MPS) (Henriksen et al., 1999) to assess mucosal surface and plaque. Each category ranged 1-4. The MPS values range from “2” to “8”. The sum of mucosal surface and plaque score of 2-4 means good or acceptable status; 5-6 means unacceptable status; and 7-8 means poor status. Weighted Kappa values were 0.79 for mucosa score, 0.8 for plaque score, 0.77 for mucosa plaque score.

Among these tools, OAT, OHAT, ROAG, and MPS have been tested for reliability and validity. The value of Cronbach alpha coefficient of OAT was .72 while ROAG was .69. The ICC value of OHAT .94. The Kappa value of MPS 0.77. According to Yildiz et al. (2013), Cronbach alpha .60-.79 was considered as acceptable. However, the OAT has been tested in general ICU in a private hospital,

using convenient sampling and limited sample only. The ROAG was tested only in elderly patients. Moreover, it has low sensitivity values in several categories (mucosa, saliva, gums, and lips). The R-THROAT has not been tested for validity and reliability. Furthermore, it has been used only in a pilot study in post-stroke patients. OHAT has been used in ICU for intubated patients with mechanical ventilators (Saensom et al., 2016). In addition, OHAT and MPS are easy to understand and easy to teach. Both resemble mouth condition and can be used for oral care practice in ICU patients. Therefore, both OHAT for determining oral care frequency and MPS for determining oral integrity will be used in this study for oral assessment of patients with mechanical ventilators in ICU in Indonesia.

Outcome measures. This study will focus on two outcomes; one from the nurses' side and the other from patients. Outcomes from nurses are nurses' satisfaction, accuracy of oral care practice. Meanwhile, patients will be observed for dental plaque and mucosal condition which reflect oral integrity status.

Tools to measure patients' outcome. Patients' dental plaque and mucosal condition will be monitored every day by nurses using MPS (Ames et al., 2011; Chalmers et al., 2005). A recent study confirmed that patient oral health will likely to worsen in the critical care unit with the increased risk of a decrease in health and quality of life (Sachdev et al., 2013). The decrease in oral health may be seen as increasing dental plaque index (Cruz, Morais, & Trevisani, 2014; Sachdev et al., 2013).

Tools to measure nurses' outcome. Accuracy of oral care practice will be monitored by the researcher after nurse deliver oral care two times, nurses'

satisfaction will be monitored in week 8 by the researcher using a special questionnaire from a study by Banu et al. (2014) modified by the researcher.

Diffusion of Oral Nursing Care Guideline

Diffusion of Innovation Theory

Diffusion innovation theory has been introduced by Everett. M Rogers to guide the diffusion process of innovation. In nursing, this theory has been widely adopted for diffusion of healthcare innovation.

Definition of diffusion of innovation. Diffusion is defined by Rogers (2003) as “a process in which an innovation is communicated through certain channels over time among the members of a social system”. Diffusion is a communication type where the messages are mostly innovative ideas. The adoption rate can be visualized in an a curve with a S-shape with a slow beginning, a period of speed up, a slowing down period before stopped at a saturation point (Yuan et al., 2010).

Diffusion of innovation is a process that occurs when people adopt innovation, either a new philosophy, idea, practice, product, or other new things. There are five adopter categories related to an innovation: innovators, early adopters, early majority, late majority, and laggards. In some cases, there is also an additional category which is called non-adopters. In term of the numbers of people in each category, it is normally distributed and appear like a bell-shaped curve when illustrated in a graph (Kaminski, 2011).

Stages of diffusion of innovations. An innovation needs some time to be adopted by the people. According to Roger’s Diffusion of Innovations Theory, there are five stages of adoptions of an innovation. These stages are knowledge, persuasion, decision, implementation, and confirmation (Bowen et al., 2012). Knowledge or

awareness refers to a stage where a person is exposed to an innovation without knowing much details. The persuasion or interest stage is characterized by an interest of the individual with the innovation and willingness to figure out more information. The third stage is evaluation or decision stage, where a person prepares the mental to apply the innovation. A decision to apply the innovation or not is made in this stage. The next step is trial or implementation stage which is characterized by the use of the innovation by the individual. The last stage is the adoption or confirmation stage, where the individual decides to continue using the innovation (Kaminski, 2011; Rogers, 2003).

Elements of diffusion of innovations. Elements of the diffusion of innovations have been detailed by Rogers (2003) in his theory as innovations, time, communication channels, and social system. The elements are described as follows:

Innovation. Innovation is a practice, idea, or object that is considered as new to individuals or persons (Rogers, 2003). Most times, the innovation is tightly connected with technological innovations and thus technology and innovation may refer to the same thing. In addition, some technologies may not be a recent invention, yet due to the technology have not been diffused well into the society, it may be considered an innovation to the adopters.

Communication channel. Communication is a process by which two or more persons (communicants) share information with each other for a shared interest (Rogers, 2003). Diffusion is a specialized type of communication which includes an innovation. The process involves (1) innovation, (2) participants with knowledge of the innovation, (3) participants lacking information about the innovation, and (4)

communication channel between two units. The communication channel is the mean to pass the message from one individual to another. It may involve mass media or interpersonal channel. Mass media may be used to reach more potential adopters; however, the interpersonal channel is more effective to persuade an individual to accept the new idea and thus become an adopter.

Time. Time is the third element described by Rogers (2003) in this process. Time is a critical part of the process of diffusion. Time influences several processes including (1) innovation-decision process starting from the first knowing to the decision process, (2) individual readiness for innovation compared with another, and (3) the rate of adoption of the innovation, measured by the number of adopters in a certain time.

Social system. Social system is a system where units are interrelated in common problem solving attempts to pursue a common objectives (Rogers, 2003). The social system may be consisted of individuals, organizations, subsystems, or informal groups. Diffusion takes part in the social system and is affected by the structure of the social system. A social structure can be defined as arrangements of the units in the certain position in the system. The social structure may support or impede the diffusion of innovations process. Social norms also have been identified as a factor affecting diffusion. Norms are the established behavior patterns among members of the system. A norm can be an obstacle to a change and may include religious norms, cultural norms, legal norms or other norms. Innovations are mostly come from a deviant or of low credibility status individual in the social system. Therefore, the innovator's role in the diffusion process is very limited. A social

system member in higher rank may play a significant role as opinion leaders in the process. They may introduce the innovation to other individuals in the system.

Factors related to the rate of adoption. Some factors have been identified with the rate of adoption and may affect the diffusion process (Rogers, 2003). The rate of adoption is closely related to the perceived characteristics or attributes of innovations. The first factor is the relative advantage of the innovation, or a degree that an innovation is considered better than the old idea. It is not merely the objective advantages itself, yet more emphasized on the perception of the advantages to the individual. The second factor is compatibility that is the level of perception of being consistent with the old norms, individual experiences, and additional needs of potential adopters. An idea with less compatibility with old values and norms will be adopted slower than the compatible one. The third factor is complexity, that is the level of perception as difficult to use and understand. Complicated innovations will be adopted more slowly compared with simpler ones. The fourth factor is trialability that is the degree that the innovation may be tried by individuals on a limited basis. Innovations that can be shown on a trial will be adopted more easily compared to those that are not divisible. The last factor is observability, that is when the result of an innovation can be clearly seen by others. Innovations that are easy to provide results are more likely to be adopted by an individual (Rogers, 2003).

Adopters categories. Rogers (2003) described the rate of adoption depending on adopter categories. He referred to five different categories with each group having its own personality. Based on the categories there are five types of adopter categories

which include innovators, early adopters, early majority, late majority, and laggards. Individuals are similar in terms of their innovativeness in each adopter category.

Innovators. Innovators are the first individuals to adopt an innovation.

Innovators are willing to take risk and ready to practice a new idea. Innovators are minority in the social system with only 2.5% of the individuals in a system in this category and are the first to adopt an innovation. They are also prepared to cope with the new idea which can be sometimes not profitable and not successful, and with the uncertainty of the innovation. The innovators may not obtain appreciation from other members of the social system for taking the decision related to the innovation, and due to their relationships, that are closer with the outside of the social system.

Early adopters. The next category who first adopting an innovation which account to 13.5 percent of the individuals in a system are called early adopters. Early adopters integrate more closely to a local system than the innovators. Due to that fact, the early adopters have less limitations related to the social system, compared to innovators. Rogers (2003) stated that individuals in this category may serve as role models for the innovation and for other members of the social system due to most of them are holding leadership roles in the social system.

Early majority. Rogers (2003) in his theory mentioned that the early majorities do not have the leadership role as the early adopters possess, although they have a good social interaction with other members in the social system. However, their networks of interpersonal relationship are of important factor in the diffusion of innovation process. Within a social system, the early majority numbers to about 34% of the individuals to adopt an innovation. The early majority individuals start to adopt

innovative ideas right before the average members of the social system. They are carefully adopting an innovation and are neither the first nor the last to adopt it. Their decision to take up the innovation usually takes longer compared to that of innovators and early adopters.

Late majority. The next 34% of the system member adopting an innovation is the late majority. The late majority has a similarity with early majority, who wait until most of the member of social system adopt the innovation. They are quite suspicious about the innovation and its outcomes. However, a clear economic drive and social pressure from their peers may make them adopt the innovation. To reduce the uncertainty of the innovation, late majority may only be persuaded to adopt innovation by their close friends using interpersonal network (Rogers, 2003).

Laggards. The last members of social system to adopt an innovation are laggards which usually account to around 16% of all individual in a system. They do not usually possess any leadership position in the system. Laggards are more suspicious than the late majority about innovations and change agents and are the last individuals adopting an innovation. Their interpersonal relationship networks are mostly consisted of interactions with other members from the same category and are the most localized group of the social system. They also do not have a leadership role in the system. They need to make sure that an innovation works well before they are willing to adopt due to the lack of awareness or knowledge regarding innovations, as well as the limited resources. Laggards are looking to find the successful innovation adoption by other social system members. Those are the reason for the lengthy process of innovation-decision period of the laggards (Rogers, 2003).

Research evidence employing the Diffusion of Innovation Theory. Roger's

Diffusion of Innovation Theory has been used in nursing practices to introduce new innovations. It has been used to introduce delirium screening test in mechanically ventilated patients (Bowen et al., 2012). The study showed that Roger's Diffusion of Innovation Theory was effective for implementation of the Confusion Assessment Method for Intensive Care Unit (CAM-ICU). The study used 5 stages in the innovation - decision process, which were knowledge, persuasion, decision, implementation, and confirmation stage. Training, booklet containing material of the training and two journal articles, and a poster related to CAM-ICU and delirium which was updated every week in the nurse's lounge, were used to increase nursing knowledge. In the persuasion stage, a senior nurse was selected from nurses who have positive opinion about innovation and was appointed to nurse in charge to motivate other nurses. Poster and journal article were used to influence the decision process. In the implementation phase, a CAM-ICU worksheet and a laminated CAM-ICU flowsheet were put in the patient's binder with the nurses' daily paper work. In addition, nurse in charge, nurse manager, and clinical educator supports were used to maintain interest with a display of weekly result on the poster board in nurses lounge. Lastly, in the confirmation stage, a final result of the pilot was presented to nurses along with weekly result to aid nurses on recognizing the benefit of CAM-ICU and the impact on patients' outcome.

Furthermore, there was another study using Roger Diffusion of Innovation theory in the adoption of Peripheral Nerve Block (PNB) for orthopedic ambulatory surgery (Leggott et al., 2016). In that study, the innovation of PNB was successfully

adopted and the quality, safety, and efficiency of the procedure improved. Four elements were used to study PNB adoption to replace general anesthesia, which include time, characteristic of the innovation, communication channel, and social system. Time needed for the adoption is 10 years. The innovation was the adoption of PNB to replace General Anesthesia (GA). Interpersonal communication such as discussion about PNB with lead physician in departmental meeting and regional meeting was used as the communication channel. The social system in the study includes faculty surgeons, faculty anesthesiologists, and residents.

A similar study of evaluation of Braden Scale implementation has also been done in Bangladesh. The result of the study showed that nurses were capable of using Braden Scale to assess pressure ulcer and the Braden Scale could be incorporated into their work protocol (Banu et al., 2014). In the study, four elements of the Diffusion of Innovation Theory were followed in the implementation of Braden Scale in Bangladesh.

Tentative Guideline for Oral Care

Clinical practice guideline is designed to improve the quality of healthcare, to reduce intervention that may be harmful, unnecessary or ineffective, and to facilitate the patient's treatment with maximum benefit, minimum risk, and acceptable cost. However, clinical practice guideline is only effective if it is used in clinical decision making and considered helpful (National Health and Medical Research Council, 2002).

The guideline in this study is derived from guideline from AACN with modification according to local condition and recent studies about oral care in intubated patients. The guideline is composed of six components, which are oral assessment, preparation of equipment and patients, oral care procedure, oral re-assessment, and patient monitoring and care, and documentation. The guideline is presented in Table 9.

Table 9*Oral Nursing Care Guideline for ICU's Intubated Patients in Mechanical Ventilator*

No	Activities
Oral Assessment	
1.	Perform oral assessment using Oral Health Assessment Tool (OHAT) by assessing lips, tongue, gum and tissue, saliva, natural teeth, and oral cleanliness every morning to determine the frequency of daily oral care (level of evidence 1.c)
Preparation	
1.	Prepare oral care equipment (catheter/saline for suction, sterile syringe 5 or 10 ml, towel or tissue, pediatric toothbrush or soft toothbrush, sponge swab) (AACN)
2.	Prepare glove and face mask (AACN)
3.	Pour chlorhexidine 0.12% to cup. If patient has ulcer or sensitive to chlorhexidine, use normal saline 0.9% (level of evidence 1.c)
4.	Hand hygiene, wear glove and face mask (AACN)
5.	Check that endotracheal tube is connected to ventilator with a swivel adapter (AACN)
6.	Connect extension tubing to suction device if not already in place, and adjust suction control to between 80-100 mmHg
7.	Position patients head elevated 30 degrees or higher in semi recumbent position (AACN)
8.	Position patient's chin flexed forward with the patients in side lying position to allow the mouth rinse to drain with gravity to reduce risk of aspiration (AACN)

*Continued***Table 9.** *Oral Nursing Care Guideline for ICU's Intubated Patients in Mechanical*

Ventilator (continued)

No	Activities
9.	Place towel across client's chest or under face and mouth if head is turned to one side
Oral care procedure	
1.	Inject 10 ml of 0.12% chlorhexidine into oral cavity, if patient have ulcer or sensitive to chlorhexidine use normal saline 0.9% (level of evidence 1.c)
2.	Suction the excess solution with pressure 80-100mmHg (level of evidence 1.c)
3.	Begin oral care with pediatric toothbrush or adult (soft) toothbrush. Gently brush patient's teeth to clean and remove plaque from teeth. Suction oropharyngeal secretion after brushing with pressure 80-100 mmHg (AACN)
4.	Clean the surface of the tongue moving in back to front direction (level evidence 1.c)
5.	Clean mucosa surface using sponge swab moistened using chlorhexidine 0.12%, if patient has ulcer use normal saline 0.9% (level of evidence 1c)
6.	Assess for significant gum bleeding and stop brushing if encounter (level of evidence 1.c)
7.	Suction oral cavity/pharynx intermittently with pressure 80-100 mmHg (AACN)
8.	After oral care is completed, change the ETT securing device with tape. The securing mechanism should be change at least once daily and as needed for loose securing device to reduce risk pressure skin injury. (AACN)
9.	Measure and adjust cuff pressure to 20-30 cm of H ₂ O (level of evidence 1.c)

Continued

Table 9. *Oral Nursing Care Guideline for ICU's Intubated Patients in Mechanical Ventilator* (continued)

No	Activities
10.	Reconfirm placement, and note the position of tube at teeth or naris. Common tube placement at the teeth is 21 cm for woman and 23 cm for men. Make note the number in the securing tape (AACN)
Oral re-assessment	
Re-assess patient oral cavity with Mucosal-Plaque Score (MPS) to assess mucosa and plaque condition after oral care	
Patient monitoring and care	
1.	Monitor the amount, type and color of secretion (AACN)
2.	With oral care, assess for buildup of plaque on teeth or potential infection related to oral abscess (AACN)
3.	Assess gum bleeding after oral care
Documentation	
Document oral care include date, time result of oral assessment (OHAT and MPS)	

Summary of Literature Review

The literature review in this study was focused on exploring oral care practice in intubated patients with mechanical ventilator in ICU. Omitting oral care may have consequences, such as VAP, especially in intubated patients who the immune system has been compromised due to the presence intubation. Many factors related to the effectiveness of oral care including patients' condition, nurses' knowledge, nurses' attitude, nurses' practice, and the availability of oral nursing care guideline. The daily oral care should be delivered minimum twice a day and the frequency should be determined based on the result of oral assessment. Chlorhexidine should be used for oral care in intubated patients for VAP prevention. Oral nursing care guideline is needed to improve quality of oral care in intubated patients by guiding the necessary step for nurses. In intubated patients, a specific oral nursing care guideline must be provided due to the presence of intubation which differs from other patients.

The aforementioned measures are the known aspects in oral care for intubated patients. Existing oral nursing care guideline for the intubated patient in other countries may not be fully applicable in the context of Dr. Moewardi hospital due to different facilitators, barriers, and environment. Oral care in Dr. Moewardi hospital has been implemented to all patients without differentiating intubated patients with non-intubated patients. However, intubated patients need a specific oral care due to their condition. Therefore, an oral nursing care guideline would be implemented based on the existing guideline.

CHAPTER 3

METHODOLOGY

This chapter describes the research design, sample and setting, instrumentation, translation of instrument, validity and reliability of the instruments, data collection, ethical consideration, and data analysis.

Research Design

The study used developmental research design. Developmental research is the study of designing, developing, and evaluating systematically of processes, instructional programs, and products that must meet a certain criteria including that of internal consistency and effectiveness (Richey, 1994). The objective of this study was to implement and to test oral nursing care guideline based on the best available evidence in intubated patients with mechanical ventilator admitted in ICU of Dr. Moewardi Hospital. Expected outcomes of this study included outcomes for nurses' and patient point of view. Nurses' outcomes included nurses' satisfaction and accuracy of oral nursing care practice. Patients' outcomes were related to a dental plaque and mucosal condition, which reflects the oral integrity.

Sample and Setting

The target sample for the study was 28 nurses out of 34 nurses working in ICU at Dr. Moewardi hospital, which is the biggest regional referral hospital in the southern part of Central Java, Indonesia. Six nurses were excluded from the study including one nurse as the head nurse, and five nurses who were recruited as research

assistants (RAs). As the nature of this study is about guideline implementation, all remaining 28 nurses were recruited as participants. Nurses in ICU are grouped into six teams, and each team is assessed by a nurse RA, except the cardio team which is assessed together with another team due to small number of patient. Every shift has six nurses in which one nurse is specialized for one cardiac surgery patient, whereas the other four nurses are responsible for three patients and the remainder is responsible for four patients. Therefore, five nurse RA were recruited in this study.

The second target sample were 47 intubated patients admitted in the ICU from February to March 2018, fulfilling inclusion criteria were included in this study. Dr. Moewardi hospital has one general ICU with a total of 17 beds and 17 mechanical ventilators, with mixed patients from surgical and medical cases. Therefore, the underlying diseases of the patients in ICU varies from either surgical cases or medical cases who are considered as life-threatening conditions and required ventilator support. The majority of admitted patients were post-surgery condition. Moreover, almost all patients used mechanical ventilator for 1-3 days.

The inclusion criteria for the patients were:

1. Age 17 years old or more
2. Orally intubated with a mechanical ventilator (conscious and unconscious)

Exclusion criteria were:

1. Edentulous
2. Facial fracture or trauma affecting the oral care cavity
3. Unstable cervical fracture
4. Unstable vital signs

Oral care in ICU at Dr. Moewardi hospital. Oral care in the Dr. Moewardi Hospital had been implemented in the healthcare services. There is a protocol for oral care delivery to all patients and is not specific to intubated patients with mechanical ventilators. There is no oral assessment tool and oral care delivery is inconsistent in frequency and highly vary from one nurse to another. The current technique for oral care is the use of sponge swab with 0.9% NaCl and oral antiseptic solution. In addition, outcomes of the oral care, such as dental plaque and mucosal condition, have not been monitored and the documentation of oral care delivery is not completed.

Measurement

This part discusses the development and preparation of instruments and persons involved in the study.

Instrumentation. Instruments in this study consisted three sections including oral nursing care guideline, Oral Health Assessment Tool (OHAT), and outcome measures.

Oral nursing care guideline. The guideline was developed by the researcher for guiding the delivery of oral nursing care based on the AACN (A.-M. Batiha et al., 2015) and current evidence (Feider et al., 2010; Munro & Grap, 2004; Prendergast, Hagell, & Hallberg, 2011). The guideline consisted of six components, which were: oral assessment, preparation of equipment and patients, oral care procedure, oral re-assessment, patient monitoring and care, and documentation (Appendix A).

Oral Health Assessment Tool (OHAT). This tool is an oral assessment tool to assess oral health status. It was developed by Chalmers et al. (2005). In this study,

OHAT was used to determine the daily frequency of oral care in intubated patients. Oral assessment using OHAT was performed by nurses every morning and was included as part of guideline implementation. The OHAT includes an assessment of the condition of tongue, lips, saliva, gums and tissues, natural teeth, oral cleanliness, denture, and dental pain (Appendix B). Its minimum score was “0”, while its maximum score was “2” for each category. A higher score indicates unhealthy oral condition. The scoring system was divided into 3 categories as: “0” indicating healthy oral condition, “1-6” indicating poor oral condition, and “7-12” indicating unhealthy oral condition (Chalmers et al., 2005). The first category of score “0” indicates that nurses performed oral care twice a day. The second category of 1-6 indicates that nurses performed oral care every shift or three time a day. And the third category ranging between 7-12 indicates that nurses performed oral care every four hours.

Outcome measures. Outcomes in this study consisted of nurses’ outcomes and patients’ outcomes. Nurses’ outcomes consist nurses’ satisfaction and accuracy of oral care practice. The patient outcome constitutes oral integrity.

Data collection in nurses. There were three questionnaires for data collection in nurses: Nurse Demographic Data Questionnaire (Nurse-DDQ), Nurse Satisfaction Questionnaire (NSQ), and Accuracy of Oral Nursing Care Practice Checklist (AONCPC).

Nurse Demographic Data Questionnaire (Nurse-DDQ). This Nurse-DDQ was created by the researcher to obtain background information on the nurses. This self-reported DDQ included parameters such as: age, gender, academic qualification, working experience, duration of service in ICU and formal training. This information

was obtained during the first and the second week of the implementation phase (Appendix C).

Nurse Satisfaction Questionnaire (NSQ). This self-reported questionnaire was used to examine nurses' satisfaction on implementing oral nursing care guideline. The NSQ was modified by the researcher from Banu, Sae-Sia, and Khupantavee (2014). The dimension of determining nurses' satisfaction covered the usefulness of the oral nursing care guideline (question number 1,2,3), confidence in using oral nursing care guideline (question number 4,5,6), being proud to be part of health care team to improve the quality of nursing care (question number 7,8,9), and overall satisfaction (question number 10). It composed of 10 items with 5-point Likert scale. The scoring ranged from 10 to 50. The raw score was transformed into a percentage for easy interpretation. The score "1" indicated no satisfaction at all, while score "5" indicated high satisfaction on using oral nursing care guideline. The highest score indicated the highest level of nurses' satisfaction on using oral nursing care guideline. The NSQ was measured in the eighth week of implementation phase. The NSQ score was transformed into percentage for easy interpretation (Appendix D). The nurses' satisfaction scores were categorized into four level as low, moderate, high, and very high satisfaction (Banu et al., 2014). The range of score at each level are indicated as follows:

Low	: 1% - 25%
Moderate	: 25.01% - 50%
High	: 50.01% - 75%
Very high	: 75.01% - 100%

Accuracy of Oral Nursing Care Practice Checklist (AONCPC). The AONCPC was developed by the researcher to determine the accuracy of nurse practice in adopting/following the oral nursing care guideline. The accuracy was observed by the nurse research assistant (RA) using AONCPC. The measurement was started from the fifth week through the eighth week until all nurse participants were assessed.

The AONCPC had 25 items. Each item had three responses format as correctly practiced oral care, incorrectly practiced oral care, and not practiced. The score of “1” was given to a correctly practice, score of “0” was given to an incorrectly practice and not practiced for each item. The total score of AONCPC was transformed into percentage by dividing the total score of correctly performed practice by total score of 25 and multiply by 100 (Appendix E).

Data collection in the patients. There were two questionnaires for data collection in patients, which were Patient Demographic Data Questionnaire (Patient-DDQ) and Mucosal Plaque Score (MPS).

Patient Demographic Data Questionnaire (Patient-DDQ). This Patient- DDQ was created by the researcher to obtain background information on the patients. Patients-DDQ included parameters such as: age, gender, education background, occupation, religion, diagnosis, and intubation duration. The Patient-DDQ was obtained from medical record in the fifth week through the eighth week of implementation phase (Appendix F).

Mucosal-Plaque Score (MPS). The Mucosal-Plaque Score (MPS) was developed by Henriksen et al. (1999) and was used to assess an oral integrity of the patients. The oral integrity was measured once by two dental nurse research assistants

(RAs) in the fifth week through the eighth week. The MPS assessment was performed after oral care delivery for each patient once between 8.00 am and 4.00 pm. Dental nurse RAs used dental mirror to see the mouth thoroughly. The MPS consisted of two sets of scores that are mucosal score and plaques score. Each set of scores ranged from 1-4. For mucosa, a score of “1” indicates a normal appearance of gingiva and oral mucosa, a score of “2” indicates mild inflammation, a score of “3” indicates moderate inflammation, and a score of “4” indicates severe inflammation. For plaque, a score of “1” indicates no easily visible plaque, a score of “2” indicates small amount of hardly visible plaque, a score of “3” indicates moderate amount of plaque, and a score of “4” indicates abundant amount of confluent plaque. The total MPS score obtained by sum the mucosa and plaque score. The MPS total score range from “2” to “8”. A score of 2-4 indicates a good or acceptable status of oral integrity, a score of 5-6 indicates an unacceptable status of oral integrity, while a score of 7-8 indicates a poor status of oral integrity (Appendix G).

Person. This section consists of the researcher and research assistants

Researcher. The researcher has been trained in Songkhlanagarind hospital, Thailand, under the supervision of an expert in the hospital, who is an APN in surgical critical care. The researcher received training in oral care in intubated patient with mechanical ventilator including oral assessment, preparation of equipment and patients, oral care procedure, oral re-assessment, patient monitoring and care, and documentation. The accuracy of oral care practice of the researcher was assessed and evaluated by APN with 5 patients. The APN observed the researcher in performing oral care. The researcher was found to be able to follow all steps in the guideline

according to the expert's evaluation with 100% of accuracy for those five patients. In addition, the researcher was evaluated on performing oral integrity using MPS in five patients. The result showed that inter-rater reliability using kappa statistic was 1.0 between the researcher and the APN. Therefore, the researcher had been validated as a gold standard person for guiding oral care in intubated patients with a mechanical ventilator in Dr. Moewardi hospital, Indonesia.

Research Assistant (RA). In this study, seven RAs were responsible for data collection. The researcher had no role in data collection. This technique is considered important to reduce the possibility of experimenter bias (Mc Burney & White, 2009). In this study, five nurses research assistants (RAs) who had an experience in caring for intubated patients at least four years were trained to assess the accuracy of oral nursing care practice. These five nurse RAs were recruited from ICU nurses and were excluded from the study. In addition, two dental nurse RAs who were competent in dental plaque and mucosa measurement were invited to assess the oral integrity in intubated patients.

Five nurse RAs were trained on oral nursing care practice by the researcher in three steps. The first step includes discussions about 1) oral care issues in intubated patients with mechanical ventilators, 2) oral assessment, 3) oral nursing care guideline, and 4) assessment of oral integrity. The second step includes an explanation of research procedure by providing study manual. The third step provides demonstration of oral nursing care based on the guideline. In addition, training on assessment of the accuracy of oral care practice using AONCPC was also performed.

Two dental nurse RAs were trained for checking patients' oral integrity by the researcher in three steps. The first step includes discussions about dental plaque and mucosa condition and measurement. The second step explains the research procedure and technique of checking patients' oral integrity based on MPS manual. The third step involves checking oral integrity using MPS Form. Dental nurse RAs checked patients' oral integrity together at the same time. One of them assess the oral integrity, while the other helped holding the flashlight for lighting. They changed role in each patient.

Translation of Instruments

The Oral Nursing Care Guideline, Nurses' Satisfaction Questionnaire, and MPS were originally written in English and were translated into Bahasa Indonesia. The translation was performed using back translation technique (Sperber, Devellis, & Boehlecke, 1994) with the following steps.

In the first step, the original English questionnaires were translated into Bahasa Indonesia language by a lecturer in critical care in Indonesia who was fluent in English and Bahasa Indonesia. The second step involves the back-translation of the Bahasa Indonesia version questionnaire into English version without consulting the original English version by a second professional English translator in Dr. Moewardi Hospital. The last step then compares the original English version and back-translated English version questionnaire by thesis advisor to ensure the equivalency between the two versions (Appendix H).

There was no discrepancy in meaning in the Satisfaction Questionnaire and MPS after being back translated; however, there is one item of Oral Nursing Care Guideline translated by translators that had different meaning. The term “blister on the skin” in item no 9 that identified the tape to secure the endotracheal tube was unclear. Then, after discussions with both the first and the second translator, the term “blister on the skin” was replaced with “pressure related skin injury”. Then, the revised version of oral nursing care guideline has been considered to be more appropriate.

Validity and Reliability of the Questionnaire

The validity and the reliability of the questionnaires were checked as follows.

Validity of questionnaires. The original English version of the Oral Nursing Care Guideline, Nurses’ Satisfaction Questionnaire, and MPS were approved for content validity by five experts, who were as follows: one lecturer from the Faculty of Nursing, Prince of Songkla University whose expertise was in critical care, one dentist lecturer from Faculty of Dentistry, Prince of Songkla University whose expertise was in oral care, one Advanced Practice Nurse (APN) from Songklanagarind Hospital whose expertise was in critical care nursing, one lecturer from Indonesia from Diponegoro University whose expertise was in critical care and one dentist from Dr. Moewardi Hospital whose expertise in oral care (Appendix I). The result of S-CVI for Oral Nursing Care Guideline, NSQ, and MPS were equal to 1.0 respectively therefore, all questionnaires were considered acceptable.

Reliability of questionnaires. The Bahasa Indonesia version of Accuracy of Oral Nursing Care Practice Checklist (AONCPC) and MPS were tested for inter-rater reliability using Cohen Kappa in Dr. Moewardi hospital Indonesia.

Reliability of Accuracy of Oral Nursing Care Practice (AONCPC).

AONCPC was tested for interrater reliability between researcher and five nurse RAs in 10 intubated patients with mechanical ventilators. Each nurse RA was inter-rated in two patients with the researcher to compare the oral nursing care practice based on the guideline. The researcher and each RA assessed two patients and got the agreement values. The obtained agreement values were then averaged. The process was done for each RA until reach 5 interrater with the researcher. The inter-rater reliability yielded a Kappa Value of .96 (Appendix J).

Reliability of MPS. MPS was tested for interrater reliability with two dental nurse RAs in 10 intubated patients with mechanical ventilators. Each dental nurse RA was inter-rated in five patients with the researcher. The researcher and each dental nurse RA assessed 5 patients together and got the agreement values. The obtained agreement values were then averaged. The process was done for each dental nurse RA. Then, from average of agreement yielded interrater reliability of Kappa value of .92 (Appendix K).

Reliability of Nurses' Satisfaction Questionnaire (NSQ). NSQ had been tested for internal consistency using Cronbach Alpha coefficient. Reliability test had been done after data collection was completed due to the fact that oral care guideline for intubated patients had never been used in ICU of Dr. Moewardi hospital. The

reliability of NSQ was tested with 28 nurse participants and yielded Cronbach Alpha coefficient of .93 (Appendix L)

Procedures

Preparation phase. This phase was performed before implementation phase and consists several steps as follows:

1. Obtaining an approval from Social and Behavioral Science, Institutional Review Board, Prince of Songkla University, Thailand before conducting data collection.
2. Asking for permission from the authorities including hospital director, nursing superintendent, head of Intensive Care Unit Department Dr. Moewardi Hospital in Indonesia.
3. Introducing detailed information about the purpose of study, research protocol to the head nurse and nursing staff in ICU.

Implementation phase. This phase comprises activities for promoting participant knowledge and skill through workshop and oral care activities

Promoting participant knowledge and skill. The first step of implementation was delivering a workshop in oral care in intubated patients with a total of 51 attendants. From 28 nurses, 15 nurses attended in the first day of workshop with director of Dr. Moewardi hospital, two nursing superintendent/manager, one head nurse, six infection control nurses, one case manager and two dental nurses (total 30 attendants), while the remaining 13 nurses attended in the second day workshop with five research assistants, two nurses from critical nurses' association, and one head nurse of other critical care (total of 21 attendants).

The workshop in oral care in intubated patients was delivered by a dentist and the researcher. The dentist delivered a lecture on the definition of oral care, its purposes, complication of irregular oral care, the importance of oral care in intubated patients, and techniques in oral care. The researcher, however, delivered a lecture about oral assessment and details of oral nursing care guideline developed by the researcher. In addition, the presentation slides were printed and distributed to the attendants. A handbook of oral care was also distributed to the attendants (Appendix M).

A discussion and demonstration of oral care delivery after presentation were included in the workshop. The discussion session was given at the end of each lecture to allow the attendants to ask questions or to discuss further information related to oral care in participants. In the discussion session, a dental nurse recommended using the dental mirror in assessing patient's oral condition. A demonstration of oral assessment and oral care based on the guideline was performed in intubated patients. The demonstration session was performed in one patient for each day of the workshop. The management was very supportive to the researcher by providing equipment for cuff pressure measurement, which was previously unavailable.

Oral care procedures. After finishing the workshop, in the first week through the fourth week, the nurses practiced delivering oral care based on the guideline under the supervision of the researcher. Nurses were accompanied by the researcher when performing oral care to improve their confidence on doing oral care procedure based on the guideline. The Accuracy of Oral Nursing Care Practice Checklist

(AONCPC) was provided for each oral care delivery to evaluate nurses' practice by RAs. Twenty-six nurses were accompanied by the researcher for a minimum of two oral care deliveries. Only two nurses who delivered oral care were accompanied by the researcher for four oral care deliveries due to less confidence in performing oral care by themselves. Most nurses felt not confidence when performing oral care by themselves for the first time. The researcher provided step by step explanation and discussion while accompanying nurses performing the procedure. Each step was explained in detail until all nurses understand and confident in performing oral care by themselves.

Patients were given oral care based on the guideline on the first day of intubation provided the patient's conditions were stable. Oral care frequency was determined using OHAT and the oral care was delivered until extubation. The oral care frequency was ranged from minimum of two times and maximum of three times a day for all 47 patients according to the result of OHAT. Most of the patients used endotracheal tube between 1 and 3 days. Every day, nurses performed oral nursing care based on the guideline.

Data collection phase. Demographics and characteristics data of the ICU nurses were collected by self-reported on the first week through the second week of the implementation phase. The demographics and characteristics of patients' data were collected from medical record in the fifth week through the eighth week. Furthermore, the self-reported Nurses Satisfaction Questionnaire (NSQ) to the oral nursing care guideline was examined in eighth week among 28 nurse participants. In addition, five nurse RAs observed the oral care practice of all 28 nurse participants

using AONCPC during the fifth week through to the eighth week. Moreover, each patient's oral integrity was assessed once after receiving oral care using MPS by dental nurse RAs in the fifth week through the eighth week. The assessment was done during dental nurse RAs working hours in a conveniently picked time between 09.00 am and 16.30 pm, while the nurses' shift in ICU were 07.00 am to 14.00 pm for the morning shift, and 14.00 pm to 21.00 pm for the afternoon shift. Therefore, each patient's oral integrity was assessed by dental nurse RAs in various time after receiving oral care from ICU nurses. Dental nurse observed patients' mouth using dental mirror and compared the mucosa and plaque against the MPS criteria.

The researcher maintained a list of nurse participants who had been assessed for accuracy of oral nursing care practice by nurse RAs. The list is communicated daily between the researcher and all nurse RAs. Therefore, all nurse RAs know which nurse participants to assess. In addition, a different list of patient participants was also maintained to know which patient participants had been assessed for oral integrity by dental nurse RAs. The researcher and dental nurse RAs updated and synchronized the list every day. Therefore, dental nurse RAs know which patient participants to assess.

Ethical Considerations

This study was conducted based on the ethical consideration in nursing research. Ethical approval was obtained prior to the study from the Social and Behavioral Science, Institutional Review Board, Prince of Songkla University, Thailand (Appendix N). Permission to conduct the study was also obtained from the Director of Dr. Moewardi Hospital (Appendix P). As discussed previously, there were

both nurses and patients participated in this study, therefore the ethical issues were considered in both perspectives.

Participation in this study was voluntary. Nurses in ICU were provided with a plain language statement, which explained the study and invite participation in the research. There were 28 nurses agreed to participate in this study, and they were at any time unimpeded to withdraw from this study without any effect on their work or their relationship with the researcher. Written informed consent was obtained from the nurses before conducting the study (Appendix Q).

For the patients, nurse participants were requested to introduce the researcher to potential patient participants. The researcher then contacted targeted participants and ensured their willingness to participate in this study. Participants who agreed to be involved in this study received explanation about the details this study including procedures of the intervention, and the benefits of the study. Patient participants were also informed about their right to withdraw from this study at any time, and that the withdrawal will not influence the care or medical treatment. However, regarding the intubated patients with mechanical ventilator who lacked ability to sign the consent form, the inform consent was signed by patients' family, using the inform consent document provided by the Dr. Moewardi Hospital.

To ensure the anonymity and confidentiality, participants' names were removed and replaced with a coded unique identifier during data analysis. All information obtained in connection with this study was kept confidential. All paper-based information was securely stored in a separate cupboard which was locked during data collection and data analyzation and will be destroyed after the research

finished. Data in electronic form were kept on password protected computer accessible only to the researchers. Data will be deleted five years after completion of research similar with existing guide (IRB-SBS University of Virginia, 2012).

There was a minimum risk of participation for participants in this study. There may be risk for the patient if nurses do oral care not correctly including aspiration and accidental extubation. Therefore, to anticipate risks, it was highly recommended to follow the guideline strictly.

Data Analysis

After the data collection was finished, the data were recorded in a statistical software and checked for errors and validated before starting data analysis. The data was analyzed using descriptive statistics. Demographic data and nurses' satisfaction data were analyzed against percentage, mean, frequency, minimum-maximum and standard deviation. The accuracy of oral care practice was analyzed using percentages. The patients' oral integrity was also analyzed using percentage. The skewness and kurtosis value was used to test the assumption of normality. The nurses' satisfaction and accuracy of oral nursing care practice were of normal distribution while patient's oral integrity was not normally distributed (Appendix R).

CHAPTER 4

RESULTS AND DISCUSSIONS

This chapter presents and discusses the findings of the study. The results of this study and discussions are presented as follows:

1. Nurses' demographic characteristics
2. Patients' demographic characteristic and clinical relevant data
3. Nurses' satisfaction on the implementation of oral nursing care guideline
4. Accuracy of oral nursing care practice
5. Patients' oral integrity conditions

Results

Nurses' Demographic Characteristics

The demographic characteristics of nurse participants were presented in Table 10. The mean age of participants was 32.75 years old ($SD = 5.60$) with a minimum and maximum age of 23 years old and 44 years old, respectively. Nine nurses (32.1%) were male and 19 nurses (67.9%) were female, 17 nurses (60.7%) had an associate degree in nursing, three nurses (10.7%) had bachelor's degree nursing, and eight nurses (28.6%) had bachelor's degree and professional degree. In Indonesia, a nurse must complete a one-year professional degree in clinic after graduated from bachelor's degree to enable him/her to obtain practice license. The average of work experience before becoming an ICU nurse was 3.79 years ($SD = 4.31$). The duration of service as ICU nurse ranged from 4 months to 214 months (17 years and 10 months) with a mean of 61.46 months ($SD = 50.01$). All nurses had never before received formal training in oral care in intubated patients.

Table 10*Nurse Participants Demographic Characteristics (N=28)*

Variables	<i>n</i>	<i>(%)</i>
Age (years) (<i>M</i> = 32.75, <i>SD</i> = 5.60, Min – Max = 23-44)		
Gender		
Male	9	(32.1)
Female	19	(67.9)
Academic qualification		
Associate degree /diploma in nursing	17	(60.7)
Bachelor of nursing	3	(10.7)
Bachelor of nursing with professional degree	8	(28.6)
Working experience before becoming a nurse at the ICU		
Less than 1 year	8	(28.6)
1-5 years	14	(50.0)
6-10 years	3	(10.7)
10-15 years	3	(10.7)
Duration of service as a nurse at current location		
Less than 1 year	3	(10.7)
1-5 years	12	(42.8)
6-10 years	8	(28.6)
10-15 years	5	(17.9)
Receiving formal training workshop or short course on oral care and oral assessment		
Yes	0	(0.0)
No	28	(100.0)

Patients' Demographic and Clinical Relevant Characteristic Characteristics

The characteristics of 47 patients are presented in Table 11. The age ranged from 17 to 89 years old with a mean age of 48.43 years old ($SD = 16.11$). Twenty-one patients (44.7%) were male and 26 patients (55.3%) were female. Approximately half of them ($n = 24$, 51.1%) attended senior high school. Most of them were married ($n = 42$, 89.4%). The religion of patients was mostly Islam ($n = 44$ patients, 93.6%). The majority of patients ($n = 42$, 89.4%) were post-surgery with abdominal laparotomy as the most surgery procedure undertaken ($n = 15$, 31.9%). Moreover, almost all of patients ($n = 40$, 85%) used mechanical ventilator for 1-3 days, with median of 2 days ($SD = 1.61$).

Table 11

Patients Demographic Characteristics and Clinical Relevant Characteristics (N=47)

Variable	<i>n</i>	(%)
Age (years) ($M = 48.43$, $SD = 16.11$, Min-Max=17-89)		
Gender		
Male	21	(44.7)
Female	26	(55.3)
Education Level		
No schooling	1	(2.1)
Elementary school graduate	11	(23.4)
Junior high school graduate	4	(8.5)
Senior high school graduate	24	(51.1)
Diploma degree	1	(2.1)
College/bachelor's degree	6	(12.8)

(continued)

Table 11. *Patients Demographic Characteristics and Clinical Relevant Characteristics (N=47) (continued)*

Variable	<i>n</i>	(%)
Occupation		
Entrepreneur	16	(34.6)
Housewife	14	(29.8)
Labour	5	(10.6)
Retired	5	(10.6)
Student	3	(6.4)
Teacher	2	(4.3)
Public service	1	(2.1)
Religion		
Islam	44	(93.6)
Christian	3	(6.4)
Medical diagnoses		
Brain injury	2	(4.3)
Chronic Kidney Diseases	1	(2.1)
Eclampsia post forceps	1	(2.1)
Hypertension, piquant syndrome	1	(2.1)
Laparotomy	15	(31.9)
Craniotomy	10	(21.3)
Hysterectomy	2	(4.3)
Open Reduction Internal Fixation (ORIF)	2	(4.3)
Other surgery	6	(12.6)
Post debridement	2	(4.3)
Laminectomy	2	(4.3)
Post VP shunt	3	(6.4)

(continued)

Table 11. *Patients Demographic Characteristics and Clinical Relevant Characteristi (N=47) (continued)*

Variable	<i>n</i>	(%)
Duration of intubation (days) (<i>Mdn</i> = 2 days, <i>SD</i> = 1.61)		
1-3	40	(85.2)
4-5	5	(10.6)
>5	2	(4.2)

Nurses' Satisfaction on Implementing Oral Nursing Care Guideline

The total score of nurses' satisfaction of using oral care guideline in intubated patients with mechanical ventilators ranged from 80%-100%. The total level of nurse satisfaction from 10 items was found to be at a very high level ($M = 92.54$, $SD = 7.58$), and no item was at low or moderate level. The complete data is available in Table 12.

Table 12

The Mean and SD of Nurses' Satisfaction per Dimension in Implementing Oral Nursing Care Guideline (N=28)

Dimensions	<i>M</i>	<i>SD</i>	Level
Usefulness of the oral nursing care guideline	92.86	8.10	Very high
Confidence using oral nursing care guideline	91.90	9.49	Very high
Being proud to be part of health care team to improve the quality of nursing care	92.86	8.30	Very high
Overall satisfaction	93.57	9.51	Very high
Total	92.54	7.58	Very high

Accuracy of Oral Nursing Care Practice in ICU

There were six dimensions of oral nursing care practice according to oral nursing care guideline which include: oral assessment, preparation of equipment and patient, procedure, oral re-assessment, monitoring and care, and documentation. The accuracy of oral nursing care practice was assessed in the fifth week through the eighth week. The overall accuracy from the six dimensions showed that 50% of nurses ($n = 14$) had 100% accuracy of practice, 8 nurses (28.6%) had 96% accuracy of practice, 4 nurses (14.3%) had 92% accuracy of practice, and two nurses (7.1%) had 88% accuracy of practice. The mean accuracy of practice was 96.86% ($SD = 3.82$). The complete information is presented in Table 13.

Table 13

Frequency and Percentage of Overall Accuracy of Oral Care Practice Based on the Guideline (N=28)

Percentage of accuracy of practice	n (%)	Number of incorrect step	Incorrect steps
100	14 (50.0)	0	-
96	8 (28.6)	1	Place towel across client's chest or under face and mouth if head is turned to one side, ($n=5$) Perform oral assessment using Oral Health Assessment Tool (OHAT), ($n=2$) After oral care is completed, change the ETT securing device with tape, ($n=1$)

(continued)

Table 13. *Frequency and Percentage of Overall Accuracy of Oral Care Practice*

Based on the Guideline (N=28) (continued)

Percentage of accuracy of practice	n (%)	Number of incorrect step	Incorrect steps
92	4 (14.3)	2	<p>Perform oral assessment using Oral Health Assessment Tool (OHAT), (n=2)</p> <p>Place towel across client's chest or under face and mouth if head is turned to one side, (n=2)</p> <p>Position patients head elevated 30 degrees or higher in semi recumbent position, (n=1)</p> <p>Clean the surface of the tongue moving in back to front direction, (n=1)</p> <p>Reconfirm placement of tube at teeth, (n= 2)</p>
88	2 (7.1)	3	<p>Hand hygiene, wear glove and face mask (n=1)</p> <p>Prepare glove and face mask (n=1)</p> <p>Clean mucosa surface using sponge swab moistened using chlorhexidine 0.12% (n=1)</p> <p>Suction the excess solution with pressure 80-100mmHg (n=1)</p> <p>Place towel across client's chest or under face and mouth if head is turned to one side (n=1)</p> <p>Document oral care include date, time result of oral assessment (OHAT and MPS) (n=1)</p>

In addition, the result of each dimension showed that all nurses could perform re-assessment as well as monitoring and care with 100% accuracy (n = 48), while preparation of equipment and patient had the lowest score with 64.3% (n = 18). The data is available in Table 14.

Table 14

Frequency and Percentage of Nurse Participants Correctly Performing Oral Care Using Oral Nursing Care Guideline Categorize by Each Dimension (N=28)

Percentage of accuracy of practice categorized by each dimension	<i>n</i>	(%)
Oral Assessment	25	(89.3)
Preparation	18	(64.3)
Procedure	23	(82.1)
Re assessment	28	(100)
Monitor and care	28	(100)
Documentation	27	(96.4)

Patients' Oral Integrity

For the patients' oral integrity condition, the result of the study showed that most patients ($n = 46, 97.87\%$) had MPS score in an acceptable status, while one patient (2.13%) had MPS score in unacceptable status, and no patient had poor status. The data is available in Table 15.

Table 15

Percentage of Patients' Oral Integrity Identified by MPS (N=47)

Oral integrity status	<i>n</i>	(%)
Good / acceptable	46	(97.47)
Unacceptable	1	(2.13)
Poor	0	(0.00)

The result of MPS showed that patients' oral integrity condition after receiving oral care was good. This result was confirmed by OHAT, which assesses

patients oral condition to determine frequency of daily oral care, it can also be used to review oral condition. The result of OHAT showed an improvement of oral health condition day by day during intubation period. The result of OHAT score corresponded to that of MPS.

The result of OHAT in first day intubation period showed that oral health condition of patients ($n = 35, 74.47\%$) was mostly in poor condition with OHAT score of 1-6. For 42 patients, the result of assessment in second day showed that oral health condition of patients ($n = 30, 71.4\%$) was mostly in healthy condition with OHAT score of 0. The result of assessment on the third day in 16 patients showed that oral health condition of patients ($n = 14, 87.5\%$) was mostly in healthy condition with OHAT score of 0. The number of patients in the first day, the second day, and the third day is different due to extubation. The detail information was provided in Table 16.

Table 16

Frequency and Percentage of Oral Health Condition of Patients from Daily Assessment

Condition	Day 1		Day 2		Day 3	
	<i>n</i>	(%)	<i>n</i>	(%)	<i>n</i>	(%)
Healthy	12	(25.5)	30	(71.4)	14	(87.5)
Poor	35	(74.5)	12	(28.6)	2	(12.5)
Unhealthy	0	(0.0)	0	(0.0)	0	(0.0)
Total	47		42		16	

In addition, 85.1% of patients received oral care between two and eight times during the intubation period. The other 10.6% received oral care from 9 to 13 times,

and the remaining 4.3% received 18 to 20 times during the intubation period. The data is provided in Table 17.

Table 17

Frequency and Percentage of Total Oral Care Received by Patients During Intubation Period (N=47)

Duration of intubation (days)	Number of patients <i>n</i> (%)	Frequency of oral care received during intubation
1-3	40 (85.1)	2-8
4-5	5 (10.6)	9-13
>5	2 (4.3)	18-20

Discussion

Results of this study showed that the accuracy of practice of oral nursing care guideline implementation was between 88% and 100% and nurses had very high satisfaction level on implementing oral nursing care guideline. Moreover, the patient outcome showed that 97.87% of patients had an acceptable oral integrity. The following sections discuss the rationales for each finding.

Accuracy of Oral Nursing Care Practice

The result showed that 50% of nurse participants showed 100% of an accuracy of oral nursing care practice. This result may be caused by several factors.

The attributes of the innovation itself may contribute to the adoption process. This is similar to that stated by Rogers (2003), which mentioned the perceived attributes of innovation, such as compatibility, relative advantages, observability, trialability, and complexity would determine its rate of adoption. Firstly, the innovation itself is probably low complexity and simple enough for easy understanding. The oral nursing care guideline used in this study contains only six basic elements including oral assessment, preparation, oral care, patient monitoring, oral re-assessment, and documentation. Moreover, the oral nursing care guideline has a high trialability and could be easily deployed by nurse participants. Procedures involved in the guideline do not require complex procedures or equipment. Therefore, nurse participants could perform the steps in the oral nursing care guideline easily. Furthermore, the oral nursing care guideline

contains elements of regular oral care procedures; therefore, increases the familiarity and thus, compatibility of the innovation to nurse participants. Among steps in the oral nursing care guideline, oral assessment and re-assessment are of new procedures introduced to nurses, while other procedures are familiar procedures to nurses. Many of these procedures are incorporated into healthcare services as standardized procedures, yet the inclusion of the oral nursing care guideline as an integrated component is a new concept. In addition, the oral nursing care guideline is based on up to date evidence-based practice guideline (A.-M. Batiha et al., 2015). There were many studies that recommended the use of AACN guideline in a clinical practice (Bashayreh, Saifan, Batiha, & Abu Ruz, 2013; A.-M. M. Batiha, Bashaireh, AlBashtawy, & Shennaq, 2012; Feider et al., 2010). These recommendations served as a strong relative advantage of the oral nursing care guideline for nurse participants to implement.

Secondly, the communication channel used in this study might also play an important role in the success of implementation. The five steps of diffused innovation including knowledge, persuasion, decision, implementation, and confirmation are incorporated into the communication channel. For example, mass media in this study includes workshop, booklet, powerpoint, and demonstration, while interpersonal communication includes private coaching and consultative sessions. The workshop provides an early introduction to the innovation to nurse participants. Demonstration is an effective way to show nurses how to use the guideline properly. Booklet is also used as reminders for materials in the workshop. Private coaching and consultative sessions are strategy used to increases nurse participants confidence in performing oral care based on

the guideline. Private coaching and consultation were believed as the most powerful and effective approach for communication (Rogers, 2003).

Thirdly, the time dimension used in this study is believed to be appropriate for the successful implementation of the oral nursing care guideline. This is similar to recent studies (Banu et al., 2014; Bowen et al., 2012) that used the time of two months for implementation of innovations in a limited single healthcare setting with a successful result. Two months was considered enough for the adoption of a specific innovation in a small-scale environment. The ICU in Dr. Moewardi Hospital can be considered as a small-scale environment, while the oral nursing care guideline can be considered as a simple innovation. Therefore, this study also used two months for oral nursing care guideline implementation.

In addition, the persuasion from the head nurse, senior nurses, and researcher during the workshop and implementation phase also promote a positive attitude towards oral care in intubated patients. Senior nurses in each shift were encouraged to motivate and inspire other nurses to follow the oral care guideline in their shift. This method had also been used in a recent study (Bowen et al., 2012) and has had good results. Support from a head nurse every day also strengthens motivation for nurses. Then, a positive attitude would help nurse participants to make decisions to implement oral care nursing practice guideline into their daily nursing care. Moreover, feedback and discussion of nurse participants with the researcher after delivery oral care would increase clear understanding of the correct or incorrect practice for their oral care practice and also promote self-confidence to do oral care in intubated patients.

However, the result showed that 42.9% of nurse participants had 90-99% accuracy of oral care practice. The main obstacle for most nurse participants was in preparation part, specifically in the step of putting tissue/towel across patient's chest during oral care. This is because some nurses were not accustomed to using towel/tissue in any healthcare procedure. It can be easily understood that when a nurse was not used to supply tissue or towel in their regular services, they tend to skip this step in the oral nursing care guideline. The remaining 7.1% ($n=12$) of nurse participants had an accuracy of 80-89%. This result is due to the fact that this oral care innovation is first implemented in the ICU, then, some nurses still forgot some steps of performing oral care as reported in table 13. Although previous studies (Ibrahim et al., 2015) showed that working experience and educational background were related to nursing care practice, this claim is not found in this current study. The result showed that several junior nurses ($n = 14, 50%$) who had working experience less than 5 years had a high accuracy of practice as compared to senior nurses ($n = 14, 50%$) who had working experience of five years or more. Moreover, the educational level also did not relate to the accuracy of practice.

Nurses' Satisfaction on Implementing Oral Nursing Care Guideline

The result showed that nurses had a very high satisfaction level towards the implementation of oral nursing care guideline. The high level of satisfaction is believed to be related to several factors including successful training and workshop where nurses can learn how to use the guideline properly; high level of teamwork, mentoring, and

supervision; as well as innovation based on a current evidence; and that detailed steps were provided to participants.

An effective workshop and training would enable nurses to follow the guideline properly and thus, increase their confidence and consequently, increased their satisfaction. In this study, training and workshop are delivered by experts and include lectures, presentations, discussions, demonstrations, and accompanies with booklet and printed presentation slides. These methods are similar to that of a recent study (Banu et al., 2014). which used workshop by the expert in the field for implementation of Braden Scale, and yielded a success. Workshop and training in this study were provided by experts in oral care. The knowledge in oral care thus could be provided in theoretical as well as practical application. In addition, discussion session arranged in the workshop provided the opportunity to clarify the concept received by nurses during training with experts. The demonstration session provided a practical experience to nurses to the know-how of oral care practice in intubated patients. Furthermore, by printing and distributing presentation slides and booklet to nurses, the knowledge, and experience during training and workshop could be easily recalled.

Secondly, nurses' satisfaction could also be caused by the social interaction in the ICU via teamwork, mentoring, and supervision approaches. This is similar to the result of a recent study (Gray, Wilde, & Shutes, 2018), which found that nurses were satisfied with teamwork, continuing professional education, and autonomy. Within an ICU setting, nurses worked with intubated patients in a team. Team members give positive comments on the oral care delivery based on the guideline, and their positive comments are strong

motivation and thus, increases their satisfaction. In addition, monitoring by shift leader who always reminds their colleagues to perform oral care based on the guideline also probably plays a role in improving satisfaction. The head nurse also has a key responsibility in monitoring and supervising nurses' practice including oral care practice.

Next, the techniques of oral care procedure may also contribute to nurse's satisfaction. Nurses were satisfied because the guideline is based on current evidence and its steps of implementation are provided in detail. It is similar to findings of a recent study (Songwathana, Promlek, & Naka, 2011) that mentioned about when innovations were based on current evidence, had detailed steps to follow, and were accessible through media (e.g. booklet) were believed to contribute to nurses' satisfaction.

Moreover, patients expressed a sensation of clean and fresh mouth after oral care would help nurses increase their satisfaction with oral care. Patients who have received oral care often requests for oral care on a regular basis. Patients' positive comments and responses after extubation probably played a significant role in nurses' satisfaction as well. In addition, the results showed that it was an effective procedure to keep the mouth of patients clean and reduce bad breath. Nurses observed that after delivering oral care based on the oral nursing care guideline, the patient's oral integrity was improved. Nurses were satisfied when their work showed observable results.

Patients' Oral Integrity

The result of the study showed that oral integrity of patients receiving oral care based on the guideline was very good, with 97.87% of patients showed an acceptable

status. This result might be attributed to continuous oral care and monitoring following the frequency determined by oral assessment as recommended in the guideline. This is similar to a study by Ames et al. (2011) who used oral assessment to determine the frequency of oral care delivery, and the result showed that the oral assessment scores were improved after oral care delivery. A continuous oral care ensured that oral condition of patients could be maintained. In this study, oral care was delivered according to the result of oral assessment using OHAT. During the study, all patients received oral care for a minimum of two times a day. This result confirms the previous study that recommended oral care two times a day as a minimum (Ames et al., 2011; Prendergast et al., 2011).

In this study, chlorhexidine 0.12% was used as oral care solution with a toothbrush as equipment. The combination of chlorhexidine and toothbrush was effective to remove dental plaque as shown by the result of oral re-assessment after oral care delivery. This result was in accordance with a recent study (Khan et al., 2017; Needleman et al., 2011), which mentioned that chlorhexidine gluconate rinsing with toothbrushing was effective to eliminate the bacteria colonization in dental plaque and to prevent and treat gingivitis. The plaque score of all patients was in acceptable status. In addition, the mucosa score of patients was mostly in acceptable status with 46 (97.87%) patients.

CHAPTER 5

CONCLUSION AND RECOMMENDATION

This chapter presents the conclusion of the study based on the research finding. The strength and limitation of the study will also be addressed. Furthermore, implication and recommendation for nursing practice will be offered.

Conclusion

This developmental research was designed to implement and test the effectiveness of oral nursing care guideline for intubated patients with mechanical ventilators in an ICU in Indonesia. The study was conducted in ICU Dr. Moewardi hospital Surakarta, Central Java, Indonesia from January to March 2018. Twenty-eight ICU nurses and 47 patients who met inclusion criteria were recruited. All nurses were recruited to implement oral nursing care guideline and tested for accuracy of oral nursing care practice as well as measured on their satisfaction level in implementing oral nursing care guideline. Patients were recruited and assessed for their oral integrity after receiving oral care based on the guideline.

The Roger's Diffusion of Innovation Theory and oral care related literature were used in the implementation of oral nursing care guideline which was a new thing in Dr. Moewardi hospital. Four elements of the theory were adopted to guide the implementation of oral nursing care guideline, which includes innovation,

communication channel, time, and social system. During implementation, strategies to provide knowledge, persuasion, decision, implementation, and confirmation were employed to implement the oral nursing care guideline. The workshop was organized to provide the knowledge related to oral care, oral assessment, oral care procedure. All nurses were requested to deliver oral care following the oral nursing care guideline under supervision for one month. In the second month, the nurses were requested to deliver oral care in intubated patients without supervision. Accuracy of practice and nurses' satisfaction were two indicators observed in nurses, while oral integrity was the outcome measured in patients after receiving oral care based on the guideline. Before data collection, the patients' demographic data were obtained. The instrument to measure the Accuracy of Oral Nursing Care Practice Checklist (AONCPC), Nurses' Satisfaction Questionnaire (NSQ) and Mucosa Plaques Score (MPS) were validated by five experts. AONCPC and MPS were tested for reliability using interrater and gained a score of .96 and .92, while NSQ was tested using internal reliability and had a score of .93. The data was analyzed using descriptive statistic.

The result of the study showed that nurses' satisfaction on the implementation of the oral nursing care guideline was at very high level ($M = 92.54\%$, $SD = 7.58$). Moreover, the accuracy of oral nursing care practice was high in terms of accuracy ($M = 96.86\%$, $SD = 3.82$). Furthermore, regarding the patients' outcome, the oral integrity of 46 patients (97.87%) was found to be acceptable.

Strength and Limitation

This study has several strengths. Firstly, this is the first study to implement oral nursing care guideline in Dr. Moewardi hospital as a model for other hospitals in Indonesia. Therefore, this guideline could be used in other hospitals. Being an educational hospital, recent advances in Dr. Moewardi hospital might be observable by nursing students and universities involved. Students may initiate a similar implementation effort in their respective hospitals after finishing their study.

Secondly, the oral nursing care guideline as the innovation was easy to use, not complicated, and cost-effective. The guideline has detailed steps, so nurses could easily follow. The guideline did not include complicated procedure, and therefore, could be incorporated into nurses' daily activities. Moreover, the guideline did not require a lot of time in the procedure, thus; did not spend much time and increase workload significantly. The guideline also used available equipment without the requirement to purchase a lot of expensive tools.

Thirdly, the AONCPC, NSQ, and MPS were translated into Bahasa Indonesia. This fact makes the tools compatible with daily nursing practice and thus, are suitable for practice in Indonesia. The tools have been validated and tested for reliability and resulted in high validity and high reliability. Therefore, the tools are acceptable for the application.

Lastly, the data were collected by research assistants (RAs) without interference from the researcher. Data collection by research assistants provides a control mechanism

to enhance internal validity. Therefore, a threat to internal validity can be controlled to a minimum extent.

In spite of the strength, this study still has some limitation. The first limitation was the conduction of the study only in one ICU in a hospital in Indonesia, thus limiting the generalization of the findings to other countries. Since the implementation program is according to Roger's Diffusion of Innovation Theory which is heavily reliant on the innovation, communication channel, social system, and time, the applicability of the oral nursing care implementation could as well constitute a limitation to hospitals where the social system and the communication channel are not similar with that of Dr. Moewardi Hospital. The second limitation can be attributed to the dental nurse RAs who only assess patient's oral integrity once for each patient. Dental nurses should assess patient's oral integrity every time after patients received oral care to every patient. Therefore, all patients will be assessed at the same time between one patient and another to increase the internal validity of the patient outcome.

Implication and Recommendation

This study provides evidence of the effectiveness of oral nursing care guideline implementation in intubated patients. Based on the result of the study, the implementation process was successful and effective to diffuse oral nursing care guideline in ICU of Dr. Moewardi Hospital and it may contribute to nursing practice, nursing research, and nursing education.

Nursing practice. The oral nursing care guideline was found to be effective to increase patient's oral integrity condition. Therefore, it is recommended that hospital management ratify the oral nursing care guideline as standard procedure in the hospital. Furthermore, it is highly recommended that nurses should perform an oral assessment before doing oral care and deliver oral care based on the result of the assessment, with a minimum of two times a day.

Nursing research. Results of this study can be used as information for future study associated with clinical guideline implementation. Further research incorporating this study in a wider setting, such as in multiple hospitals, is necessary to increase the generalizability of the results. In addition, VAP outcome measurement should be recommended for future research.

Nursing education. This study incorporates a significant component in a nursing education, particularly in educating nurses of recent advancements and innovations in nursing and healthcare services. Roger's Diffusion of Innovation Theory may be followed by hospital management in implementing healthcare innovations in the hospital. For example, workshop, and private coaching could be arranged when introducing new technologies/innovations in the hospital.

Nursing policy. Hospital management should provide policy to implement oral nursing care guideline in intubated patients in ICU.

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APPENDICES

APPENDIX A

**ORAL NURSING CARE GUIDELINE FOR INTUBATED PATIENT IN
MECHANICAL VENTILATOR**

Pre-amble:

Effective oral care interventions especially in intubated patient with mechanical ventilator ensure good oral health and facilitate the ability to eat and communicate, along with contributing to the prevention of systemic diseases and improve quality of life.

Good oral care prevents drying of the oral mucosa which assist the reduction of mucosal breakdown and aids the removal of dental plaque from teeth to reduce risk of ventilator associated pneumonia (VAP).

Guideline

This guideline does not replace the need for the application of clinical judgment in respect to each individual patient. Maintaining oral health is an essential aspect of patient care. Good oral care can reduce the risk of infection and improve quality of life. The practice of good oral care (removing dental plaque and traces of food), is crucial factor in maintaining the health of the mouth, teeth, and gums. Mucous membranes dry quickly in the patient breathing through their mouth or receiving oxygen therapy.

Oral care is performed to:

- Achieve and maintain oral cleanliness

- Maintain oral structures in good order
- Keep the oral mucosa, teeth and lips moist, clean and intact
- Promote patient's comfort
- Remove dental debris, food plaque and plaque
- Prevent infection/stomatitis, gingivitis, and periodontal diseases
- Prevent aspiration pneumonia

Perform mouth care at least twice a day, obtaining consent as able:

- Do oral assessment using Oral Health Assessment Tool every morning to determine the frequency of daily oral care
- Perform oral assessment before and after oral using Mucosa Plaque Score (MPS) tool

Preparation

The preparation includes equipment preparation, staff preparation and equipment preparation.

a. Staff preparation:

It is mandatory for staff to follow relevant; five moments of hand hygiene, infection control, moving safely, safe manual handling, and documentation practice.

b. Patient preparation:

It is mandatory to ensure that the patient has received appropriate information to provide informed consent and, that the patient identification, correct procedure and correct site procedure is completed prior to any procedure.

c. Equipment preparation:

- Personal protective equipment: Non-sterile gloves and glasses depend on patient condition/if needed, face mask if risk of contamination identified such as patient coughing requiring additional precautions
- Toothbrush (pediatric toothbrush or adult soft toothbrush)
- Towel
- Chlorhexidine 0.12% if patient has ulcer or sensitive to chlorhexidine use normal saline solution
- Suction equipment including catheter
- Sponge swab
- Syringe
- Glass

Outcomes:

1. Mucosal breakdown is minimized
2. The risk of the transmission of infection is minimized
3. Lip moisture is maintained
4. Patients oral discomfort is minimized
5. Dentures, crown, bridges, caps or any hardware/appliances attached to teeth are protected from damage

Procedure

Oral Nursing Care Guideline for ICU's Intubated Patients in Mechanical Ventilator

No	Activities
Oral Assessment	
1.	Perform oral assessment using Oral Health Assessment Tool (OHAT) by assessing lips, tongue, gum and tissue, saliva, natural teeth, and oral cleanliness every morning to determine the frequency of daily oral care (level of evidence 1.c)
Preparation	
1.	Prepare oral care equipment (catheter/saline for suction, sterile syringe 5 or 10 ml, towel or tissue, pediatric toothbrush or soft toothbrush, sponge swab)
2.	.....
9.	Place towel across client's chest or under face and mouth if head is turned to one side
Oral care procedure	
1.	Inject 10 ml of 0.12% chlorhexidine into oral cavity, if patient have ulcer or sensitive to chlorhexidine use normal saline 0.9% (level of evidence 1.c)
2.	.....
10	Reconfirm placement, and note the position of tube at teeth or naris. Common tube placement at the teeth is 21 cm for woman and 23 cm for men. Make note the number in the securing tape (AACN)
Oral re-assessment	
1.	Re-assess patient oral cavity with Mucosal-Plaque Score (MPS) to assess mucosa and plaque condition after oral care
Patient monitoring and care	
1.	Monitor
2.	.....
3.	Assess gum bleeding after oral care
Documentation	
1.	Document oral care include date, time result of oral assessment

APPENDIX B

ORAL HEALTH ASSESSMENT TOOL

Category	0 = healthy	1= Poor	2= unhealthy
Lips	smooth, pink, moist	dry, chapped, or red at corners	Swelling or lump, white/red/ulcerated patch; bleeding/ulcerated at corners

Tongue			
.....
.....
.....

Oral cleanliness	Clean and no food particle or tartar in mouth	Food particle/tartar/plaque in 1-2 areas of the mouth or halitosis (bad breath)	Food particle/tartar/ plaque in most areas of the mouth or severe halitosis (bad breath)

Note. Adapted from "The Oral Health Assessment Tool — Validity and reliability", by Chalmers, J., King, P., Spencer, A., Wright, F., & Carter, K., 2005, *Australian Dental Journal*, 50(3), 191–199. <https://doi.org/10.1111/j.1834-7819.2005.tb00360.x> copyright 2005 by Australian Dental Journal

OHAT 0: perform oral care twice a day.

OHAT 1-6: perform oral care every shift.

OHAT 7-12: perform oral care every four hours.

APPENDIX C

NURSE DEMOGRAPHIC DATA QUESTIONNAIRE (NURSE-DDQ)

Date:

.....

Subject No:

Ward:

.....

Introduction:

This instrument contains Demographic questionnaire about your personal information.

Demographic questionnaire

Instruction: Please answer the following questions according to your real condition by filling the blank (...) and putting a tick (√) mark in the box near the most appropriate response (one for each question). If you do not understand or are not clear about any items, please ask the researcher.

1. Age Years old
2. Gender:

<input type="checkbox"/> 1. Male	<input type="checkbox"/> 2. Female
----------------------------------	------------------------------------
3. Academic qualification:

<input type="checkbox"/> 1. Nursing Vocational High School / SPK
<input type="checkbox"/> 2. Bachelor of Nursing
<input type="checkbox"/> 3. Master of Nursing
<input type="checkbox"/> 4. Associate Degree / Diploma in Nursing

5. Bachelor of Nursing + Professional Degree

6. Others, please identify.....

4. Working experience before becoming a nurse at current location

.....

5. Duration of service as a nurse at current location years

..... month, since

6. Have you ever received any formal training, workshop, or short course on oral care and oral assessment since you have been qualified as a nurse / after graduation?

1. Yes

2. No

7. If yes, please specify:

a. Training / Workshop / Course organizer

b. Year

c. Place.....

d. Duration/length of the training/workshop/course

.....

APPENDIX D

NURSES' SATISFACTION QUESTIONNAIRE (NSQ)

Instruction: Please put a tick (✓) into the column that reflects your satisfaction of using oral nursing care guideline for oral care in intubated patient with mechanical ventilator

Interpretation / Meaning of the scores:

- 1: Very Unsatisfied / No Satisfaction
- 2: Unsatisfied / Poor Satisfaction
- 3: Fair / Acceptable Satisfaction
- 4: Satisfied / Moderate Satisfaction
- 5: Very Satisfied / High Satisfaction

No.	Statement	Level of Satisfaction				
		1	2	3	4	5
1.	The oral nursing care guideline is applicable for oral care of the critical ill patients					
2.	.....				
3.	.....				
4.	.....				
5.	.....				
10.	Overall satisfaction					

Table 18

Frequency and Percentage of Nurses Satisfaction on Implementing Oral Nursing Care Guideline (N=28)

No.	Statement	Level of Satisfaction				
		1 n (%)	2 n (%)	3 n (%)	4 n (%)	5 n (%)
1.	The oral nursing care guideline is applicable for oral care of the critical ill patients	0 (0%)	0 (0%)	0 (0%)	14 (50)	14 (50)
2.	Implementing of the oral nursing care guideline is helpful for oral health of the critical ill patients	0 (0%)	0 (0%)	0 (0%)	8 (28.6)	20 (71.4)
3.	.....	.....	.....	.....	.....	.....
4.	.....	.....	.....	.....	.....	.....
5.	.....	.....	.....	.....	.....	.....
6.	.....	.....	.....	.....	.....	.....
7.	.....	.....	.....	.....	.....	.....
8.	.....	.....	.....	.....	.....	.....
9.	.....	.....	.....	.....	.....	.....
10.	Overall satisfaction	0 (0%)	0 (0%)	0 (0%)	9 (32.1)	19 (67.9)

APPENDIX E

ACCURACY OF ORAL NURSING CARE PRACTICE CHECKLIST

(AONCPC)

Instruction:

Put a tick in the right column according to your practice
Checklist oral care practice

No	Activities	Yes (correct)	Yes (incorrect)	No
Oral Assessment				
1.	Perform oral assessment using Oral Health Assessment Tool (OHAT)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Preparation				
1.	Prepare oral care equipment (catheter/saline for suction, sterile syringe 5 or 10 ml, towel or tissue, pediatric toothbrush or soft toothbrush, sponge swab)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9.	Place towel across client's chest or under face and mouth if head is turned to one side	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Oral care procedure				
1.	Inject 10 ml of 0.12% chlorhexidine into oral cavity, if patient have ulcer or sensitive to chlorhexidine use normal saline 0.9%	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10.	Reconfirm placement, and note the position of tube at teeth or naris. Common tube placement at the teeth is 21 cm for woman and 23 cm for men. Make note the number in the securing tape	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

No	Activities	Yes (correct)	Yes (incorrect)	No
Oral re-assessment				
	Re-assess patient oral cavity with Mucosal-Plaque Score (MPS)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Patient monitoring and care				
1.	Monitor the amount, type and color of secretion	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.	Assess gum bleeding after oral care	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Documentation				
	Document oral care include date, time result of oral assessment (OHAT and MPS)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Table 19

Frequency and Percentage of Implementation of Oral Nursing Care Guideline in Each Step by Nurse Participant (N=28)

Oral care guideline	Yes Correct n (%)	Yes incorrect n (%)	No n (%)
Oral assessment			
Perform oral assessment using OHAT	25 (89.3)	2(7.1)	1 (3.6)
Preparation			
1. Prepare oral care equipment	28 (100)	0	0
2. ....	.....	.....	.....
3. ....	.....	.....	.....
9 . Place a towel across client's chest or under face and mouth if the head is turned to one side	19 (67.9)	1 (3.6)	8 (28.6)
Procedure			
1. Inject 10 ml of 0.12% chlorhexidine into oral cavity, if patient have ulcer or sensitive to chlorhexidine use normal saline 0.9%	28 (100)	0	0
2. ....	.....	.....	.....
3. ....	.....	.....	.....
10. Reconfirm placement, and note the position of tube at teeth or naris.	26 (92.9)	0	2 (7.1)
Re-assessment			
Re-assess patient oral cavity with Mucosal- Plaque Score (MPS)	28(100)	0	0

Oral care guideline	Yes Correct n (%)	Yes incorrect n (%)	No n (%)
Monitor and Care			
1. Monitor the amount, type and color of secretion	28 (100)	0	0
2. ....	.....	.....	.....
3. Assess gum bleeding after oral care	28 (100)	0	0
Documentation			
Document oral care include date, time result of oral assessment	27 (96.4)	1 (3.6)	0

APPENDIX F

PATIENT DEMOGRAPHIC DATA QUESTIONNAIRE (PATIENT-DDQ)

(Note: No personal information is needed)

Date:

.....

Subject No:

Ward:

.....

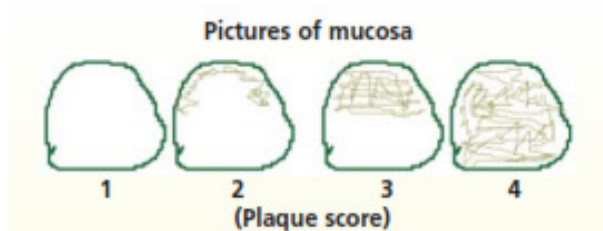
Demographic questionnaire

Instruction: Please answer the following questions according to your real condition by filling the blank (...) and putting a tick (V) mark on the box near the most appropriate response (one for each question). If you do not understand or are not clear about any items, please ask the researcher.

1. Age Years old
2. Gender:
 - Male Female
3. Marital status
 - Married Unmarried
4. Religion
 - Islam Catholic Hindu Buddhism Christian
5. Education
 - No schooling Elementary school Junior high school
 - Senior high school Associate degree Bachelor degree
 - Master degree Doctoral degree
6. Occupation.....
7. Diagnosis of patients.....
8. Length of ventilator duration.....

APPENDIX G

MUCOSAL-PLAQUE SCORE

**Mucosa**

Normal appearance of gingiva and oral mucosa	1
Mild inflammation =	2
Moderate inflammation =	3
Severe inflammation =	4

Plaque

No easily visible plaque	1
Small amounts.....	2
Moderate amounts.....	3
Abundant amounts.....	4

Total score

Note. Adapted from “Evaluation of a mucosal-plaque index (MPS) designed to assess oral care in groups of elderly”, by Henriksen, B. M., Ambjørnsen, E., & Axéll, T. E., 1999, *Special Care in Dentistry*, 19(4), 154–157. Copyright 1999 by Special Care in Dentistry

MPS status:

2-4 good/acceptable status

5-6 unacceptable status

7-8 poor status

APPENDIX H
EXPERTS OF INSTRUMENT TRANSLATION

The following three bilingual English experts served in the translation process of the instruments. These three experts are:

1. Assistant Professor Dr. Suhartini Ismail
Lecturer in Faculty of Nursing Diponegoro Faculty
2. Asri Handayani (Professional English Translator)
Dr. Moewardi Hospital
3. Assistant Professor Dr. Wipa Sae-Sia
Lecturer in Faculty of Nursing, Prince of Songkla University

APPENDIX I
LIST OF EXPERTS

Five experts who validated the content of the instrument consisting of the Nurse Satisfaction Questionnaire (NSQ), Accuracy of Oral Nursing Care Practice Checklist (AONCPC), Mucosal Plaque Score (MPS)

1. Assistant Professor Dr. Hathairat Sangchan
Faculty of Nursing, Prince of Songkla University
2. Assistant Professor Dr. Supitcha Talungchit
Faculty of Dentistry, Prince of Songkla University
3. Mrs. Supattra Uppanisakorn, MNS
APN Critical Care, Songkhlanagarind Hospital
4. Assistant Professor Dr. Suhartini Ismail
Faculty of Nursing, Diponegoro University
5. Drg. Eva Sutyowati Permatasari SpMB., MARS
Dentist in Dr. Moewardi Hospital

APPENDIX J

INTERRATER RELIABILITY OF ACCURACY OF ORAL NURSING CARE PRACTICE CHECKLIST (AONCPC)

Patient ID	Ste No	Guideline	Agreement			Agreement			Agreement			Agreement					
			RA1	PI	PI-RA1	RA2	PI	PI-RA2	RA3	PI	PI-RA3	RA4	PI	PI-RA4	RA5	PI	PI-RA5
1	1	Perform oral assessment using Oral Health Assessment Tool (OHAT) by assessing lips, tongue, gum and tissue, saliva, natural teeth, and oral cleanliness every morning to determine the frequency of daily oral care	√	√	1	√	√	1	√	√	1	√	√	1	√	√	1
2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
4	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
25	25	Document oral care include date, time result of oral assessment (OHAT and MPS)	√	√	1	√	√	1	√	√	1	√	√	1	√	√	1

Patient p ID	Ste No	Guideline	Agree- ment			Agree- ment			Agree- ment			Agree- ment					
			RA1	PI	PI-RA1	RA2	PI	PI-RA2	RA3	PI	PI-RA3	RA4	PI	PI-RA4	RA5	PI	PI-RA5
		Value			38			7			8			8			1
2	1	Perform oral assessment using Oral Health Assessment Tool (OHAT) by assessing lips, tongue, gum and tissue, saliva, natural teeth, and oral cleanliness every morning to determine the frequency of daily oral care	√	√	1	√	√	1	√	√	1	√	√	1	√	√	1
	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	4	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
25		Document oral care include date, time result of oral assessment (OHAT and MPS)	√	√	1	√	√	1	√	√	1	√	√	1	√	√	1
		Value			1			0,92307			0,96153			0,96153			0,96153

APPENDIX K

INTERRATER RELIABILITY OF MPS

	Patient1			Patient2			Patient3			Patient4			Patient5			
	RA1	PI	Agreement	RA1	PI	Agreement	RA1	PI	Agreement	RA1	PI	Agreement	RA1	PI	Agreement	
RA1 Plaque score	1	1		1	1	1	1	2	2	1	1	2	0	1	1	1
Mucosal Score	1	1		1	1	1	1	1	1	1	1	1	1	1	1	1
MPS score	2	2		1	2	2	1	3	3	1	2	2	1	2	2	1
Value				1			1			1			0,66667			1
	Patient6			Patient7			Patient8			Patient9			Patient10			
	RA2	PI	Agreement	RA2	PI	Agreement	RA2	PI	Agreement	RA2	PI	Agreement	RA2	PI	Agreement	
RA2 Plaque score	1	1		1	2	2	1	1	1	1	1	1	1	1	1	1
Mucosal score	1	1		1	1	2	0	1	1	1	1	1	1	1	1	1
MPS score	2	2		1	3	3	1	2	2	1	2	2	1	2	2	1
Value				1			0,66666667			1			1			1

Total: 10 Patients

Kappa value:

9.20/10: 0.92

APPENDIX L**INTERNAL RELIABILITY OF NURSES' SATISFACTION QUESTIONNAIRE****(NSQ)**

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,927	,927	10

APPENDIX M
HANDBOOK OF ORAL NURSING CARE

APPENDIX N

ETHICAL APPROVAL



Certificate of Approval of Human Research Ethics
Center for Social and Behavioral Sciences Institutional Review Board,
Prince of Songkla University

Document Number: 2017 NSt – Qn 048

Research Title: Implementation of Oral Nursing Care Guideline for Intubated Patients with Mechanical Ventilator in an ICU in Indonesia

Research Code: PSU IRB 2017 – NSt 037

Principal Investigator: Isti Haniyatun Khasanah

Workplace: Master of Nursing Science (International Program) Faculty of Nursing,
Prince of Songkla University

Approved Document: 1. Human Subjects
2. Instrument
3. Invitation and Informed Consent

Approved Date: 23 November 2017

Expiration Date: 23 November 2019

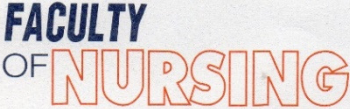

The Research Ethics Review of Center for Social and Behavioral Sciences Institutional Review Board, Prince of Songkla University approved for Ethics of this research in accordance with Declaration of Belmont.

Waraporn

(Assoc. Prof. Dr. Waraporn Kongsuwan)

Committee Vice-Chairman of Center for Social and Behavioral Sciences
Institutional Review Board, Prince of Songkla University

APPENDIX O
LETTER FOR DATA COLLECTION

 <p>FACULTY OF NURSING</p>		<p>PRINCE OF SONGKLA UNIVERSITY</p> <p>P.O. BOX 9, KHOR HONG, HATYAI SONGKHLA, THAILAND, 90112 FAX NO. 66-74-286421 TEL. NO. 66-74-286456, 66-74-286459</p>
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MOE 0521.1.05/ ๒๙๐๖

November ๒๒, 2017

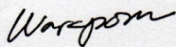
To Director of Rumah Sakit Dr. Moewardi

This letter is to inform you that Mrs. Isti Haniyatun Khasanah ID. 5910420003, a master student of the Faculty of Nursing, Prince of Songkla University, Thailand, is taking a thesis in this semester. As part of the requirement of the course, she has to conduct a research study in Indonesia. Her thesis is entitled "Implementation of Oral Nursing Care Guideline for Intubated Patients with Mechanical Ventilator in an ICU in Indonesia". The thesis proposal has been approved on November 6, 2017. Therefore, she will collect the data from Intensive Care Unit nurses and patient in your hospital, during December 2017 - January 2018.

I will be greatly appreciated if Mrs. Isti Haniyatun Khasanah is permitted to collect the data in your hospital, as it will provide valuable information for nursing profession in the future.

If you need any further information regarding her study, please do not hesitate to contact us at the above address or e-mail Assistant Professor Dr. Wipa Sae-Sia, her advisor at: wipa.sa@psu.ac.th


Sincerely Yours,



(Associate Professor Dr. Waraporn Kongsuwan)
Associate Dean for Research, Graduate Studies, and International Affairs
Faculty of Nursing
Prince of Songkla University
Hat Yai, Songkhla
THAILAND

APPENDIX P

PERMISSION LETTER FOR DATA COLLECTION



PEMERINTAH PROVINSI JAWA TENGAH
RUMAH SAKIT UMUM DAERAH Dr. MOEWARDI
 Jalan Kolonel Sutarto 132 Surakarta Kodepos 57126 Telp (0271) 634 634,
 Faksimile (0271) 637412 Email : rsmoewardi@jatengprov.go.id
 Website : rsmoewardi.jatengprov.go.id

Surakarta, 19 Desember 2017

Nomor : 1.156 /DIK/ XII / 2017
 Lampiran : -
 Perihal : Pengantar Penelitian

Kepada Yth. :
1. Ka. Bid. Pelayanan Keperawatan
2. Ka. Ruang ICU


RSUD Dr. Moewardi
 di-
SURAKARTA.

Memperhatikan Surat dari Associate Dean For Research, Graduate Studies and international affairs Faculty Of Nursing Prince Of Songkla University, nomor : MOE 0521.1.05/2905; Perihal Permohonan Ijin Penelitian dan Disposisi Direktur tanggal 02 Desember 2017, maka dengan ini kami menghadapkan mahasiswa:

Nama : Isti Haniatun Khasanah
NIM : 5910420003
Institusi : Master Student Of The Faculty Of Nursing, Prince Of Songkla University, Thailand

Untuk melaksanakan penelitian dalam rangka penyusunan **Tesis** dengan judul : **"Implementation Of Oral Nursing Care Guideline For Intubated Patients With Mechanical Ventilator In An ICU In Indonesia"**.

Demikian untuk menjadikan periksa dan atas kerjasamanya di ucapkan terima kasih.

Kepala
 Bagian Pendidikan & Penelitian,

 Ari Subagio, SE.,MM.
 NIP. 19660131 199503 1 002

Tembusan Kepada Yth.:
 1. Wadir Umum RSDM (sebagai laporan)
 2. Ka. IPI
 3. Arsip

RSDM Cepat, Tepat, Nyaman dan Mudah

APPENDIX Q

INFORMED CONSENT

Dear Participants,

My name is Isti Haniyatun Khasanah, a master student in Nursing Science (International Program) at Faculty of Nursing, Prince of Songkla University, Thailand. I am also serving in Dr. Moewardi Hospital in Surakarta, Central Java, Indonesia as a nurse. I am conducting a research in Implementation of Oral Nursing Care Guideline for Intubated patients with Mechanical Ventilator in an ICU in Indonesia.

The purpose of the research is to implement oral nursing care guideline to improve patients' oral health in ICU patients. The finding of the study will contribute to help nurses improving quality of nursing practice in patient's oral health, particularly in intubated patient with mechanical ventilator.

The study has been approved by Ethical Board Committee of Prince of Songkla University, Thailand. The research will be conducted for 2 months in ICU. If you decide to participate in the research, the procedure is as follows:

2. Explanation Procedures

a. Training/workshop

1. You will receive training/workshop for 1 day in oral care in intubated patient with mechanical ventilator including: oral assessment, oral care preparation, oral care procedure, oral re-assessment and patient monitoring and care. Leaflet will be

provided in the workshop to help you understand about oral care and oral assessment. Moreover, Flowchart and worksheet will be provided in every patient file.

2. You will practice using oral nursing care guideline for two months including doing oral assessment (using OHAT every morning to determine oral care frequency per day), oral care preparation, oral care procedure, oral re-assessment (using MPS) after delivering oral care, and patient monitoring and care.
3. You will deliver oral care daily with a frequency determined by the result of oral assessment (OHAT).
4. You will be supervised by the researcher in week one until you are able to perform oral care based on guideline.
5. You will continue delivering oral care to intubated patient with mechanical ventilator based on the oral nursing care guideline until week 8
6. Your accuracy of oral care practice will be evaluated after you perform oral care based on the guideline two times and your satisfaction of using the guideline will be evaluated in week 8.

b. Evaluation and Form

There would be some background information (demographic data) to be collected during the research. Some questionnaires about accuracy

of oral care practice and satisfaction will be evaluated based on your feedback.

3. Benefit of Research

The result of the research can be used to help nurses improving quality of nursing practice in oral health, particularly in intubated patient with mechanical ventilator.

Furthermore, it can be implemented in other hospitals particularly in ICU.

4. Risk and Discomfort

There is no harm/risk if you decide to volunteer for the research. However, some extra task related to oral care maybe experienced. In addition, there may be risk for patient if you do oral care not correctly including aspiration and accidental extubation. Therefore, to anticipate risks, it is highly recommended to suction frequently during oral care (especially after brushing, rinse mouth, saliva) as mentioned in the guideline. It is also necessary to reconfirm placement and note the position of tube at teeth or naris. Re tape or secure endotracheal tube every 24 hours and as needed for soiled or loose securing device.

5. Confidentiality

All information obtained in the research will be treated in a confidential manner. The data will not be shared with any third parties not related to the

research. The data will be shared among data collectors, researchers, and advisors. No identity will be revealed should the research is published or presented at the conference. The data will be provided as a group data.

6. Participation and withdrawal from participation

Your participation in the research is voluntary. If you want to participate in the research, you can change your mind later. You can decide to withdraw from the research at any time. There will be no penalty or effect to your ongoing medical / healthcare services. If you have any question, suggestion, or wish to withdraw from the research after you decide to participate in the research, please contact the researcher directly at:

Phone : +625743511334

Email: hannie_isti@yahoo.com

Advisor: Assistant Professor Dr. Wipa Sae-Sia

Phone: +66866948584

Email: wipa.sa@psu.ac.th

Miss Chayanit Pudpong

E-mail: chayanit.p@psu.ac.th (Tel.074-286475)

Center for Social and Behavioral Sciences Institutional Review Board,
Prince of Songkla University (SBSIRB-PSU) Faculty of Nursing Hatyai,
Songkla

Furthermore, if you think you would like to participate in the research, please kindly put your signature and full name below:

.....,

Participant,

Researcher,

.....

Isti Haniyatun Khasanah

APPENDIX R
ASSUMPTION

Test Assumption of Normality

Table 20
Skewness and Kurtosis of the Study Variable

Variables	Skewness/SE	Value	Kurtosis/SE	Value
Nurses' Satisfaction	-.484/.441	1.097	-1.285/.858	1.497
Accuracy of Oral Nursing Care Practice	-1.009/.441	-2.28	.066/.858	.769
Patients Oral Integrity	1.973/.347	5.68	5.704/.681	8.38

Note. SE = Standard error

If the values of skewness/SE and kurtosis /SE lies between the ± 3.29 then the data is considered having a normal distribution (Kim, 2013)

APPENDIX S

JBI LEVEL OF EVIDENCE

New JBI Levels of Evidence

Developed by the Joanna Briggs Institute Levels of Evidence and Grades of Recommendation Working Party October 2013

LEVELS OF EVIDENCE FOR EFFECTIVENESS

Level 1 – Experimental Designs

Level 1.a – Systematic review of Randomized Controlled Trials (RCTs)

Level 1.b – Systematic review of RCTs and other study designs

Level 1.c – RCT

Level 1.d – Pseudo-RCTs

Level 2 – Quasi-experimental Designs

Level 2.a – Systematic review of quasi-experimental studies

Level 2.b – Systematic review of quasi-experimental and other lower study designs

Level 2.c – Quasi-experimental prospectively controlled study

Level 2.d – Pre-test – post-test or historic/retrospective control group study

Level 3 – Observational – Analytic Designs

Level 3.a – Systematic review of comparable cohort studies

Level 3.b – Systematic review of comparable cohort and other lower study designs

Level 3.c – Cohort study with control group

Level 3.d – Case-controlled study

Level 3.e – Observational study without a control group

Level 4 – Observational –Descriptive Studies

Level 4.a – Systematic review of descriptive studies

Level 4.b – Cross-sectional study

Level 4.c – Case series

Level 4.d – Case study

Level 5 – Expert Opinion and Bench Research

Level 5.a – Systematic review of expert opinion

Level 5.b – Expert consensus

Level 5.c – Bench research/ single expert opinion

*LEVELS OF EVIDENCE FOR DIAGNOSIS***Level 1 – Studies of Test Accuracy among consecutive patients**

Level 1.a – Systematic review of studies of test accuracy among consecutive patients

Level 1.b – Study of test accuracy among consecutive patients

Level 2 – Studies of Test Accuracy among non-consecutive patients

Level 2.a – Systematic review of studies of test accuracy among non-consecutive patients

Level 2.b – Study of test accuracy among non-consecutive patients

Level 3 – Diagnostic Case-control studies

Level 3.a – Systematic review of diagnostic case-control studies

Level 3.b – Diagnostic case-control study

Level 4 – Diagnostic yield studies

Level 4.a – Systematic review of diagnostic yield studies

Level 4.b – Individual diagnostic yield study

Level 5 – Expert Opinion and Bench Research

Level 5.a – Systematic review of expert opinion

Level 5.b – Expert consensus

Level 5.c – Bench research/ single expert opinion

New JBI Grades of Recommendation

Developed by the Joanna Briggs Institute Levels of Evidence and Grades of Recommendation Working Party October 2013

JBI Grades of Recommendation

Grade A

A ‘strong’ recommendation for a certain health management strategy where

- (1) it is clear that desirable effects outweigh undesirable effects of the strategy;
- (2) where there is evidence of adequate quality supporting its use;
- (3) there is a benefit or no impact on resource use, and
- (4) values, preferences and the patient experience have been taken into account.

Grade B


A ‘weak’ recommendation for a certain health management strategy where


- (1) desirable effects appear to outweigh undesirable effects of the strategy, although this is not as clear;
- (2) where there is evidence supporting its use, although this may not be of high quality;

- (3) there is a benefit, no impact or minimal impact on resource use, and
- (4) values, preferences and the patient experience may or may not have been taken into account.

APPENDIX T

ORAL CARE PROTOCOL IN DR. MOEWARDI HOSPITAL

 Dr. MOEWARDI HOSPITAL	ORAL HYGIENE PROCEDURE		
	Document number RSDM/SPO.P/YANKEP/007	Revision number 06	page 1 / 2
STANDARD OPERATING PROCEDURE	Publication Date: 10 September 2014	Announced by: Director <u>BASOEKI SOETARDJO</u> NIP.19581018 198603 1 009	
Definition	A nursing procedure to provide oral hygiene for the patient who unable to perform their self.		
Objective	1 Preserve mouth hygiene and health 2 Provide comfort and freshness to the patients		
Policy	All nursing procedure performed according to director order number:188.4/316A/2013 about Dr. Moewardi hospital service policy		
Procedure	Preparation 1. Clean towel 2. Glove 3. Faucet anatomy 4. Sterile gauze ready 5. Boiled water ready 6. <i>Tongue</i> spatel 7. Bengkok 8. Oral Betadine Steps 1. Hand wash 2. Bring equipment near the patient		

 Dr. MOEWARDI HOSPITAL	ORAL HYGIENE PROCEDURE		
	Document number RSDM/SPO.P/YANKEP/007	Revision number 06	page 1 / 2
STANDARD OPERATING PROCEDURE	Publication Date: 10 September 2014	Announced by: Director <u>BASOEKI SOETARDJO</u> NIP.19581018 198603 1 009	
	<ol style="list-style-type: none"> 3. greeting <i>“Good morning/afternoon/evening/night Sir/Mam, my name is....., from unit/ward... (tell the patient)”</i> 4. Patient identification <i>“Excuse me, based on the patient safety standard, before doing the procedure of (tell the patient), please tell me your name and date of birth (while checking ID bracelet with name, date of birth, medical record number, or for unconscious patients, simply check the ID bracelet)”</i> 5. Explain the objective and steps of the procedure <i>“Sir/Mam, we are going to help to provide oral care by cleaning the mouth (oral hygiene)”</i> 6. Keep the patient’s privacy by closing the curtain <i>“Sir/Mam, we are going to close the curtain, all family member please step outside for a while”</i> 7. Wear gloves 8. Put towel under the chin <i>“Sir/Mam, excuse me, I am going to put the towel under your chin to prevent wetting of your clothes”</i> 9. Clean the teeth from inner to outer part followed with the tongue 		

APPENDIX U

APPRAISAL OF GUIDELINES FOR RESEARCH AND EVALUATION (AGREE) II

Domain	Section	1	2	3	4	5	6	7
Scope and Purpose (1)								
The overall objective (s) of the guideline is (are) specifically described	1							√
The health question (s) covered by the guideline is (are) specifically described	2					√		
The population (patients, public, etc.) to whom the guideline is meant to apply is specifically described	3							√
Stakeholder involvement (2)								
the guideline development group include an individual from relevant professional groups	4				√			
The views and preferences of the target population (patients, public, etc.)	5						√	
The target users of the guideline are clearly defined	6						√	
Rigor of development (3)								
Systematic methods were used to search for evidence	7			√				
The criteria for selecting the evidence are clearly described	8			√				
The strength and limitations of the body of evidence are clearly described	9							√
The methods for formulating the recommendations are clearly described	10							√
The health benefits, side effects, and risks have been considered in formulating the recommendations	11							√
There is an explicit link between the recommendations and the supporting evidence	12							√
The guideline has been externally reviewed by experts prior to its publication	13						√	

Domain	Section	1	2	3	4	5	6	7
A procedure for updating the guideline is provided	14					√		
Clarity of presentation (4)								
The recommendation is specific and unambiguous	15							√
The different options for management of the condition or health issue are clearly presented	16							√
Key recommendation is easily identifiable	17							√
Applicability (5)								
The guideline describes facilitators and barriers to its application	18						√	
The guideline provides advice and/or tools on how the recommendations can be put into practice	19						√	
The potential resources implications of applying the recommendations have been considered	20							√
The guideline presents monitoring and/or auditing criteria	21							√
Editorial independent (6)								
The views of the funding body have not influenced the content of the guideline	22						√	
Competing interest of guideline development group members have been recorded and addressed	23					√		

Formula for AGREE II scoring:

$\frac{\text{Obtained score}-\text{minimum possible score}}{\text{Maximum possible score}-\text{minimum possible score}} \times 100\%$

Maximum possible score-minimum possible score

Domain 1:

Maximum: $7 \times 3 \times 1 = 21$

Minimum: $1 \times 3 \times 1 = 3$

$\frac{19-3}{21-3} \times 100\% = \frac{16}{18} \times 100 = 88.89\%$

Domain 2:Maximum: $7 \times 3 \times 1 = 21$ Minimum: $1 \times 3 \times 1 = 3$

$$\frac{16-3}{21-3} \times 100\% = \frac{13}{18} \times 100\% = 72.22\%$$

Domain 3:Maximum: $7 \times 8 \times 1 = 56$ Minimum: $1 \times 8 \times 1 = 8$

$$\frac{45-8}{56-8} \times 100\% = \frac{37}{48} \times 100\% = 77.08\%$$

Domain 4:Maximum: $7 \times 3 \times 1 = 21$ Minimum: $1 \times 3 \times 1 = 3$

$$\frac{21-4}{21-4} = \frac{17}{17} \times 100 = 100\%$$

Domain 5:Maximum: $7 \times 4 \times 1 = 28$ Minimum: $1 \times 4 \times 1 = 4$

$$\frac{26-4}{28-4} = \frac{22}{24} \times 100 = 91.67\%$$

Domain 6:Maximum: $7 \times 2 \times 1 = 14$ Minimum: $1 \times 2 \times 1 = 2$

$$\frac{11-2}{14-2} \times 100\% = \frac{9}{12} \times 100\% = 75\%$$

Total Domain:

Total score: 138

Maximum score: 161

Minimum score: 23

Calculation total domain:

$$\begin{aligned} & \frac{138-23}{161-23} \\ & = \frac{115}{138} \times 100 \\ & = 83.33 \end{aligned}$$

APPENDIX V
EVIDENCE TABLE

Table 21

Ventilator Associated Pneumonia with or without Toothbrushing: A Randomized Controlled Trial

Citation	Design/ Sample Method	Objective	Intervention	Outcome	Level evidence
Lorente et al., (2012)	RCT n: 436	Compare the incidence of VAP in critical care patients receiving oral care with and without manual brushing of the teeth.	<p>Intervention:</p> <ol style="list-style-type: none"> 1. Endotracheal cuff pressure tested 2. Oropharyngeal secretions aspirated 3. Gauze impregnated with 20 mL of 0.12% chlorhexidine used to cleanse the teeth, tongue, and mucosal surfaces 4. Oral cavity injection of 10 mL of 0.12% chlorhexidine 5. Oropharyngeal aspirations aspirated after 30 s 6. Manual brushing with a brush impregnated with 0.12% chlorhexidine 7. Procedure completed three times daily by nurses <p>Control:</p> <ol style="list-style-type: none"> 1. Endotracheal cuff pressure tested 2. Oropharyngeal secretions aspirated 3. Gauze impregnated with 20 mL of 0.12% chlorhexidine used to cleanse the teeth, tongue, and mucosal surfaces 4. Oral cavity injection of 10 mL of 0.12% chlorhexidine 5. Oropharyngeal aspirations aspirated after 30 s <p>Procedure completed three times daily by nurses</p>	<p>VAP Mortality</p> <p>Antibiotic-free days</p> <p>Ventilator-free days</p> <p>ICU length of stay</p>	<p>Accord to Joanna Brigs Institute (JBI) level evidence 1c. Grade A (Strong recommendation)</p>

Table 22*Electric Versus Manual Toothbrushing among Neuroscience ICU Patients: Is it Safe?*

Citation	Design/ Method	Sample	Objective	Intervention	Outcome	Level evidence
Prendergast et al., (2012)	RCT	n=78	to determine the safety of tooth brushing in intubated patients with acute neurological injuries by measuring the effects of intervention on intracranial dynamics.	<p>Intervention:</p> <ol style="list-style-type: none"> 1. Tongue scraping 2. Toothbrushing with an electric toothbrush and non-foaming toothpaste for 2 mins 3. Moisturizing agent to oral mucosa and lips <p>Procedure completed two times daily by nurses</p> <p>Standard oral care:</p> <ol style="list-style-type: none"> 1. Toothbrushing with a manual, pediatric toothbrush and nonfoaming toothpaste for 2 mins 2. Moisturizing agent to oral mucosa and lips <p>Procedure completed two times daily by nurses</p>	<p>Oral colonization</p> <p>Respiratory colonization</p> <p>VAP</p>	<p>According to Joanna Briggs Institute (JBI) level evidence 1c. Grade A (Strong recommendation)</p>

Table 23
Brushing Teeth with Purified Water to Reduce Ventilator-Associated Pneumonia

Citation	Design/ Method	Sample	Objective	Intervention	Outcome	Level evidence
Yao et al., (2011)	RCT	53	This study evaluated the effects in post neurosurgical, intensive care unit patients of brushing teeth twice daily with purified water on VAP rates and oral health or hygiene.	<p>All patients received usual care including daily oral care with toothette oral or cotton swabs</p> <p>Intervention:</p> <ol style="list-style-type: none"> 1. Elevate head of bed 30–45°, and suction hypopharyngeal secretions 2. Moisturize oral cavity with 5–10 mL purified water 3. Clean teeth with an electric toothbrush and clean lingual sides with a soft pediatric toothbrush 4. Tongue, gums, and mucosa massaged using a soft pediatric toothbrush 5. Oral cavity cleaned using a toothette swab connected to a suction tube and rinsed with 50 mL purified water 6. Hypopharyngeal suctioning <p>Procedure completed two times daily by trained intervention nurse</p> <p>Control:</p> <ol style="list-style-type: none"> 1. Elevate head of bed 30–45°, and suction hypopharyngeal secretions 2. Moisturize lips with a toothette swab with purified water 3. Hypopharyngeal suctioning <p>Procedure completed two times daily by trained intervention nurse</p>	<p>Oral health and hygiene (OAG scores and the plaque index)</p> <p>VAP</p>	<p>According to Joanna Briggs Institute (JBI) level evidence 1c. Grade A (Strong recommendation)</p>

Table 24

A Randomized Controlled Trial of Dental Brushing for Preventing Ventilator-Associated Pneumonia

Citation	Design/ Method	Sample / setting	Objective	Intervention	Outcome	Level evidence
Pobo et al., (2009)	RCT	147	to assess whether using a mechanical debridement system (electric tooth and tongue brushing) associated with standard oral care reduces the incidence of VAP.	<p>Intervention:</p> <ol style="list-style-type: none"> 1. Head of bed elevated at 30° 2. Aspiration of oropharyngeal secretions 3. Adjustment of endotracheal cuff pressure 4. Gauze containing 20 mL of 0.12% chlorhexidine applied to all dental pieces, tongue, and mucosal surfaces 5. Injection of 10 mL of 0.12% chlorhexidine into oral cavity 6. Aspiration of excess solution after 30 s 7. Brushing tooth by tooth on anterior and posterior surfaces and along the gumline with an electric toothbrush 8. Tongue brushing <p>Procedure completed three times daily by nurses</p> <p>Standard oral care:</p> <ol style="list-style-type: none"> 1. Head of bed elevated at 30° 2. Aspiration of oropharyngeal secretions 3. Adjustment of endotracheal cuff pressure 4. Gauze containing 20 mL of 0.12% chlorhexidine applied to all dental pieces, tongue, and mucosal surfaces 5. Injection of 10 mL of 0.12% chlorhexidine into oral cavity 6. Aspiration of excess solution after 30 s <p>Procedure completed three times daily by nurses</p>	VAP Days of mechanical ventilation Hospital/ ICU Length of stay Ventilator free days Antibiotic free days ICU mortality Adverse events	According to Joanna Brigs Institute (JBI) level evidence 1c. Grade A (Strong recommen dation)

Table 25
Chlorhexidine, Toothbrushing, and Preventing Ventilator-Associated Pneumonia in Critically Ill

Citation	Design/ Method	Sample / setting	Objective	Intervention	Outcome	Level evidence
Munro et al., (2009)	RCT	547	To examine the effects of mechanical (toothbrushing), pharmacological (topical oral chlorhexidine), and combination (toothbrushing plus chlorhexidine) oral care on the development of ventilator-associated pneumonia in critically ill patients receiving mechanical ventilation	<p>Intervention 1: Toothbrushing</p> <ol style="list-style-type: none"> 1. Each tooth in each quadrant brushed for five strokes on the lingual, buccal, and biting surfaces with a soft pediatric toothbrush and toothpaste 2. Palate and tongue brushed 3. Each quadrant rinsed with 2.5 mL mouthwash using a transfer pipette 4. Excess saliva removed by suction 5. Moisturizing gel applied to all surfaces of the oral cavity and lips using a green toothette swab. Procedure completed three times a day by nurses <p>Intervention 2: Chlorhexidine 1. 5 mL of 0.12% solution of chlorhexidine gluconate by green toothette swab to coat each tooth, the tongue, and the palate Procedure completed twice daily by nurses</p> <p>Intervention 3: Toothbrushing and Chlorhexidine As above</p> <p>Control group: usual care (not describe)</p>	VAP at days 1 through 7	According to Joanna Brigs Institute (JBI) level evidence 1c. Grade A (Strong recommendation)

APPENDIX W**PERMISSION OF USING OHAT FROM AUTHOR/COPYRIGHT HOLDER**

Subject: FW: Website Inquiry

From: dan-caplan@uiowa.edu
To: hannie_isti@yahoo.com
Cc: dan-caplan@uiowa.edu; xi-chen-6@uiowa.edu
Date: Wednesday, September 20, 2017, 6:40:52 PM GMT+7

Hello Isti – You have my permission to use Dr. Chalmers' measurement instrument in your research. I am sure she would like her work to be used by others.

Unfortunately I do not have access to the actual instrument without searching the literature myself, and I will be busy and/or out of town for several weeks. For that reason, I am cc'ing Dr. Xi Chen on this message. Dr. Chen does research in the area you are interested in and should know how to find Dr. Chalmers' measurement instrument. He also may be interested in your particular research topic as well.

Thank you for your interest in Dr. Chalmers' work!

Daniel J. Caplan, DDS, PhD
Professor and DEO
Department of Preventive & Community Dentistry
University of Iowa, College of Dentistry
N339 Dental Science Building
Iowa City, IA 52242

Tel: 319-335-7206

APPENDIX X

PERMISSION OF USING MPS FROM AUTHOR/COPYRIGHT HOLDER

Subject: Re: Request for Permission of using oral assessment tool

From: tony.axell@telia.com
 To: hannie_isti@yahoo.com
 Date: Tuesday, September 26, 2017, 1:41:58 AM GMT+7

Hi,
 Of course, you have my permission.
 I could mail you a couple of pamphlets if you send me your postal address.
 With kind regards,
 Tony

-----Ursprungligt meddelande-----
 Från : hannie_isti@yahoo.com
 Datum : 2017-09-25 - 08:41 (UTC)
 Till : tony.axell@telia.com
 Ämne : Request for Permission of using oral assessment tool

Dear Prof. Tony Axell,

Greetings,

First of all please kindly allow me to introduce myself. My name is Isti Haniyatun Khasanah from Indonesia. I am currently studying in Master of Nursing Science (International Program) at Prince of Songkla University in Thailand.

As part of my study I would like to do research in oral nursing care guideline development for patients with mechanical ventilator. On doing the research, I would like to use Mucosal Plaque Score (MPS) developed by you and Birgitte M Henriksen as your paper in [Spec Care Dentist](#). 1999 Jul-Aug;19(4):154-7 for Oral Assessment of patients with mechanical ventilator.

Regarding that matter, I would like to kindly request you the tool and your written permission to use aforementioned tool in my research to comply the legal and ethical code of research. I would highly appreciate if you willing to provide me such permission.

I look forward to hearing from you soon. Thank you for your attention.

Best regards,

Isti Haniyatun Khasanah



VITAE

Name Mrs. Isti Haniyatun Khasanah

Student ID 591042003

Educational Attainment

Degree	Name of Institution	Year of Graduation
Bachelor of Nursing	University of Indonesia	2009

Scholarship Award during Enrollment

Thailand's Education Hub for ASEAN Countries (TEH-AC) Scholarship, funded by Graduate School, Prince of Songkla University, Thailand

Work Position and Address

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 Jawa Tengah, Indonesia
 Telp 0271-634634
 Email: hannie_isti@yahoo.com

List of Publication and Proceeding

Khasanah, IH., Sae-Sia, W., Damkliang, J. (2018, May). *Oral health of orally intubated patients admitted in Intensive Care Unit, Indonesia*. Paper presented at the 6th Padjadjaran International Nursing Conference, Faculty of Nursing University of Padjadjaran, Bandung.

Khasanah, IH., Sae-Sia, W. (2017, November). *Oral care related to Ventilator Associated Pneumonia (VAP): Integrative review*. Poster session presented at STTI Conference, Sigma Theta Tau International, Bangkok.

Ruan, Q., Khasanah, IH., Kongkeaw, O., Maneewat K. (2017). Pain management during endotracheal tube suctioning: An evidence-based approach for nurses. *Int J Nur Care*, 1(4), 1-3.

Maneewat, K., Ruan, Q., Khasanah, IH., Kongkeaw O. (2017). Pain management during endotracheal tube suctioning: An evidence-based approach for nurses. *J Healthc Commun*, 2, 4 (Suppl). DOI: 10.4172/2472-1654-C1-002