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FACTORS AFFECTING INTENSIVE CARE NURSES IN PROVIDING ORAL CARE IN THE INTENSIVE CARE UNITS OF A PUBLIC SECTOR TERTIARY HOSPITAL IN JOHANNESBURG

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A research report submitted to the

Faculty of Health Sciences, University of the Witwatersrand, Johannesburg

In partial fulfilment of the requirements for the degree

of

Master of Science in Nursing

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DECLARATION

I, Afiamma Adiakpantin, declare that this research report is my own work. It is being submitted for the degree of Master of Science (in Nursing) in the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination at this or any other university.

Signature …….

……day of …… 2018

Protocol Number M150770

DEDICATION

His Majesty, the king of kings…

…in awe of your love.

ACKNOWLEDGEMENTS

The Adiakpantin's family, Mr and Mrs Lekan Oyeniyi, holding true in the storm.

Dr. Shelley Schmollgruber, her constructive input in supervising this work to its completion.

Operational managers in the various intensive care units, for their motherly support.

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ABSTRACT

Background: evidence-based oral care prevents ventilator associated pneumonia. However, not all intensive care nurses provide this level of care. Although several studies have been undertaken to identify factors that affect the provision of oral care, none of these studies looked at the situation in South Africa.

Aim: the purpose of this study was to explore and describe the factors that affect intensive care nurses in providing oral care in the intensive care units of a public sector hospital in Johannesburg.

Design: an explorative - descriptive qualitative and contextual design was used.

Methods: participants were recruited by convenience maximum variation sampling, from the population of certified intensive care nurses working in four (n=4) adult intensive care units of one public sector hospital in Johannesburg. Data was collected by audiotaping nineteen (n=19) participants using semi-structured one-to-one interviews. Verbatim transcripts were analysed by Braun and Clarke's thematic analysis; trustworthiness ensured following the criterion of Lincoln and Guba; ethical considerations were applied.

Results: this study reveals oral care education is perceived by senior nurses to have been completed in basic nursing school and not meant for specialist training. Oral care for the intubated patient is based on common sense. There is lack of knowledge on the characteristics of lotions used, prevention of complications during oral care and preventive strategies for ventilator associated pneumonia. Even though participants acknowledge the goal for oral care to be preventing ventilator associated pneumonia, contextual factors greatly affect its provision.

Recommendations: improved human and material resources is required to facilitate the process involved in nurses' provision of oral care for intubated patients to prevent ventilator associated pneumonia. Improved staffing, facilitation of learning and the development of specific intensive care nursing skill for oral care on the intubated patient through multi-strategy education and clinical research is recommended.

Conclusion: the attitude of nurses and the hospital management to oral care is a strong determinant to its provision in the intensive care unit.

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CHAPTER ONE

OVERVIEW OF THE STUDY

1.0 INTRODUCTION

Oral care is essential to intensive care nursing. About 90% of critically ill patients admitted in the intensive care unit need mechanical ventilation to assist breathing, invasive mechanical ventilation requires connecting the patient to the mechanical ventilator with an endotracheal tube (Tembo & Schmollgruber 2013). The risk of ventilator associated pneumonia is 7% to 70% and mortality rate is 20% to 75%, depending on the population studied (Alp & Voss 2006). The Institute for Healthcare Improvement realized the impact oral care has in reducing the morbidity, mortality, length of stay and cost from ventilator associated pneumonia, and included it as one of the five elements of the Institute for Healthcare Improvement 2010 ventilator bundle (a grouping of best practices that, when applied together, may result in substantially greater improvement in preventing ventilator associated pneumonia) (Institute for Healthcare Improvement 2014).

The intensive care nurse has the responsibility of providing oral care (Browne, Evans, Christmas *et al.* 2011), but studies have reported that not all intensive care nurses provide adequate oral care assessments and frequency for intubated patients (Feider, Mitchell & Bridges 2010; Yeung & Chui 2010). Optimal oral care can only be rendered when the oral care competencies of the intensive care nurse matches the specific needs of the intubated patient (Ross & Crumpler 2007). This study intends to explore and describe factors affecting intensive care nurses in providing oral care in the intensive care units of a public sector tertiary hospital in Johannesburg.

1.1 BACKGROUND OF THE STUDY

There is an increased risk for oral mucosal infection and breakdown in the mechanically ventilated patient with a predisposition to ventilator associated pneumonia. This requires greater attention to consistent oral care (Munro & Grap 2004). Ventilator associated pneumonia occurs when there is aspiration of infected sub-glottal secretions from bacterial

colonization and growth on the teeth and oropharyngeal area. Ventilator associated pneumonia is defined as a new or tenacious radiographic infiltrate, coupled with fever, leucocytosis, change in amount or appearance and isolation of a pathogen from sputum (Muscedere, Dodek, Keenan *et al.* 2008) .

In a prospective comparative study, xerostomia, the inadequate salivation and dryness of the buccal mucosa in the critically ill patient was found to contribute to oral mucosal breakdown and colonization with gram negative organisms (Dennesen, van der Ven, Vlasveld *et al.* (2003) cited in Prendergast 2012). Oral infection occurs from xerostomia due to the presence of the endotracheal tube which leaves the mouth perpetually open and exposed to dryness from surrounding air. Drug therapy is also shown to predispose the critically ill patient to xerostomia. In a review of adverse effects of inhalation therapy on oral health, salivary glands were hypovascularized and enzymes which help in cleansing debris to protect the cavity from inflammation and infection were decreased (Godara, Khullar & Godara 2011; Bartels 2014). Once saliva is thickened or reduced in volume, plaque becomes thick and infected. Inflammation of tissue from infection weakens the oral mucosal layer, allowing bacteria to pass into adjoining tissue and the blood stream. Local pulmonary infection progresses to systemic infection if infective foci are transferred to other organs (Scannapieco & Binkley 2012).

Poor oral health in the intensive care unit is a global health concern, there is increased emphasis on multidisciplinary collaboration for evidence based oral care practice. Evidenced based practice is when clinicians deliberately use current best research evidence and clinical expertise to match specific patient needs in their care (Polit & Beck 2010). In 2004, the Canadian Critical Care Clinical Trials Group and Critical Care Society developed clinical practice guidelines against ventilator associated pneumonia to improve clinician's access and utilization of current research (Dodek, Keenan, Cook *et al.* 2004). The American Association of Critical Care Nurses' 2010 practice alert was released 'to develop and implement a comprehensive oral hygiene program for patients in critical care and acute care settings who are at high risk for ventilator associated pneumonia' (Aliso 2010).

Critically ill patients pose more challenges in their care due to life threatening conditions which require high clinical judgement, special skill, sophisticated equipment and good

communication for a better chance of survival. Nurses' oral care practice typically involves cleaning a patient's mouth with a mouth wash solution, suctioning and using a lubricant for moistening the lips to prevent subsequent aspiration of accumulated microorganisms. Despite the great burden of ventilator-associated pneumonia, nurses' knowledge on evidenced based oral care on intubated patients is lacking, practice varies in frequency, documentation, tools, materials and procedures (Perrie, Schmollgruber, Bruce *et al.* 2014; Lin, Chang, Chang *et al.* 2011; Rello Koulenti, Blot *et al.* 2007; Binkley, Furr, Carrico *et al.* 2004). In a study of nurses' oral care practice, in the United States, 80% of the respondents had no orientation on oral care for the critically ill patient, 20% did not know of an existing policy, 61% were not aware of the American Association of Critical Care Nurses' 2005 procedure manual chapter on oral care on ventilated patients (Feider, Mitchell & Bridges 2010).

Oral problems are often given low priority compared to other lifesaving interventions within the intensive care unit (Lin, Chang, Chang *et al.* 2011); moreover the prevention and management of oral problems has been based on history and routine rather than on contemporary research. Although it is now seen as a major intervention in preventing ventilator associated pneumonia, a survey of oral care practice on ventilated patients in South Africa indicates that it is still considered basic potential non-essential care (Perrie, Schmollgruber, Bruce *et al.* 2014).

Variation in practice across the globe is associated with nurse's culture (Yeung & Chui 2010), nurses' attitudes and knowledge, availability of human and material resources, implementation of hospital policy, administrative involvement, information management and research (Perrie, Schmollgruber, Bruce *et al.* 2014). Inconsistent oral care may also be related to insufficient training during the critical care nursing programme, lack of in-service education during orientation for the newly employed, or lack of continued workplace learning and research on oral care (Ross & Crumpler 2007). Intubated patients may not be receiving appropriate care as a result of this low priority and may be receiving treatments that cause or exacerbate dry mouth leading to infections. Routine or non-uniform practice is ineffective and deleterious to the patient's health and makes them more susceptible to oral disease than the general population (Perrie, Schmollgruber, Bruce *et al.* 2014).

Intensive care nurses require knowledge beyond what is needed to register as basic nurses for safe practice (Toth 1984). Perrie, Schmollgruber, Bruce *et al.* (2014) note that specific competencies are necessary to guide complex decision making when faced with patient conditions requiring multiple protocols, and intensive care nursing involves choosing the best action of care to suit a patient situation - not just following guidelines. Nurses' personal oral care views may influence the care they give and each other's perceptions about oral care. Oral care education is shown to increase knowledge, understanding and frequency of oral care for mechanically ventilated patients (Ross & Crumpler 2007).

1.2 PROBLEM STATEMENT

The mechanically ventilated patient has an increased risk of infection. When ventilator associated pneumonia develops, it drastically reduces the patient's ability to cope with illness; increases length of stay on the ventilator and the demands for rehabilitation if the patient survives. The death rate from ventilator associated pneumonia is about 24% and up to 76% (Chastre & Faygon 2002). This implies emotional and financial consequences to the family.

The researcher developed a concern about nurses' oral care practice after witnessing the death of some critically ill patients who developed ventilator associated pneumonia in an academic hospital in southern Nigeria. This was attributed to shortage of staff which led to inadequate oral care. Her curiosity was provoked even further by some nurses' verbalization of lack of awareness on the existence of documentation guiding oral care practice in an intensive care unit of an academic hospital in South Africa.

Where gaps occur during training, practice or administrative involvement; oral care practice becomes dependent on personal assumptions which places the patient at an increased risk for ventilator associated pneumonia and its consequences. Consistent oral care practice reduces ventilator associated pneumonia. However, barriers and facilitators to evidenced based oral care for intubated patients is not well known in the South African context.

The researcher will attempt to address the following research question:

- What are the factors that affect intensive care nurses' provision of oral care in the intensive care units?

1.3 AIM OF THE STUDY

The aim of this study, is to explore and describe factors affecting intensive care nurses in providing oral care in the intensive care units of a public sector tertiary level hospital in Johannesburg.

1.4 OBJECTIVES

The objectives for the study are:

- To explore intensive care nurses' perception of oral care in the intensive care units.
- To describe facilitators and barriers to providing oral care in the intensive care units.

1.5 SIGNIFICANCE OF THE STUDY

This study is significant in raising nurses' awareness on oral care for the mechanically ventilated patient towards safety, optimum patient outcomes, and decreased cost. It is hoped that hospital administrators' decision making will be guided to ensure adequate staffing, sufficient materials, and the implementation of evidenced based oral care policy. Nurse clinicians and educators will find insight in advocating for research and measurement of outcomes for monitoring and evaluating evidenced based oral care for intubated patients.

1.6 PARADIGMATIC ASSUMPTIONS

A paradigmatic assumption is the worldview upon which assumptions are made. Paradigms show relationships of concepts which make up ideas in a nursing theory. According to Polit and Beck (2010), nursing discipline research is conducted in two broad paradigms. These are the positivist and naturalistic paradigms. In the positivist paradigm, a fixed reality exists, an objective generalization can be arrived through statistical analysis

without the inquirer interacting with those being researched. The naturalistic paradigm is anti-positivist. Reality is subjective and not fixed, depending on how participants in the research context construct reality during an interactive process. The researcher adopted naturalistic qualitative paradigmatic assumptions from literature to collect rich in-depth information from intensive care nurses having first-hand knowledge of the factors affecting their oral care practice in the critical care context.

1.6.1 Meta-theoretical Assumptions

Meta-theoretical assumptions are used to organise knowledge; explain phenomenon in nursing theory, and guide nursing research. In nursing, there are four major meta-theoretical concepts: the person, environment, health and nursing.

- **The Person**

In this study, the person refers to the patient and the nurse. Both are unique, composing of body, mind and spirit; and seek solutions from understanding the meaning of life experiences, survival, and death (Pitacco, Silvestro, Drigo *et al.* 2005). The patient is critically ill and mechanically ventilated in the critical care unit. The American Association of Critical Care Nurses developed the Synergy Model to link certified practice to patient outcomes with the premise that patient's characteristics drive nurses' competencies.

According to the Synergy Model (Curley 1998), the patient is described in terms of stability, complexity, predictability, resiliency, vulnerability, resource availability, and his ability to play a part in decision making and care. The critically ill patient wavers, is unpredictable, having low ability to maintain a steady state; highly vulnerable and complex due to illness involving more than one organ (Curley 1998). The critically ill patient lacks resilience; compensatory and coping mechanisms, and is often immune compromised. The patient is dependent on the nurse for decision making and integration of his essential oral care needs with other lifesaving interventions in his care (Curley 1998). The patient is the centre of care to which nursing efforts are channelled towards positive outcomes influenced by contextual and environmental factors.

The nurse is someone who has learned essential caring activities that promote oral health to relieve suffering and preserve human dignity in the critical care context (American Association of Critical Care Nurses 2015) . The nurse has the responsibility for updating her oral care competencies. Competencies may be updated through continuing education opportunities such as conferences, workshops, seminars, and mentorship to assist her progression from novice to expert with the goal of making evidenced based decisions.

- **The Environment**

The intensive care unit environment is busy, demanding and highly technologized; these complexities within the environment consist external stressors and internal stressors to the person. Safe environments can be created for patients by quality, emphasizing nurse competencies such as observation, presence, commitment, and responsiveness (Curley 1998). Hence, the importance of nurses' awareness of quality oral care practice and its role in preventing ventilator associated pneumonia.

The intensive care units in this study are within a public healthcare facility typically serving 80% of the South African population while private healthcare facilities serve only 20% (Harris, Goudge, Ataguba *et al.* 2011). The unit's resource availability: knowledge, skills, financial, personal, psychological support and social systems within this public healthcare setting is limited compared to the population it serves (Edwards 1999).

- **Nursing**

The goal of specialist nursing is to bring a patient from illness to the best level of wellness as defined by patient and nursing outcomes (Curley 1998). Intensive care nurses' oral care practice is a combination of knowledge which may be formal or experienced in addition to attitude and skills to meet the patient's oral care needs through evidenced based practice. This requires systems thinking from a body of knowledge, and tools that assist the nurse in managing existing environmental and system resources. Nurse competency develops from clinical judgement in evaluating information and anticipating problems. Critical care nurses seek opportunities to teach and be taught, collaborate, be actively involved and

complement contribution from the patient, family, healthcare staff and administration in response to a dynamic critical care setting (Curley 1998).

- **Health**

Health is a positive concept emphasizing bio-psychosocial resources of the person, an absence of illness where a steady physical and psychological state is maintained (World Health Organization 2013). Although health is a place on the health-illness continuum where health and wellness are nearer to life than to illness and death at the other side (Taylor & Lippincott 2011); the illness state of the patient is first considered in the critical care area (Pitacco, Silvestro, Drigo *et al.* 2005). Intensive care nurses prevent, promote and maintain the oral health of critically ill patients towards the wellness end of the continuum.

1.6.2 Theoretical Assumptions

Theoretical assumptions explain the theoretical operational terms used with the synergy model in the study. Synergy, the theoretical model used in this study, was designed by the American Association of Critical Care Nurses for a contextual understanding of nursing practice in relation to the patient's needs and characteristics in an acute care setting (Curley 1998).

- **Oral care**

This is an essential nursing activity which involves frequent assessment, cleaning, debridement, suctioning and moisturizing of the entire oral cavity on a mechanically ventilated patient. Oral care prevents complications such as injury from oral intubation devices and accumulation of microorganisms which could be aspirated leading to ventilator associated pneumonia (Browne, Evans, Christmas *et al.* 2011; Jones, Newton & Bower 2004).

- **Intensive care nurse**

An intensive care nurse is a clinical nurse specialist trained to work autonomously or collaboratively to promote health and prevent ventilator associated pneumonia on mechanically ventilated patients. The intensive care nurse advocates safety, research, education, and contributes to the development of health policy and systems (International Council of Nurses 2010). In this study, intensive care nurses are registered with the South African Nursing Council as critical care nurse specialists and have the responsibility of working collaboratively to prevent complications associated with mechanical ventilation.

- **Intensive care unit**

A special area in the hospital where critically ill patients who require close attention, regular and special interventions receive care from highly trained and specialised staff, working under the best possible conditions to provide optimal health care (American Association of Critical Care Nurses 2015). This study includes the general, trauma, neurology and cardiothoracic intensive care units of an academic hospital in Johannesburg.

- **Factors**

A factor is something that influences an outcome (Merriam-Webster 2004). In this study's context, factors are the facilitators and barriers that affect matching and synergy between intensive care nurses' competencies and critically ill intubated patient characteristics for evidenced based oral care practice.

- **Facilitators**

Facilitators help to bring about an outcome (Merriam-Webster 2004). In this study, facilitators refer to all factors: knowledge attitudes and procedures that encourage matching and synergy between intensive care nurses' competencies and critically ill intubated patient characteristics for evidenced based oral care practice and optimal outcomes.

- **Barriers**

Barriers prevent an outcome (Merriam-Webster 2004). In this study barriers refer to all factors: knowledge, attitudes and procedures that discourage matching and synergy between intensive care nurses' competencies and critically ill intubated patient characteristics for evidenced based oral care practice and optimal outcomes.

1.6.3 Methodological Assumptions

Qualitative assumptions were made about the designing, sampling, data collection, ethics and analysis of this study to answer the research questions in order to get a worldview (Polit & Beck 2010). The researcher assumed that factors affecting nurses' oral care practice in the critical care unit can be inferred from both qualitative data collection and literature. Evidenced based nursing is believed to be best practice based on current evidence, nurses' competence, positive attitudes and patient characteristics to provide oral care on intubated patients towards reducing the risk of ventilator associated pneumonia within an organisational context. The researcher assumes that intensive care nurses can describe their perceptions and experiences on oral care for the intubated patient without bias. The researcher relied on written, verbal and non-verbal communication from the voluntary participant's view to gain understanding and make inductions about nurses' perception of oral care practice in the intensive care unit (Liamputtong 2013).

According to Thomas Kuhn (1962), 'normal science' means using certain existing scientific research of a community of practitioners as basis in building further practice. Grbich (2007) asserts that a pre-chosen position from literature can be used for theorising qualitative data. An understanding of the literature and data was used to inform and make inductions and deductions about facilitators and barriers to oral care practice in the intensive care unit (De Vos 2011:299).

1.7 OVERVIEW OF THE RESEARCH METHODOLOGY

A research methodology outlines the theoretically informed framework for collecting and analysing data (Rohleder & Lyons 2014). An exploratory-descriptive qualitative and contextual design was used in achieving the objectives of the study to explore and describe

factors affecting intensive care nurses in providing oral care in the intensive care units of a public sector tertiary hospital in Johannesburg. The study participants were intensive care nurses trained, registered and permanently working in four (n=4) adult intensive care units of a 1,200 bed capacity university-affiliated hospital and tertiary/quaternary institution in Johannesburg. The four intensive care units were the general, neurology, trauma, and cardio-thoracic intensive care units.

After permission was obtained from the hospital administration and intensive care unit managers; ethical clearance and permission to conduct the study was received from the relevant University Research Committees and the Department of Health. Participation in the study was voluntary and respondents were informed that they could withdraw at any point.

Data was collected using semi structured one-to-one interviews using an interview guide. Trustworthiness of the study was maintained using criteria outlined by Lincoln & Guba (1985) cited in Shenton (2004). Credibility was confirmed by post graduate assessors, dependability warranted by leaving behind a decision trail, confirmability and transferability was ensured through an audit trail. Transcripts of data were analysed by thematic analysis according to the Braun & Clarke (2006) method.

1.8 RESEARCH ACTION PLAN

The study will be presented as follows:

Chapter One:	Overview of the study.
Chapter Two:	Literature review.
Chapter Three:	Research design and methods.
Chapter Four:	Findings.
Chapter Five:	Discussion, limitations, recommendations and conclusion.

1.9 SUMMARY

In this chapter an overview of the study was given; the background of the study, research rationale and questions were detailed. The researcher's assumptions were discussed and the research methodology described. Ethical considerations pertaining to the study were given. In the next chapter, literature review will be discussed in greater detail.

CHAPTER TWO

LITERATURE REVIEW

2.1 INTRODUCTION

Globally, there is a shift to focus on oral care as a lifesaving measure for the prevention of ventilator associated pneumonia. In a survey of intensive care nurses' oral care practice in South Africa, practice variations were found (Tembo & Schmollgruber 2013; Perrie, Schmollgruber, Bruce *et al*. 2014); it is thus imperative to build a base understanding of factors affecting intensive care nurses in the provision of oral care for intubated patients in the critical care context. A literature search from 2004 to 2015 was conducted on various databases: Google scholar, ProQuest, EbscoHost, CINHAL, PubMed databases using keywords such as 'nurses', 'practice', 'oral health status' , 'oral hygiene', 'intensive care'.

This chapter describes intensive care nurses' oral care practice in relation to the prevention of ventilator associated pneumonia according to literature. Factors affecting oral care practice is approached from a broad perspective within the context of ventilator associated pneumonia; its timing, pathogenesis, patient risk factors, mortality and length of stay and existing guidelines for an understanding of measurement and bundle compliance. The literature review then proceeds to a discussion on facilitators and barriers in terms of knowledge, attitude and procedures.

2.2 VENTILATOR ASSOCIATED PNEUMONIA

Centers for Disease Control (2015) acknowledges that there is no definition of ventilator associated pneumonia which is valid and reliable and there is lack of consensus on diagnosing ventilator associated pneumonia among clinicians based on clinical features, pathology or histology (Shan, Chen & Zhu 2011). Ventilator associated pneumonia is a respiratory tract infection which was not present or developing for at least 24 hours previously, but occurs after endotracheal intubation and mechanical ventilation (Kollef, Shorr, Tabak *et al.* 2005; Munro, Grap, Jones *et al*. 2009). Bingham, Ashley, De Jong *et al.* (2010) argue that ventilator associated pneumonia is complicated by many factors; the

primary goal should be to prevent ventilator associated pneumonia rather than concentrating on the difficulties in predicting its onset, diagnosis and consequences.

Pugin, Auckenthaler, Mili *et al.* (1991) cited in Munro & Grap (2004) introduced the clinical pulmonary infection score for easy diagnosis of ventilator associated pneumonia. The clinical pulmonary infection score uses 6 parameters: temperature, white blood cell count, tracheal secretions, oxygenation (calculated by arterial oxygen saturation PaO_2/fraction of inspired oxygen FiO_2), radiologist's report on chest radiograph and tracheal aspirate culture (Grap, Munro, Hamilton *et al.* 2011). Shan, Chen & Zhu (2011) conducted a meta-analysis pooled estimates of clinical pulmonary infection scores with heterogeneity by meta regression and subgroup analysis. The analysis showed that pulmonary infection scoring for ventilator associated pneumonia is an easy to use and moderately useful scoring system when managing antimicrobial treatment (65% : 95% CI 61–69%, I^2 = 89.6%) and recommended that further study would be beneficial in relating tendencies for user variability in diagnosing ventilator associated pneumonia.

According to the Centers for Disease Control (2015), clarification on parameters and timing should be made; positive end expiratory pressure or fraction of inspired oxygen should be stable for at least 2 days followed by a steady increase in settings for an additional 2 days. Ventilator associated pneumonia should be suspected when a patient who had been started on mechanical ventilation for more than 48 hours has raised temperature, decreased white blood cell count, and at least one of the following: change in sputum colour, an increased amount of sputum in relation to the extent of inflammation, worsened cough, difficulty in breathing, increased respiratory rate, bronchial breath sounds, an increased oxygen and ventilation requirement with tendency to desaturate (Centers for Disease Control 2015).

2.2.1 Timing

Early and late timing of occurrence is mostly related to the causative organism but varies with study variables and criteria for diagnosis. More resistant strains such as gram negative bacteria and methicillin resistant staphylococcus aureus isolated more than 4 days after intubation are suspects for late onset ventilator associated pneumonia. Less resistant strains

such as staphylococcus aureus were isolated in less than 4 days (Rello, Ollendorf, Oster *et al.* 2002).

In a randomised controlled clinical trial to determine the effects of chlorhexidine, tooth brushing or both on the occurrence of ventilator associated pneumonia, subjects were included from 24 hours to 14 days after initiation of mechanical ventilation, early ventilator associated pneumonia occurred within 3 days, after which there was a decline in non-resistant microorganisms (Scannapieco & Binkley 2012). In a systematic review and meta-analysis of randomised trials to evaluate the effect of oral care using chlorhexidine or povidone-iodine on ventilator associated pneumonia, 5 days of endotracheal intubation was the difference between early and late ventilator associated pneumonia (Labeau, Van de Vyver, Brusselaers *et al.* 2011). Even though a large United States database study on the epidemiology of ventilator associated pneumonia identified 5.4 ± 7.7 days as the mean day of onset between initiation of ventilation and identification of ventilator associated pneumonia (Rello, Ollendorf, Oster *et al.* 2002), more studies show 1-4 days as the difference between early and late onset (Kollef, Shorr, Tabak *et al.* 2005; Berry, Davidson, Nicholson *et al.* 2011).

2.2.2 Pathogenesis

On admission into the intensive care unit environment, the critically ill mechanically ventilated patient is exposed to the ventilator associated pneumonia infection chain. Pathogenesis of ventilator associated pneumonia depends on the quantity and virulence of the microorganisms entering the lungs and the host's response. Hunter (2006) suggests patient mix such as neurology versus cardiac unit; institutional factors, prior antibiotic use and antibiotic resistance patterns in the unit and length of mechanical ventilation as determinants of the type of microorganisms responsible for the occurrence of ventilator associated pneumonia.

In a prospective cohort study, more virulent organisms: Pseudomonas aeruginosa, Acinetobacter sp, Xanthomonas maltophilia were identified more than 4 days from initiation of mechanical ventilation. These organisms were noted to be a great determining factor in the 65% intensive care unit mortality (Kollef, Shorr, Tabak *et al.* 2005). Supporting this finding, a randomised control trial compared positive cultured oral swabs

on day 1 and day 4 containing $\geq 10^5$ multi-resistant Staphylococcus, multi-resistant Acinobacter, Vancomycin resistant enterococcus, Escherica coli to determine the effect of oral hygiene approaches to bacterial colonisation. 4% of these patients showed ventilator associated pneumonia criteria and were positive for multiresistant Acinetobacter baumannii, Pseudomonas aeruginosa, Serratia and Enterobacter species on day 8 (Berry, Davidson, Nicholson *et al.* 2011). Viruses and fungi are more likely to be found in the oral cavities of immunocompromised patients with human immunodeficiency virus (File 2015). The National Noscomial Infection Survellance (1998) data shows that although the most frequently reported isolate was Staphylococcus aureus (17%), 59% of all reported isolates were gram-negative and the most communal gram-negative species were Pseudomonas aeruginosa (15.6%), Enterobacter species (10.9%), and Klebsiella pneumoniae (7.0%).

The intensive care unit environment contains more respiratory pathogens derived from a variety of sources compared with other units in the hospital. Russell, Boylan, Kaslick *et al.* (1999) In Garcia (2005) found that medical intensive care unit patients' oral mucosa and plaque were colonised 4 times more than dentistry clinic patients with respiratory pathogens such as Staphylococcus aureus, Streptococcus pneumonia and fungi. Coffin, Klompas, Classen *et al.* (2008) acknowledge that the external environment – contaminated air, water, staff, and equipment serve as reservoirs and habitat for causative organisms to grow and multiply before the oral cavity becomes colonised. A review of literature notes that antibiotic resistant Pseudomonas aeruginosa grows in tap water and may be transmitted during bronchoscopy or gastric endoscopy (Muscarella 2004). Poor infection prevention practices maintained during ventilator management such as failure to timely change the connection tube to the mechanical ventilator, and wearing rings during patient care also encourage growth of infectious organisms. A root cause analysis in a randomised control trial picked up poor hand washing technique among staff as reason for a critical incident of ventilator associated pneumonia which had been controlled to zero (Heck 2012).

The mechanically ventilated patient is highly critical, requiring an endotracheal tube or nasopharyngeal tube to be inserted into the oral or nasal openings for respiratory support (Munro & Grap 2004). Subglottal secretions accumulate above the endotracheal cuff and trickle down as micro aspirates into the lungs (Browne, Evans, Christmas *et al.* 2011). This becomes a connection for organisms from the external environment into the patient's

lungs. The presence of an airway also interferes with removal of secretions from the airway. Aspirated infected oral secretions are the major portal of exit for microorganisms from the oral cavity into the lungs. Acute Infection and inflammation of the lungs from aspiration of infective microorganisms alters the integrity of the lower airways reducing cilia activity and pneumonia develops (Stonecypher 2010).

Dry mucus membranes (xerostomia) may result because the patient's mouth is constantly open due to the presence of the endotracheal tube. Therapeutic administration of drugs such as diuretics during critical illness to protect the heart, lungs and kidneys may cause dehydration. Xerostomia decreases the amount of antibodies, intensifies formation of plaque and colonisation of microorganisms (Munro & Grap 2004).

2.2.3 Patient Characteristics

Susceptibility of the host is an important factor in determining outcomes of ventilator associated pneumonia. The critically ill patient is vulnerable and often immune-compromised, loss of consciousness and ability to protect the airway with gag reflex increases tendency for aspiration. Endotracheal intubation combined with mechanical ventilation is associated with a 7 to 21 fold increased incidence of pneumonia with up to 28% of patients mechanically ventilated developing this problem (Hunter 2006).

Ventilator associated pneumonia risk increases from 1- 3% each day a person is intubated; the most common patient being trauma, neurosurgical ,burn, medical ,surgical ,coronary patients (Rosenthal, Maki, Jamulitrat *et al.* 2010; Edwards, Peterson, Andrus *et al.* 2007). Rello, Ollendorf, Oster *et al.* (2002) used multiple logistic regression analysis demonstrate that trauma and male gender patients are at risk. Trauma patients may sustain oral injuries; leukaemia and other medical disease conditions like human immunodeficiency syndrome may disrupt the integrity of the oral mucosa, encouraging the growth of pathogenic organisms (Jones, Newton & Bower 2004). It was found that head and neck patients are more predisposed to oral problems (Jones, Newton & Bower 2004). Special positioning like the prone position; special equipment and lack of cooperation (Chan & Hui-Ling Ng 2012) also constitute difficulties. The presence of the endotracheal tube may pose challenges such as fear of dislodgment during oral care (Johnson & Chelmers (2002) cited in Registered Nurses' Association of Ontario 2008).

2.2.4 Mortality

The Institute for Health Improvement (2010) notes that ventilator associated pneumonia is the foremost cause of death amongst other hospital-acquired infections at 46% mortality rate versus 32% for patients who did not have ventilator associated pneumonia. Mechanically ventilated patients have the highest mortality rates, between 30-75% from multi-drug resistant Acinobacter baumannii (Chastre & Fagon 2002).

2.2.5 Length of Stay and Cost

Length of stay and cost of healthcare due to ventilator associated pneumonia increases variably. Ventilator associated pneumonia rate is the standard outcome measure for surveillance and is defined as the number of critically ill patients with ventilator associated pneumonia per 1000 ventilator days (Institute for Health Improvement 2010). According to Skrupky, McConnell, Dallas *et al.* (2012), a comparison of ventilator associated pneumonia rates recognised by the National Healthcare Safety Network in 2012 for various types of hospital units in the United States ranged from 1.2 to 8.5 per 1000 ventilator days. Cost of care was estimated at $40,000 per patient (Institute for Health Improvement 2010). Kollef, Shorr, Tabak *et al.* (2005) in the epidemiologic surveillance of ventilator associated pneumonia show length of stay of 34 days with patients who had ventilator associated pneumonia compared with 21 days with patients who had no ventilator associated pneumonia. In South Africa, between 2011 and 2012, 0 to 32 per 1000 ventilator days and a 28% ventilator associated pneumonia rate was reported (Dube 2013).

Length of stay and cost may be influenced by certain strategies for managing ventilator associated pneumonia. Nicasio, Eagye, Kuti *et al.* 2010 found that using a clinical pathway to treating patients with ventilator associated pneumonia reduced length of stay and cost. Speroni, Lucas, Dugan *et al.* 2011 found a difference in cost of $5,051 when supra-glottic suctioning was employed in patient management. Although the American Association of Critical Care Nurses' 2010 oral care practice alert (Aliso 2010) acknowledges the impact of tooth brushing in reducing length of stay and cost in advocating protocols that involve tooth brushing based on several studies; it is interesting that Gu, Wan-JieGong, Pan *et al.* (2012) did not find any significant decrease in length of stay associated with tooth brushing (-0.88 days; 95% CI, -2.58 to 0.82).

2.2.6 Prevention of Ventilator Associated Pneumonia

Several guidelines have been developed to prevent ventilator associated pneumonia. The American Association of Critical Care Nurses' practice alert on ventilator associated pneumonia advocates for the necessity of oral care to be seen in combination with other interventions (Martin 2008). For a broader view on the prevention of ventilator associated pneumonia, recommendations from some guidelines are discussed.

2.2.6.1 Institute for Healthcare Improvement guideline

As part of its initiative for preventing 5 million incidents from harm during therapy, the Institute for Healthcare Improvement, a non-profit organization and global leader in improving health care took voluntary steps to develop a ventilator associated pneumonia prevention guideline by involving volunteering hospitals and communities in specific studies. This was so that if there was a success, knowledge gained would be passed to other hospitals. Intensivists and health improvement experts were included in the committee who acknowledged the high levels of mortality and morbidity and set ventilated patients as top priority in their plans to redesign the intensive care unit. The findings led the Institute for Healthcare Improvement to urge the utilization of a ventilator associated pneumonia bundle which involves elevation of the head of the bed, daily 'sedation actions' with assessment of readiness to extubate, peptic ulcer disease prophylaxis, deep venous thrombosis prophylaxis, daily oral care with chlorhexidine in all intensive care units for reducing ventilator associated pneumonia to zero (Institute for Healthcare Improvement 2014).

- **Elevation of the head of bed**

The challenge of maintaining the head of the bed elevated at 30°-45° in a study about its feasibility (van Nieuwenhoven, Vandenbroucke-Grauls, van Tiel *et al.* 2006) was met with the benefit of decreased tendencies for aspiration and increased spontaneous tidal ventilation in critically ill patients on pressure support ventilation (Drakulovic, Torres, Bauer et *al.* (1999) cited in Institute for Healthcare Improvement 2012). The Institute for Health Care Improvement highlights changes that could lead to an improvement in the implementation of elevation of the head of bed amongst other interventions for preventing ventilator associated pneumonia. The suggested changes include making it a topic and

checking compliance during multidisciplinary ward rounds; the use of nursing flow sheets, order sets, family involvement, use of electronic beds, and putting post compliance data in a conspicuous place to motivate staff (Institute for Healthcare Improvement 2012).

- **Daily 'sedation actions'**

Daily sedation lightening is suggestive of improving patient's effort in coughing, the control of secretions and cooperation while on mechanical ventilation, and is also required for a successful and safe extubation. Kress, Pohlman, O'Connor *et al.* (2000) cited in Institute for Healthcare Improvement (2012), showed that length of stay on the mechanical ventilator decreased from 7.3 days to 4.9 days (p= 0.004) when nurses evaluated the patients during daily interruptions of sedative infusions. Concerns about daily sedation lightening were risk for unplanned self-extubation, the potential for increased pain and anxiety, and worsened psychological complications (Thomas, Torben & Palle 2010; Kress, Gehlbach, Lacy *et al.* (2003) cited in Institute for Healthcare Improvement 2012). The Institute for Healthcare Improvement suggests a protocoled approach to daily lightening of sedation, neurological assessment of patient's readiness to extubate and increased vigilance to avoid self extubation (Institute for Healthcare Improvement 2012).

- **Peptic ulcer disease prophylaxis**

Critically ill patients having peptic ulcer prophylaxis were found to have less risk of ventilator associated pneumonia from aspiration (common odds ratio 0.42, 95% CI 0.17 to 1.11) (Cook, Laine, Guyatt, *et al.* (1991) cited in Institute for Healthcare Improvement 2012); also, gastric bleeding was reduced to about 5 times with less risk of mortality compared with those with gastric bleeding ($P<0.001$) (Cook, Fuller, Guyatt *et al.* (1994) cited in Institute for Healthcare Improvement 2012). Caution in maintaining a balanced pH is needed because certain infective organisms such as Gram negative bacteria and Clostridium difficle grow at higher pH of ≥ 4 (Institute for Healthcare Improvement 2012). Sucralfate administration brings concern for greater tendencies to gastric bleeding; also, the effect of not administering H_2 antagonist or proton pump inhibitors to patients who have low risk for developing gastro-intestinal bleeding is an unresolved issue (Coffin, Klompas, Classen *et al.* (2008). The Institute for Healthcare Improvement supports the

inclusion of H_2 inhibitors, sucralfate or proton pump inhibitors in a protocol's order set for ventilator associated pneumonia (Institute for Healthcare Improvement 2012).

- **Deep Venous Thrombosis Prophylaxis**

Reduced mobility during critical illness causes stagnation of blood flow and slow removal of broken down cells and toxins; leading to formation of thrombi and increased tendencies for infection. Wip & Napolitano (2009) argue that deep venous thrombosis prophylaxis is an indirect measure in the prevention of ventilator associated pneumonia and the association between deep venous prophylaxis and reduced ventilator associated pneumonia rate is not clear (Institute for Healthcare Improvement 2012), Deep venous thrombosis prophylaxis is advocated to be included as part of the intensive care unit admission order set and ventilator order set (Institute for Healthcare Improvement 2012).

- **Daily oral care with chlorhexidine**

In a sample of trauma patients who remained intubated for 48 to 72 hours, timely application of chlorhexidine was observed to reduce ventilator associated pneumonia by decreasing the amount of pathogenic organisms in the oral cavity which could become aspirated (Grap, Munro, Hamilton *et al.* 2011). The American Association for Critical Care Nurses' practice alert for oral care on critically ill patients supports the Institute for Healthcare Improvement's advocacy for 12 hourly tooth brushing and application of 0.12% chlorhexidine gluconate solution especially on adult patients who underwent cardiac surgery (Aliso 2010).

A sum of evidenced based elements in the ventilator associated pneumonia bundle rather than parts for preventing ventilator associated events in the intensive care unit is advocated as the standard approach by the Institute of Healthcare Improvement. This is because there was a 45% improvement in many intensive care units using the 'all-or nothing' approach, going consecutive months without ventilator associated pneumonia compared to when individual elements were evaluated (Institute for Healthcare Improvement 2012) acknowledging that not all possible interventions for the prevention of ventilator associated pneumonia have been included. Since the sensitivity and specificity of ventilator associated pneumonia varies, second level evidence from local review by internal experts on

ventilator associated pneumonia definition, diagnostic criteria and regular application of prevention strategies is advocated to guide decision making (Institute for Healthcare Improvement 2012).

2.2.6.2 American Thoracic Society\The Infectious Diseases Society of America guideline

This is the approved statement of the American Thoracic Society and the Infectious Diseases Society of America which aims at guiding appropriate antibiotic treatment in managing ventilator associated pneumonia for immunocompetent patients. It was accepted in October 2004 and iterates a shift of approach to antibiotic therapy from the traditional narrow spectrum (broad spectrum approach) to a rather de-escalating approach. Emphasis is placed on utilizing local microbiological data specific to the particular clinical setting in making decisions. It is also recommended that an initial empiric broad spectrum therapy should be simplified by reducing the number of antibiotic agents or reducing the spectrum to a specific therapy based on lower respiratory tract quantitative culture sensitivity results (American Thoracic Society\The Infectious Diseases Society of America 2005).

When signs of ventilator associated pneumonia are detected, early empiric antibiotic therapy is withheld if early onset and commenced if multiple drug resistant organisms are involved or late onset ventilator associated pneumonia is suspected. A broad spectrum regimen containing a separate antibiotic class than the patient had received and at least one drug active against the usual multi resistant drug regimen is prescribed in adequate doses through the most optimal route to optimize efficiency. Fewer organisms are resistant to Carbapenems which is preferred to cephalosporin as initial therapy and second inline treatment when there is resistance to early onset gram positive organisms in the second culture done 48 hours after the first culture (American Thoracic Society\The Infectious Diseases Society of America 2005).

A judicious specific combination or single antibiotic regimen is determined based on the culture result. Aminoglycosides and βlactam combination therapy is suggested for Pseudomonas aeuroginosa; colistin for Acinetobacter; linezolin for Staphylococcus aureus. A shorter duration of antibiotic therapy (7-8 days) is recommended where the patient is uncomplicated (American Thoracic Society\The Infectious Diseases Society of America 2005).

2.2.6.3 Centers for Disease Control and Prevention guidelines

The 2003 Centers for Disease Control and Prevention guideline on the prevention of healthcare associated pneumonia (Tablan, Anderson, Besser *et al*. 2004); was evaluated by specialists in infection control, intensive-care medicine, pulmonology, respiratory therapy, anaesthesiology, internal medicine, paediatrics; and approved by the Healthcare Infection Control Practices Advisory Committee. It consists of three parts. The first, a background of recommendations for a variety of settings for an effective healthcare personnel education program. Next, recommendations on epidemiology, diagnosis, pathogenesis, modes of transmission, prevention and control of infections; for the identification and prevention of specific infections (bacterial pneumonia, Legionnaires disease, pertussis, intrusive pulmonary aspergillosis, lower respiratory tract infections triggered by respiratory syncytial virus (parainfluenza and adenoviruses, and influenza). Last was performance indicators to support infection control personnel in monitoring its accomplishment.

The supplemental article by the Centers for Disease Control and Prevention (Coffin, Klompas, Classen *et al.* 2008) in the second and third part of the 2003 gives a concise outline of recommendations for planning, implementing and prioritizing the inhibition of ventilator associated pneumonia in acute care hospitals documented under 5 headings.

- Rationale and statements concerned with the incidence of ventilator associated pneumonia in acute care facilities over 10 cases per 1000 ventilator day: pathogenesis and risk factors lead to the invasion of the former sterile lower respiratory tract. Outcomes associated with ventilator associated pneumonia include mortality, prolonged length of stay, excess use of antimicrobials and increased cost. Ventilator associated pneumonia is preventable by consistency in following the recommended process of care.

- Strategies to detect ventilator associated pneumonia requires settling on a particular surveillance definition and method such as case finding, quantitative cultures and electronic surveillance tools.

- Strategies to prevent ventilator associated pneumonia infer the three most common mechanisms: aspiration of secretions, colonisation of the respiratory-digestive tract and use of unclean equipment. General strategies recommended include active surveillance for ventilator associated pneumonia, meticulous hand hygiene practice, non-invasive ventilation used when possible, protocoled daily assessment of patient readiness to wean and personnel education.

- Recommendations for implementing prevention and monitoring strategies: these include accountability and good practice besides surveillance and educating personnel on local epidemiology, risk factors and patient outcomes. Accountability, where chief and senior management take responsibility for supporting an effective infection control programme is necessary. An adequate number of trained, competent direct and ancillary healthcare personnel are held accountable for consistent and appropriate practice.

- Performance measures include internal reporting to support hospital quality improvement efforts and external reporting for state or federal requirements and external quality initiatives.

Special preventive interventions supported by the American Association of Critical Care Nurses include endotracheal tubes with in-line and subglottic suctioning and an intensive care unit bed that enhances elevation of the head of bed at 30˚ or higher. Coffin, Klompas, Classen *et al.* (2008) note that administration of intravenous immunoglobulin white-cell–stimulating factors such as filgrastim or sargramostim, chest physiotherapy or rotational therapy with kinetic or continuous lateral rotational therapy beds and changing the ventilator circuit (Martin 2008) should not be done routinely.

2.2.7 Ventilator Bundle Compliance

Ventilator bundle compliance is an ‘all-or-nothing’ weekly prevalence measure indicator. It is defined as the proportion of intensive care patients on mechanical ventilation for whom all five of the elements of the ventilator bundle (elevation of the head of the bed, daily "sedation actions" and assessment of readiness to extubate, peptic ulcer disease prophylaxis, deep venous thrombosis prophylaxis, daily oral care with chlorhexidine) are

documented on the daily goals sheets and/or elsewhere in the medical record (Institute for Healthcare Improvement 2014). The goal of the ventilator compliance bundle is that 95% of all patients will have all five elements of the bundle. Data is collected by taking samples one day per week and includes all patients on mechanical ventilation in the intensive care unit. The days of the week and the shifts are rotated. On the day of the sample, all patients on mechanical ventilation and their respective medical records are exampled for evidence of bundle compliance; only patients having all five elements of the ventilator bundle in place are documented as being in compliance with the ventilator bundle (Institute for Healthcare Improvement 2014). Coffin, Klompas, Classen *et al.* (2008) asserts that the strategy includes monitoring hand hygiene compliance as a process measure and monitoring the prevalence density of ventilator associated pneumonia as an outcome measure.

The American Association of Critical Care Nurses' practice alert for ventilator associated pneumonia suggests developing a plan of action that includes forming a multidisciplinary task force to follow up implementation of changes if ventilator compliance is less than 90%. Incorporating educational content into orientation programmes, initial and yearly competency verifications, staff alerts and reminders, setting documentation standards and the use of standing orders is also advocated (Martin 2008).

2.2.8 Summary of Recommended Strategies for Preventing Ventilator Associated Pneumonia

STRATEGY	IHI	ATS	CDC	AACN
Prevent aspiration of infected secretions				
• Brush teeth				√
• Oral cleansing with chlorhexidine	√			√
• Aspiration of subglottal secretions		√	√	√
• Endotracheal tube cuff pressure		√		
• Avoid endotracheal intubation		√	√	
• Head of bed elevation	√	√	√	√
• Enteral feeding		√	√	
• Peptic ulcer prophylaxis	√		√	
Effective infection control measures				
• Hand hygiene			√	
• Decontamination of equipment			√	
• Deep venous thrombosis prophylaxis	√			
• Judicious antimicrobial therapy		√	√	
• Surveillance			√	
• Staff education			√	
• Monitoring compliance	√	√	√	√

KEY: IHI- Institute for Healthcare Improvement; ATS- American Thoracic Society; CDC – Centers for Disease Control and Prevention; AACN- American Association of Critical Care Nurses.

2.3 ORAL CARE IN THE INTENSIVE CARE UNIT

Oral care in the intensive care unit is essential care unique to the needs of the intubated patient (Elliott, Aitken & Chaboyer 2007). Ventilator associated pneumonia predisposes the patient to the transfer of infective material by translocation to other organs leading to death (Dale, Angus, Sinuff *et al.* 2013), this necessitates the shifting focus of oral care from being a comfort measure to an infection prevention measure. Comfort care is based on no evidence, and is not sufficient to prevent respiratory infections. The nurses' role in plaque removal, stimulation of salivary flow with greater emphasis on infection prevention for evidenced based oral care is now advocated (Munro & Grap 2004).

The intensive care unit is technically sophisticated and requires high skill for operation of equipment, consideration for special patient characteristics, and collaboration of nurses with other health care professionals for successful outcomes (Binkley, Furr, Carrico *et al.* 2004). When nurse competencies match patient characteristics, this is synergy. Evidenced based oral care encourages the achievement of optimal outcomes for the mechanically ventilated patient, the nurse and the system. Nursing competencies that interact with environmental and patient factors in the oral care microsystem, amongst other interventions are knowledge: clinical judgement, facilitation of learning and clinical enquiry; attitude: systems thinking, diversity of response and collaboration; and practice: caring oral care practices, advocacy and moral agency (Curley 1998).

2.4 FACILITATORS AND BARRIERS TO ORAL CARE PRACTICE

Factors affecting the match and synergy between intubated patient characteristics and intensive care nurses' competencies in evidenced based oral care practice for optimal outcomes are discussed under knowledge, attitudes and procedures.

2.4.1 Knowledge

According to Curley (1998), nurse competencies required for oral care knowledge are clinical judgement, facilitation of learning and clinical inquiry. Clinical judgement is clinical reasoning developed from nursing skill and the comprehensive understanding of

the patient's needs within the clinical context. It is based on formal, informal learning and evidenced based guidelines.

Evidenced based oral care knowledge influences attitudes and skill demonstrated in nurses' clinical judgement towards optimal outcomes. In a Chicago area acute hospital, there was once no tooth brushing. This was improved by 30% after an initial educational intervention (Cutler & Davis 2005). The impact of knowledge in preventing ventilator associated pneumonia was also demonstrated after an evidenced based oral care educational intervention which improved oral health status with significantly decreased mean oral assessment scores (from 11 to 9); and a 50% decreased ventilator associated pneumonia rate (Ross & Crumpler 2007). After an oral care education program, the treatment group had decreasing oral assessment scores from day 1-5 with strongest correlation on day 5 (Ames, Sulima, Yates *et al.* 2011). There was decreased ventilator associated pneumonia rate from 4.4 to 1.86 per 1000 ventilator days in a study comparing a 6 month retrospective period with a 12 month prospective period (Cuccio, Cerullo, Paradis *et al.* 2012). Education caused a significant improvement in the perceived priority of oral care and the use of evidenced based practices among intensive care unit nurses in Israel (Ganz, Ofra, Khalaila *et al.* 2013).

- **Nursing school training**

Critical care nurses require advanced knowledge for specialist practice in the intensive care unit. This is different from basic generalised knowledge which is not specific to a particular context (Perrie, Schmollgruber, Bruce *et al.* 2014). Without advanced knowledge and understanding of the clinical context, nurses could perceive the oral cavity of the intubated patient as "unknown", an area of oblivion, remaining obscure and difficult to clean or appreciate if oral care makes a difference (Perrie, Scribante, Windsor *et al.* 2011; Rello, Koulenti, Blot *et al.* 2007). Developing a knowledge base to influence nurses' oral care practice starts from basic to specialist training through orientation and continuing education.

Oral care training on oral needs assessment or oral care methods is often absent or given low priority (Jones, Newton & Bower 2004), 79.2% of a sample of registered nurses disagreed to having training during nursing school (Rello, Koulenti, Blot *et al.* 2007).

Barriers to intensive care nurses' knowledge of evidenced based oral care practice exists during specialist training as there is greater focus on technology and nurse educators in specialist schools assume students already know oral care for ventilated patients despite the general approach in basic nursing oral care education (Binkley, Furr, Carrico *et al.* 2004). Knowledge on evidenced based oral care practice is scattered among the literature and is yet to be gathered for communication into specialist training books (Dale, Angus, Sinuff *et al.* 2013).

Dolce (2014) lays emphasis on oral care education in nursing schools calling nurse educators to action, to change their perceptions of oral care from basic to essential care, increase its visibility in the curricula and encourage collaborative contributions to learning from other health professionals. Students should know how to perform oral assessment as part of their physical exams, recognise common oral health diseases in the critical care unit, integrate this care into the comprehensive plan and make possible referrals through independent thinking.

- **Workplace education**

Continuous education facilitates clinical reasoning. Effective workplace education is advocated and makes up for the shortcomings between nursing school training and patient needs (Perrie, Schmollgruber, Bruce *et al.* 2014; Heck 2012; Binkley, Furr, Carrico *et al.* 2004). Orientation of the novice nurse and continued education on oral care for the intubated patient are advocated (Martin 2008; Registered Nurses' Association of Ontario 2008). Feider, Mitchell & Bridges (2010) suggest that baseline assessment of oral care knowledge and skill should be done during nurse orientation. Registered Nurses' Association of Ontario (2008) suggests that the content of orientation programmes should lay adequate oral health entry knowledge for nurses on anatomy, physiology, and normal aging; medication and radiation effects; use of evidenced based oral care protocol and oral assessment tool, referral criteria and infection control considerations.

Facilitation of clinical oral care learning is for self and other nurses' clinical inquiry by engagement in a continuous improvement process based on research and practical learning (Curley 1998). Adoption of a multi strategy approach is recommended from the partial success of a national effort towards translating evidenced based education on an oral care

guideline into practice. There was improvement in evidenced based oral care practice scores after an educational intervention on a new protocol; however, there was no improvement in the use of toothbrush, chlorhexidine or oral care documentation among nurses (Ganz, Ofra, Khalaila *et al.* 2013). According to Ross & Crumpler (2007), focusing an educational programme on patient outcomes rather than nursing tasks to be performed was successful in improving the quality of oral care. Browne, Evans, Christmas *et al.* 2011 suggest strategies such as one-on-one in-service education, using pocket brochures, discussing pathophysiology of ventilator associated pneumonia and case studies.

- **Protocol**

The Centers for Disease Control and Prevention 2003 guideline (Tablan, Anderson, Besser *et al*. 2004) recommends oropharyngeal cleaning and decontamination throughout the perioperative period. Implementation of this recommendation requires consistent oral care; maintaining quality standards in assessment, frequency and documentation (Ervin 2005). To achieve consistency, it is advocated that oral care policies for the mechanically ventilated patient need to be instituted, implemented, evaluated and updated timely to motivate administrators in making supplies available (Browne, Evans, Christmas *et al.* 2011; Stout, Goulding & Powell 2009).

Training on a simple affordable oral care protocol improved oral health status, reduced risk of ventilator associated pneumonia and cost of care. It is suggested that the oral care protocol may be accompanied by order sets to enhance quick selection of the following: oral care lotions, frequency of care, decisions on whether nurses or pharmacists can initiate and manage the protocols and order sets, the use of electronic medical records in the weekly monitoring of nurses' compliance with oral care on intubated patients by the sepsis coordinator; and provision of feedback (Prendergast, Kleiman & King 2013; Ross & Crumpler 2007; Cutler & Davis 2005).

- **Clinical facilitation and mentorship**

When senior nurses pass on a culture of evidenced based oral care practice to novice nurses, it lays a foundation for future practice. According to Vygotsky (1978), a zone of proximal development exists - where the knowledge of senior nurses becomes sufficient to

meet the learning needs of junior nurses for the provision of oral care on the intubated patient. Labeu, Van de Vyver , Brusselaers *et al.* (2008) argue that seniority correlates with increased oral care knowledge though this had no effect on providing evidenced based oral care. In one study, ninety percent of intensive care nurses responded that there was low emphasis on oral care training in specialist school and so they relied on learning from senior nurses (Lin, Chang, Chang *et al.* 2011). Direct clinical contact by trained instructors compared to passive self-learning from books may be preferred by some nurses (Binkley, Furr, Carrico *et al.* 2004), even though some nurses who learnt on their own were found to be more knowledgeable (Lin, Chang, Chang *et al.* 2011). Prendergast (2012) involved a dental hygienist in a hands-on demonstration of a new oral care protocol to reinforce learning; nurses were in pairs at the end of the educational session, cleaning each other's mouth. Ensuring a positive air during training sessions to enhance perception is encouraged (Binkley, Furr, Carrico *et al.* 2004). Continuous supervision of practice by having a trained unit based clinical nurse specialist assist in bedside rounds and compare outcomes of different strategies is recommended (Ross & Crumpler 2007).

- **Measurement**

The Institute for Healthcare Improvement (2010) encourages the establishment of methods within an institution to decide on patterns and methods for regular data collection while noting that benchmarking will depend on the institution's accepted definition for ventilator associated pneumonia, diagnostic criteria and populations treated. Curley (1998) notes that outcomes could be nurse sensitive or patient focused. The strength of linkages between nursing care and patient outcomes are checked by quality indicators such as rate of adverse incident, patient's length of stay and mortality rate. Nurse sensitive outcomes measure process of care which includes how nurses complete their daily assessments and structure of care such as education, skill, certification while patient focused outcomes measure the condition of the patient and change in ventilator associated pneumonia rate. Evaluation of the success of an oral educational programme is advised to be more on patient oriented outcomes rather than task oriented outcomes (Ross & Crumpler 2007).

2.4.2 Attitude

According to Curley (1998), the nurse requires competency in systems thinking, advocacy and moral agency. Systems' thinking is the recognition of holistic relationships within and across healthcare systems; advocacy and moral agency is where the nurse functions as a leader and moral agent on behalf of the patient, expressing and helping to resolve his ethical and clinical concerns.

Oral care perceptions and priority are nurses' personal beliefs and attitudes which form the basis for nurses' systems thinking, advocacy and moral agency. In a survey of intensive care units in the United States, a regression analysis showed that oral care priority and the perception of oral care as not unpleasant were among the strongest predictors of quality of care (Furr, Binkley & McCurren 2004). In an ethnographic review of nursing literature on oral care for intubated patients; neglect, highly determined by attitude (Lin, Chang, Chang *et al.* 2011) was found to be a major theme influencing complexity of practice (Dale, Angus, Sinuff *et al.* 2013).

2.4.2.1 Perception

Nurses' perception of oral care is the perception of unpleasantness, difficulty and importance of oral care in improving oral health, adequacy of oral care training, perception of adequacy of supplies and perception of hospital administration's commitment (Lin, Chang, Chang *et al.* 2011). Perception has been measured in different countries using a similar instrument (Perrie, Scribante, Windsor *et al.* 2011; Rello Koulenti, Blot *et al.* 2007; Binkley, Furr, Carrico *et al.* 2004). Pettit, Mccann, Emet *et al.* (2011) assessed nurses' oral care perceptions in Texas intensive care units by rating their knowledge and perception about the contribution of specialist training to their oral care preparedness, perception of responsibility and importance of oral care measured on a scale of 1-4: not at all, minimal, enough, very much.

- **Barriers**

The provision of routine oral care on intubated patients depends on nurses' personal perception or opinions of oral care (Browne, Evans, Christmas *et al.* 2011). Nurses neglect

oral care when it is performed without attention to detail (Munro & Grap 2004). A positive perception among intensive care nurses of oral care as a lifesaving essential nursing responsibility is necessary to prevent neglect of oral care on admission and during hospitalization. According to Binkley, Furr, Carrico *et al.* (2004), 91% of nurses in a survey opined that nurses should be responsible for oral care, but all nurses may not have the same perception. When open ended questioning was used in another study (Pettit, Mccann, Emet *et al.* 2011); there was lack of agreement among nurses on who should be responsible for oral care, some suggested nurse technicians and respiratory therapists.

Nurses may be too optimistic about the oral care provided even when it is done according to personal preference and timing. In a study, Malaysian nurses expressed optimism with 30-50% of nurses indicating in the survey that oral care was provided more than once a day. Oral care was provided only at night in one hospital and in another hospital, no oral care was observed (Soh, Soh, Japer *et al.* 2011).

A mutually agreed evidenced based unit philosophy, mentorship, modelling through bedside involvement of the nurse manager to encourage novice nurses' expertise in enhancing high oral care priority and positive perception may not exist. This was found in the influence of a nurse manager insisting oral care should be performed according to 'approved' unit tradition rather than contemporary research (Yeung & Chui 2010).

The Perception of oral care as important or not important could be positively influenced by co-nurses. This was found in a study to develop oral care expertise based on nurses' perception of the importance of tooth brushing versus tendencies that nurses will go by personal preference to only swab and suction a patient's mouth (Lin, Chang, Chang *et al.* 2011). Bingham, Ashley, De Jong *et al.* (2010) however, note that despite unit based strategy in the provision of directed and resourceful education using a team based approach, patient outcomes and staff compliance with oral care protocols did not improve significantly because the institution frequently changed personnel and leadership. According to Binkley, Furr, Carrico *et al.* (2004), 74% of nurse respondents agreed that the mouths of patients got worse no matter what they did. Learned helplessness is the perception of nurses about the oral care system, that no matter what they do, patient outcomes will not change.

- **Facilitators**

Administrative involvement in changing oral care documentation in an intensive care unit prevented staff from reverting back to old ways with resultant reduction in ventilator associated pneumonia rates (Chan & Hui-Ling Ng 2012). In a survey of some intensive care units in Taiwan, low evidenced based oral care knowledge scores below the sample average of 58.8% corresponded with less frequency and low priority given to oral care. Administrative involvement should give oral care high priority by providing supplies, involvement in education, allocating adequate time, proper documentation, adequate staffing and encourage positive attitudes.

2.4.2.2 Priority

Priority relates to the belief that oral care is given significance in patient care. Binkley, Furr, Carrico *et al.* (2004) measured priority by asking nurses to rate if oral care is given high priority. Grap, Munro, Ashtiani *et al.* (2003) and Ganz, Fink, Raanan *et al.* (2009) measured priority on a low to high scale between 1- 100; Jones, Newton & Bower (2004) rated priority by comparing nursing activities from low to greatest priority on a scale of 1-10; Lin, Chang, Chang *et al.* (2011) described priority by comparing non collaborative care (nurses' physical activities) with collaborative care (nurses' treatment activities).

- **Barriers**

Binkley, Furr, Carrico *et al.* (2004) suggest that low priority to oral care may be due to the fact that nursing education is very medically oriented. The higher the acuity of the patient, the fewer tendencies that oral care would come to mind (Munro & Grap 2004).

- **Facilitators**

In a study, facilitators to the standardization of oral care improved compliance after an educational intervention was given as an opportunity to earn continued education credit. The pre intervention competency assessment test over 6 months found that deep suctioning was mostly omitted, posters were displayed using SBAR format (situation, background, assessment and recommendation); 5 month and 12 month post intervention data were

collected by online test. Changes made in oral care packaging were supervised by two resource nurses (Chan & Hui-Ling Ng 2012).

The use of psychology in the process of securing and sustaining change should consider that nurse and organisational attitude progresses from compliance to commitment to change (The Aurum Institute n.d). This occurs within 5 stages: pre-contemplation, contemplation, preparation, action and maintenance. In the pre-contemplation stage, there is no awareness or perceived need for evidenced based oral care and focus is on creating awareness. Nurses are aware a problem exists in the contemplation stage and perceived benefits are emphasized. In the preparation stage, nurses decide to take future action but are not prepared for the change; they require knowledge skills and administrative support. During the action stage, new changes are in progress and need to be reinforced by coaching and mentoring towards the maintenance stage where nurses' evidenced based oral care practice becomes firmly established. Understanding how to change can break negative patterns of learned helplessness.

The Institute for Healthcare Improvement (2010) advocates placing quick feedback summaries of outcomes at a prominent area and applauding successes for staff motivation; also to serve as easy comparisons of 'where we are now' and 'where we ought to be' following the guidelines.

2.4.3 Procedures

Within a therapeutic environment, nursing care actions are tailored to the patient's special characteristics. These care actions include but are not limited to observation, commitment, and responsiveness. Nurse competencies for performing the procedure include caring practices, response to diversity and collaboration. Response to diversity as a nurse competency is recognising, appreciating, and incorporating differences found among patients in the internal and external environments during care. Collaboration with others (patient, family, healthcare providers) should be in a manner that maximises their contribution towards achieving optimal outcomes (Curley 1998).

- **Preparation**

Oral care includes preparing the patient, assembling supplies, performing the procedure, and ensuring safety. Standardization of oral care procedures and pointing out techniques meant for an intubated patient gives the nurse a feeling of competency, encourages protocol compliance and reduces tendency for inconsistency (Registered Nurses' Association of Ontario 2008). Conducting a 5P assessment (patient, purpose, professionals, patterns, process) explores and gives information for inference on potential and actual threats to the mechanically ventilated patient's oral health status. This also serves as an opportunity to explore the clinical condition, purpose and plan of care, availability of materials and personnel, and possible barriers in the intensive care unit context (Dolce 2014).

Soh, Soh, Japer *et al.* (2011) found that lack of hospital supplies such as lotions and tools; lack of documentation space and lack of an evidenced based protocol were barriers to employing safety precautions for a reduced ventilator associated pneumonia rate. After giving education to nurses (Cason, Tyner, Saunders *et al.* 2007); hand washing, a necessary precaution to prevent introducing microorganisms during suctioning and bronchoscopy (Muscarella 2004) became more frequent. Oral care safety in the intensive care unit can also be promoted by making infection control policies, employing ergonomics like the positioning of the nurse and patient during oral care, allocating of sufficient time, adequate staffing, using appropriate equipment, good documentation, collaboration, referral and monitoring compliance (Registered Nurses' Association of Ontario 2008).

Orientating the novice nurse and placing the oral care pack at the bedside promotes oral care compliance (Cutler & Davis 2005). Protective equipment such as eye shield and gloves are assembled; perception of difficulty from poor visualization may be resolved by using a direct light source (such as flash light) to allow better visualization, a disposable dental mirror and tongue blades (Sumi, Nakamura, Nagaosa *et al.* (2001) cited in Registered Nurses Association of Ontario 2008). Choice of oral care supplies differ between developed and less developed countries and may be influenced by cost, the patient's oral condition or the patient's systemic clinical condition. The patient is positioned; anticipated problems like patient biting the tube, head acing downwards, head

moving constantly are taken care of. For instance, the mouth is propped open using bite block or disposable mouth prop (open wide plus), and head is stabilized. It is also recommended that an assistant holds the tube to prevent dislodgement (Johnson & Chelmers (2002) cited in Registered Nurses' Association of Ontario 2008).

- **Assessment**

Yeung & Chui (2010), in an exploration of factors affecting the provision of oral care in Hong Kong found that nurses did not mention oral assessment as part of oral care in the intensive care unit. Because the mouth is the mirror of the body, oral health assessment of the intubated patient is not to be viewed separately; but in consideration of the patient's general clinical condition. For instance, the immune-compromised patient with raised intracranial pressure could have oral fungal infection; although oral care was found not to significantly influence fluctuation in intracranial pressure $p=0.72$, it is recommended that oral care should be done only when intracranial pressure is within normal range (Prendergast 2012).

Oral health assessment is beneficially carried out using a standard tool every shift (Browne, Evans, Christmas *et al.* (2011); Munro & Grap (2004) and White (2000) cited in Registered Nurses' Association of Ontario (2008), using pictorial oral assessment guides enhances the development of nurses' expertise in diagnosing oral problems, just like a dental hygienist would. Booker, Murff, Kitko *et al.* (2013) suggest that assessment should also be repeated after oral care.

Prendergast (2012) identified research gaps on the psychometric properties of various oral assessment guides. Beck's (Beck 1979), Eilers' (1988) cited in Prendergast, Kleiman & King 2013), and the world health organisation grading scale (World Health Organisation (1997) cited in Registered Nurses' Association of Ontario 2008) are among many. Beck's and Eilers' are similar and have been modified severally for clinical application by removing the voice component, or combined to suit studies on intubated patients. Ames, Sulima, Yates *et al.* (2009) in their study on systematic oral care argue that a modified Beck oral scale which has 5 sub scales: saliva, teeth, tongue, lips, and oral mucosa could be less time consuming, more representative and clinically useful in the intensive care unit.

Prendergast (2012) reproduced an adapted Eiler's oral assessment guide with permission from the University of Nebraska. This guide includes tools and methods for measurement and suggestions on how to evaluate 8 items: swallow, lips, tongue, saliva, mucous membranes, gingiva, and teeth (voice is replaced with olfaction on a scale of 1-3) to a total score of 24. Swallowing is observed by moving the tube during repositioning and the patient is scored 2 anticipating pain from the presence of the endotracheal tube or 3 if sedated and having absent gag reflex. Lips and tongue are observed using a bright light source and palpated with a lubricated finger, saliva is assessed by inserting a disposable mirror into the mouth and along the buccal mucosa, gingiva is pressed with the tip of the tongue blade and teeth are observed 1 minute after applying plaque disclosing swab such as Oral-B®.

According to Prendergast, Kleiman, & King (2013), purpose of oral care depends on the score; the higher the score, the more frequent oral care is needed to hydrate the oral cavity as follows: healthy mucosa (score 8-10: 2-3 times daily: oral health promotion), moderately impaired (score 11-14: 4-5 times daily: oral health maintenance) and poor oral hygiene (score 15-24: 6 or more times: oral health restoration). This oral care assessment scoring could be integrated into nursing care plans to describe, and write out oral care nursing diagnosis and plans for the intubated patient. An example of an outcome statement for a patient with healthy mucosa would be '… patient will maintain oral assessment scores of 10 or less throughout the shift'.

- **Treatment**

Saliva has many functions, it contains protective enzymes for the oral mucosa and for maintaining teeth (Pinheiro, Maria, Lauria *et al.* 2013). The oral cavity is described as wet or dry in relation to saliva production. Excessive salivation occurs in patients with organophosphate poisoning. Tendency to xerostomia or dryness of the oral cavity is more common for reasons such as the placement of the endotracheal tube which leaves the mouth open to the air, medications like diuretics; and the 30° recumbent position common in the intensive care unit which decreases the rate of saliva production compared with to standing position (Bruya & mediera (1975) cited in Prendergast 2012; Dawes (1996) cited in Prendergast 2012).

Xerostomia: is classified as a disease of the salivary glands (International Statistical Classification of Diseases and Related Health Problems ICD9 code 527.7), it occurs as dryness of the oral mucous membranes. It is the most common oral care finding because of the tendency of critically ill patients to be therapeutically dehydrated from therapies that preserve the heart, lungs and kidneys. Other predisposing factors include diabetes mellitus, hypothyroidism and altered immune system function.

The Oral Cancer Foundation (Bartels 2014) suggests ways of diagnosing xerostomia. This includes sialometry, a simple procedure which evaluates the flow rate of saliva. The mouth is inspected with a tongue depressor which may become stuck to the buccal mucosa. In women, the 'lipstick sign', where lipstick remains on the front teeth may be a suitable indicator of xerostomia which should be confirmed by feeling the buccal mucosa with a gloved finger.

Xerostomia requires more frequent oral moistening. Prendergast, Kleiman & King (2013) suggest that salivary substitutes such as fluoride gels should be tried first. Salivary stimulating lozenges or glycerine moisturizer could be massaged with a gloved finger, then a lubricant applied to lips.

As xerostomia progresses, mucositis and oropharyngeal colonization with gram negative bacteria and fungi occurs. Mucositis (International Statistical Classification of Diseases and Related Health Problems ICD9 code 528) is a painful inflammation of the mucosal lining of the gastrointestinal tract. Oral mucositis occurs in 40% of patients treated for cancers of the head and neck with chemotherapy or radiotherapy in about 6 – 12 months (Dennesen, van der Ven, Vlasveld *et al.* 2003 cited in Prendergast 2012).

Oral candidiasis: is the most common fungal infection in humans, especially among immune compromised patients. Predisposing factors are impaired salivary function, inhalation of steroids, diabetes mellitus and oral cancer. Especially in immune-compromised patients, if the growth of candida is not checked, the infection spreads, could become blood borne, colonise the upper gastrointestinal tract leading to sepsis with significant morbidity and mortality. Application of antifungal for 2 weeks. For example, 4-6 ml of nystatin 1000i.u/ml 4 times daily or clotrimazole 10 mg buccal 1x daily or 1% gentian violet to affected areas is recommended (Tablan, Anderson, Besser *et al*. 2004).

Hughes (2006) supports the application of nystatin at least 6 hours apart from chlorhexidine application to prevent the formation of nystatin-chlorhexidine salts; candida was persistent in patients who had nystatin and chlorhexidine together, compared with patients who received either nystatin or chlorhexidine.

- **Cleaning**

Brushing the teeth twice daily in the mornings and evenings, like for everyone, also applies in the intensive care unit. The American Association of Critical Care Nurses' 2010 practice alert (Aliso 2010) recommends brushing 2 times daily with toothbrush and toothpaste to reduce plaque. Oral cleaning time is presumed to take 3-4 minutes (Berry, Davidson, Nicholson *et al.* 2011). Electronic toothbrushes were found to be utilised more frequently in Europe (Rello, Koulenti, Blot *et al.* 2007) compared with America, where no electronic toothbrush is used (Feider, Mitchell & Bridges 2010). A soft bristled paediatric sized toothbrush is recommended for better access around the tube and oral cavity (Registered Nurses' Association of Ontario 2008).

There is little information on cleaning around the endotracheal tube, but the 'two tooth brushing technique' from the ergonomics of oral care for dementia patients to promote access in the oral cavity could be borrowed. The back of one toothbrush is used, and could be improvised by using a tongue blade to hold back the cheek during oral care (Registered Nurses' Association of Ontario 2008). Berry, Davidson, Nicholson *et al.* (2011) point that tooth brushing is not feasible when a patient has a bleeding mouth. The mouth could be cleaned with foam swab even when bleeding is present, clots should not be removed to prevent further bleeding and a dental hygienist should be consulted.

To prevent bad breath, tongue cleaning is opined to be more effective than brushing alone (Outhouse, Al-Alawi, Fedorowicz *et al.* (2006) cited in Registered Nurses' Association of Ontario 2008). Attaching same high priority to knowing the pharmacology of oral care solutions just like acute medications would also be beneficial (Koeman, van der Ven, Hak *et al.* 2006).

- **Prevention of aspiration**

Accumulated subglottic secretions dribble as micro aspirations which could increase the risk of ventilator associated pneumonia. Dip-brush-in-antimicrobial technique and the use of powered suction toothbrush are recommended to prevent aspiration of excess fluid (Mc Keown (2008) cited in Registered Nurses' Association of Ontario 2008). The mouth is rinsed with cotton swab dipped in boiled water; suctioning of the mouth and nose together is avoided to prevent transmission of microorganisms (Lin, Chang, Chang *et al.* 2011). In a review of 56 randomised adult studies from 1964-2011; about 11% incidence of plaque was reduced within a month, an oscillating rotating toothbrush was found to be more effective than conventional toothbrush in reducing plaque (Yaacob, Worthington, Deacon *et al.* 2014). Prendergast, Kleiman & King (2013) suggest that brushing should start posteriorly, go anteriorly with bristles angled towards the gum line. There is dearth of information on subglottic suctioning. Even though the suctioning port behind the cuff in special endotracheal tubes prevent accumulation of oral care solution, they are expensive (Canadian Intensive Care Unit Collaborative Faculty 2012). A research gap still exists on the effectiveness of suction toothbrushes, special endotracheal tubes, nurses' assessment and provision of care (Registered Nurses' Association of Ontario 2008).

- **Lotions**

In a study, lack of nurses' knowledge on the characteristics of solutions they use was found (Lin, Chang, Chang *et al.* 2011). Fluoride mineralizes and protects the teeth from demineralization (Mac Entee &Wyatt (1999) cited in Registered Nurses' Association of Ontario 2008). Registered Nurses' Association of Ontario (2008) suggests that compounded oral rinses especially hydrogen peroxide and sodium bicarbonate should be avoided to reduce the risk of erosion of the mucosa; tap water is discouraged to prevent transmission of nosocomial microorganisms (Berry, Davidson, Nicholson *et al.* 2011); lemon and glycerine are avoided as they could soften and erode the tooth enamel (Meurman, Sorvari, Pelttari *et al.* (1996) cited in Registered Nurses' Association of Ontario 2008).

Chlorhexidine: Oral cleaning with chlorhexidine and tooth brushing has been employed in several studies to reduce the risk of ventilator associated pneumonia rates (Heck 2012;

Ross & Crumpler 2007). Chlorhexidine is known to be fast acting, having strong powers to fight plaque and a broad spectrum activity inclusive of resistant Staphylococcus aureus and Vancomycin resistant enterococci. It was found to remain clinically active for up to 6 hours in concentrations between 0.12%- 2%; presentations such as liquid, spray and gel without alcohol were used daily to 4 times daily and continued up to 28 days (Grap, Munro, Elswick *et al.* 2004). In another study, chlorhexidine was effective in reducing gram positive bacteria load but had little effect on gram negative organisms (Prendergast 2012). This effect can be explained by the mode of action of chlorhexidine, which destroys the integrity of the cell by neutralizing the membrane of negatively charged gram positive bacteria. Although recommendations for concentration of chlorhexidine is 0.12% (Berry, Davidson, Nicholson *et al.* 2011; Aliso 2010), an extensive literature review of clinical trials showed that the use of chlorhexidine oral care lotion at 2% was 36% more effective in preventing ventilator associated pneumonia in the intensive care unit (Snyders, Khondowe & Bell 2011).

Chlorhexidine application is recommended irrespective of patient acuity (Registered Nurses' Association of Ontario 2008) and shown to be beneficial to cardiac patients (Labeau, Vandijck, Rello *et al.* 2008). The American Association of Critical Care Nurses' 2010 practice alert (Aliso 2010), suggests the application of chlorhexidine 24 - 48 hours before cardiac or any other surgery (Grap, Munro, Hamilton *et al.* 2011; Westwell 2008). Grap, Munro, Hamilton *et al.* (2011) showed that quick swabbing of the oral cavity for trauma patients is beneficial. In one study, a clean lotion of about 10 – 15ml of chlorhexidine was used for oral care in the morning and evening, squirting about 2.5 ml into each buccal area (Cuccio, Cerullo, Paradis *et al.* 2012). 4 hourly dip-cleaning of the tongue and gum area is advocated. Chlorhexidine may need a prescription and patients should be evaluated for any contraindications such as antabuse therapy and oral sores (Browne, Evans, Christmas *et al.* 2011).

Chlorhexidine could result in altered taste perceptions and brown stains on the teeth with long term use (Registered Nurses' Association of Ontario 2008). Nystatin, miconazole gel for angular chelitis, stomatitis and prevention of oral candida in the immunocompromised patient should not be applied 2 hours before or 2 hours after application of chlorhexidine to prevent the formation of chlorhexidine-nystatin salts, which could accumulate under the tube (Hughes 2006). Foaming toothpaste in particular should be avoided 2 hours before

and after chlorhexidine application because it contains the detergent sodium lauryl sulphate that neutralizes chlorhexidine's positive charge (Registered Nurses' Association of Ontario 2008). Foaming toothpaste when exposed to air, forms a dried up crust that sticks the endotracheal tube to the tongue and may cause injury when removed (Prendergast 2012). A peanut-sized non foaming toothpaste is advised to prevent drying of the foam under the endotracheal tube (Stout, Goulding & Powell 2009). Debridement of oral crusts could be achieved by waiting for a minute after applying chlorhexidine before swabbing (Prendergast, Kleiman & King 2013).

- **Moisturization**

After cleaning, the mucous membranes and lips are protected with a water based moisturiser (example Biotene®) 2- 4 hourly, and artificial saliva (such as Oral Balance®) is applied to prevent drying. Petroleum products are avoided because this may cause pneumonitis if aspirated. Oral balance® which contains about 2 salivary enzymes: lactoperioxidase and glucose oxidase is encouraged (Prendergast, Kleiman & King 2013). According to Koeman, van der Ven, Hak *et al.* (2006), petroleum jelly mixed with chlorhexidine was used on the oral mucosa and found to decrease ventilator associated pneumonia rates. The reaction of lung parenchyma to petroleum jelly may need to be investigated because though the suggested amount of petroleum jelly should not be more than a pea size, using oil based lubricants could cause lipoid pneumonia, an unusual cause of acute respiratory distress syndrome (Sachdev, Anand & Gupta 2015).

- **Care of surrounding areas**

The skin around the mouth is cleaned with gauze; the position of the endotracheal tube may be changed morning and evening then secured with a clean tape, a cuff inflation of between 20-30 cm of water should be ensured every shift (Browne, Evans, Christmas *et al.* 2011). According to Jones, Newton and Bower (2004), oral care includes care of orthodontic equipment and management of loose teeth but this is beyond the scope of this study.

- **Storage**

The storage of used oral care equipment should consider preventing the transmission of microorganisms which may contaminate the oropharyngeal tract. The toothbrush is stored upright to dry; yankuer and oral solution canister are cleaned, dated and changed routinely after every 24 hours (Registered Nurses' Association of Ontario 2008). The cost of preventing ventilator associated pneumonia by using suction catheters, tooth brushes, non-foaming toothpaste and special endotracheal tubes was found to be less than 10% of the cost of treatment (Lux (2007) cited in Registered Nurses' Association of Ontario 2008).

- **Documentation**

Documented details of the procedure should be clear, concise and comprehensive about the initial health assessment, equipment and supplies used, and frequency of oral care. It is suggested that dentist input on standards of oral care terms and documentation may be invaluable (Registered Nurses' Association of Ontario 2008).

Measurable outcomes could be patient sensitive. Example, ventilator associated pneumonia rates, oral health status, and oral microbiota. Booker, Murff, Kitko *et al* (2013) suggest documenting findings from the assessment tool, time, frequency, type, toleration with regards to intracranial pressure, oxygen saturation, discomfort or aspiration, bleeding and oral lesions. Examples of nurse sensitive information are details of the procedure, nurses' competence and compliance (Soh, Soh, Japer *et al.* 2011; Feider, Mitchell & Bridges 2010).

Electronic documentation enhances quick information retrieval. In a study, some codes were used to indicate type of oral care, these included 'S' – swabbing, 'B'-brushing, 'SC'-subglottic suctioning, 'M'- moisturising (Goss, Coty, & Myers 2011). Standardization of documentation using an International Statistical Classification of Diseases and Related Health Problems (ICD) code with nursing informatics techniques would enhance contribution to global data base such as the World Health Organisation oral health database for following up trends to give feedback on oral care in the intensive care unit.

The Centers for Disease Control and Prevention 2003 guidelines (Tablan, Anderson, Besser *et al*. 2004) support surveillance for bacterial pneumonia in the intensive care unit for patients who are mechanically ventilated to map trends and make comparison between hospitals. Pulmonary assessment indices are controversial and include chest auscultation, respiratory rate and character, arterial blood gases, oxygen saturation, end tidal CO_2 monitoring, chest x-rays, sputum culture, white blood cell count and temperature. The use of the clinical pulmonary infection score for early detection of ventilator associated pneumonia is encouraged (Morton & Fontaine 2013).

- **Collaboration**

Putting evidence successfully into practice requires the synergistic effort of a multidisciplinary team (Williamson, Almaskari, Lester *et al.* 2015). The nurse is the main provider collaborating with other professionals for oral care in the intensive care unit. Delegation of oral care for intubated patients to nurse assistants is discouraged. Booker, Murff, Kitko *et al.* (2013) point out why oral care in the intensive care unit should not be delegated to nurse assistants: the need for an oral assessment, chlorhexidine application is drug administration and the possibility of aspiration or unplanned extubation.

2.5 SUMMARY

Oral care is not just basic care; it exists as a major intervention combined with other approaches used to break the chain of ventilator associated pneumonia infection which occurs within 48 hours after endotracheal intubation. Complexities in definition, diagnosis and treatment problems that are considered in patient care have been iterated. Early diagnosis is still a challenge; late ventilator associated pneumonia is linked to more virulent microorganisms and poorer patient outcomes such as mortality rates in the intensive care unit up to 75%. The uniqueness of the intubated patient - unconscious and immune-compromised, places the patient at high risk of aspirating infected oral secretions and decreased self-defence from ventilator associated pneumonia. Hence, the emphasis is on prevention.

Prevention of ventilator associated pneumonia is approached as a multicomponent bundle strategy rather than single parts. Recommendations from several guidelines were discussed

for measuring and fostering compliance with good practice in the intensive care setting. These range from direct patient care in preventing aspiration to collaborative strategies requiring administrative involvement. Facilitators and barriers to the match between nurse's oral care competencies and patient characteristics for optimal outcomes are shown in terms of education, attitudes and procedures within the context of the synergy model. Neglect of oral care based on nurses' perceptions and priorities poses a major barrier to positive nurse, patient and organisation outcomes. Empowered and equipped critical care nurses at the patient's bedside develop high level contextual knowledge and attitudes to support an advanced oral care practice that is based on evidence to succeed in the fight against ventilator associated pneumonia.

CHAPTER THREE

RESEARCH DESIGN AND METHODS

3.1 INTRODUCTION

This chapter describes the research methodology used during the course of the study. The research design was explorative - descriptive qualitative and contextual design. This chapter addresses the methods and procedures employed to accomplish the aim and objectives of the study.

3.2 AIM AND OBJECTIVES

For consistency purposes the aim and objectives of the study are repeated.

The aim of this study was to explore and describe factors affecting intensive care nurses in providing oral care in the intensive care units of a public sector tertiary level hospital in Johannesburg.

In order to meet this aim the following objectives were set:

- To explore intensive care nurses' perceptions of oral care in the intensive care units.
- To describe facilitators and barriers to providing oral care in the intensive care units.

3.3 RESEARCH DESIGN

A research design is the logical plan of steps to answer the research question. An exploratory- descriptive qualitative and contextual design was used for this study to explore and describe factors affecting intensive care nurses in providing oral care in the intensive care units of a public sector tertiary hospital in Johannesburg.

3.3.1 Exploratory Design

An exploratory study gives an in-depth investigation and is used when not much is known about a single process, concept or variable to discover its broad description (Polit & Beck 2010). This study explored intensive care nurse's perceptions of oral care for critically ill patients with endotracheal tubes by thematic analysis of emerging codes from interviews in their very words.

3.3.2 Descriptive Design

Descriptive research inspects properties of a population from data for interpretation (Polit & Beck 2010). This study described the perspectives of nurses on facilitators and barriers affecting the provision of oral care in the intensive care units. Codes were collated to form categories, subcategories with emerging themes that were creatively analysed in describing the phenomena.

3.3.3 Qualitative Research

Qualitative research combines various sources for rich answers about an occurrence as it is constructed by individuals in their own context (Polit & Beck 2010). The researcher conducted semi-structured interviews of participants in each unit.

3.3.4 Contextual Design

Contextual research studies the phenomena in the setting in which it occurs; Polit & Beck (2010) describe a study setting as the place where research is undertaken or a specific place where information is gathered.

The study was conducted in a private room within the intensive care units of one university-affiliated, public sector hospital and tertiary referral institution in Johannesburg. These are trauma, cardiothoracic, neurosurgical, multi-disciplinary (general) intensive care units. There are in total approximately 50 intensive care unit beds in this 1,200 in-patient bedded institution. These units provide highly specialised services for a wide range of patients with medical, coronary, cardiac, gynaecology, trauma and emergency or

neurosurgical conditions. Intensive care nurses working in these units provide one-to-one patient care 24 hours a day.

3.4 RESEARCH METHODS

3.4.1 Population

Population refers to the entire aggregation of participants in which a researcher is interested (Polit & Beck 2010). The population for this study included all the intensive care nurses working in intensive care units in one specific Gauteng provincial hospital, who met the inclusion criteria as follows:

- Intensive care nurses with a post basic qualification and registration in intensive care nursing or equivalent critical care nursing;
- Intensive care nurses working in full time employment in one of the study selected Intensive care units; and
- Intensive care nurses working in this capacity for at least two years.

3.4.2 Sampling

Sampling refers to the process of selecting participants to represent the entire population so that references about the population can be made (Polit & Beck 2010). Convenience maximum variation sampling was used to select the sample of intensive care nurses until saturation. A minimum of 15 to 20 participant interviews were targeted. The final sample size was determined by data saturation. As such, participants were interviewed to a point where no new information was obtained and redundancy was achieved (Polit & Beck 2010).

3.4.3 Data Collection

Data collection refers to the gathering of information to address a research problem (Polit & Beck 2010). Potential participants were identified and invited to participate in the study. The participants were given an information sheet that contains all of the necessary information (**Appendix A**). Written consent was obtained from the participants (**Appendix B**). The researcher acted as the instrument of data collection using semi-structured one-to-

one interviews with each participant. A separate written consent was obtained from the participant for audiotaping the interview (**Appendix C**). Demographical data was collected form participants before the interviews (**Appendix D**). An interview guide developed from the literature was used for the interviews (**Appendix E**). A first interview was conducted as a pilot interview together with the researcher's supervisor to allow the researcher clarify questions and her interviewing techniques. Interviews were tape recorded and transcribed using researcher generated codes; field notes were made on all the interviews.

- **Managing the researcher role**

The researcher managed the content (participant's verbal cues) and process (participant's nonverbal cues) speaking less, so the participant contributes more to the interviewing process. Flexibility was allowed so the process could direct the interview into unanticipated areas, support, negate or enrich the content (De Vos 2011). The researcher prepared for the semi structural interview by becoming knowledgeable on the topic of the study through reviewing the literature; she also maintained a good relationship with the intensive care nurses during her student postings to the unit in order to gain their trust. Bearing the objectives of the study in mind, question phrasing and interviewing skills were practiced. She arrived early, equipped mentally and psychologically with a recorder, interview guide, notebook and pen. Participants were recruited according to the convenience maximum variation sampling plan and consent was obtained. Recording equipment which had been experimented was mounted in the private room in the unit and controlled during the interviews while writing down timely observed nonverbal expressions.

- **Planning the question**

Can you describe how oral care is provided for patients with endotracheal tubes in the ICU?

- How is oral care assessed?
- How is oral care planned?
- How is oral care implemented?
- Which professionals contribute to oral care?

- How is oral care documented?

What are your perceptions about oral care in the intensive care unit?

- What is your perception about the purpose of oral care?
- What is your perception about the impact of oral care on a patient's oral health?
- How does the presence of the tube make you feel?

To what extent do you think oral care is given a high priority in patient care?

- On admission when does a patient receive oral care?
- Does oral care have a high priority within the unit?
- Can you mention oral problems an intubated patient could have, which have you encountered?
- How are oral problems diagnosed?
- How was it managed?

Can you describe any major factors that affect the way oral care is provided to patients with endotracheal tubes?

- Is there an adequate provision of supplies?
- How is there supervision of oral practice in the unit?
- How does the documentation space influence documentation?

To what extent have you received training in oral care for patients with endotracheal tubes?

- How was your oral care education (basic, specialist, orientation, and continued education)?

To what extent do you think oral care training for patients with endotracheal tubes would affect intensive care unit nurses in providing oral care for these patients?

The sequence structure of the interviews was planned after scrutiny of the logical structure in consideration of the participant's human nature (Wengraf 2001). Tendency for anxiety was reduced by promoting a relaxed atmosphere, posing questions in a neutral manner with

the belief that the participant can tell it as it is, while employing good listening techniques. Follow-up questions came from themes raised by the participant; probes, and the use of silence for descriptions. Arguments progressed the participant from generalisations to focus on detailed specifics, on a sequence structure that considered timing and purpose of answer. The researcher avoided biased understanding of prepared questions.

- **Pilot testing**

Interviewing was performed first with my research supervisor who has knowledge on oral care research, to ensure that the questions framed were well understood and also to prepare for timing.

- **Conducting the interviews**

Consistent interviews of up to 30 minutes were followed by a debriefing session where the researcher reflected on the interview session with her supervisor. Interviews were transcribed verbatim and taken back to the participants to check for correctness of transcription. Field notes on the unit oral care protocol shown to the researcher in the course of interviewing were collected. Thematic analysis of data commenced during data collection using codes as they emerged from the interview, until data saturation was reached. All information was indexed, data reduced by grouping into themes, organised again according to the interview guide and research objectives for a rich discussion to answer the research questions.

3.4.4 Data Analysis

In qualitative studies, the purpose of data analysis is to organise, provide structure and to elicit meaning about data (Polit & Beck 2010). The interviews were transcribed verbatim. Thematic analysis of interview transcripts (Braun & Clarke 2006) and data collection occurred simultaneously. The researcher and her supervisor, a senior specialist intensive care nurse and lecturer coded the transcripts guided by the 6 phases of thematic analysis (Braun & Clarke 2006). The essential steps were as follows:

Phase 1: Familiarizing with Data - transcribing data (if necessary), reading and re-reading the data, noting down initial ideas. Interviews were transcribed by the researcher. Transcripts were read and reread to ensure they were verbatim and retained the information true to its original nature. Reading the transcript many times also helped in familiarizing herself with the data corpus to discover and develop a list of interesting points about the data. Data management was achieved by ensuring confidentiality through sharing information with only the supervisor and code labels of the recordings.

Phase 2: Generating Initial Codes - coding interesting features of the data in a systematic fashion across the entire data set, collating data relevant to each code. Data was condensed by coding. Inductive coding was done to answer the two research objectives; underlining, writing on margins from the participant's own words. According to Braun & Clarke (2006), inductive coding is data driven without using a coding frame. This was done systematically for each transcript in entirety before moving to the next, bearing in mind how previous transcripts were transcribed and coded.

Phase 3: Searching For Themes - collating codes into potential themes, gathering all data relevant to each potential theme. Codes were retrieved, collated into columns by linking data sets to the literature with an audit trail. Ordered relationships between codes according to significance attached by the participants were established as themes extrapolated from categories generated from the codes with the help of mind maps. Further interview questions were refined by identified categories. Refined probes were used to get more information from more experienced nurses on the history of administrative involvement in oral care and nurses' understanding of oral care as part of the strategies to prevent ventilator associated pneumonia.

Phase 4: Reviewing Themes - checking if the themes work in relation to the coded extracts (level 1) and the entire data set (level 2), generating a thematic 'map' of the analysis. Data that did not fit were identified to retain accounts that were contrasting from the prevailing story in analysis.

Phase 5: Defining and Naming Themes - ongoing analysis to refine the specifics of each theme, and the overall story the analysis tells, generating clear definitions and names for each theme. Both data driven and theory driven themes were put together inferring broader

analytic issues and themes - not merely a mechanistic exercise of sectioning the data but interrogating the data, paying attention to forms, contrasts, gaps and metaphors arising from the participants' voice. Two overarching themes: Resources and Processes emerged.

Phase 6: Producing the Report - the final opportunity for analysis. Selection of vivid, compelling extract examples, final analysis of selected extracts, relating back the analysis to the research question and literature, producing a scholarly report of the analysis: inductive coding led from bottom - up to the identification of informant's own categories. Overarching themes that reflected the participant's views were used to answer the main research question and build a contextual report concerning nurses' oral care practice in the intensive care unit.

3.5 TRUSTWORTHINESS

The term trustworthiness refers to the degree of confidence qualitative researchers have in their findings using criterion of credibility, transferability, dependability and confirmability (Polit & Beck 2010). To ensure trustworthiness, four defining criteria are described by Lincoln & Guba (1985) in Shenton (2004).

3.5.1 Credibility

The term credibility refers to confidence in the truth of data and interpretations as the researcher attempts to demonstrate that a true picture of the phenomenon under study is being presented (Polit & Beck 2010; Shenton 2004). The researcher watched practices related to oral care over the years of intensive care nursing practice. This assisted in formulating this research in the researcher's mind as the factors affecting intensive care nurses' oral care practices was explored. The researcher had frequent member checks and peer reviews with regard to relevant literature searches, data collection and analysis. This research is relevant to intensive care nursing as it has not been explored in this particular setting.

3.5.2 Dependability

The term dependability refers to stability or reliability of data over time and conditions (Polit & Beck 2010). The researcher reviewed relevant literature on similar studies conducted in similar contexts. The researcher left behind a decision trail about the theoretical methodologies and analytical choices used throughout the study.

3.5.3 Transferability

This refers to the potential for extrapolation or the extent to which the findings can be transferred or have applicability in other settings (Polit & Beck 2010). The researcher provided description of the specific research setting and process.

3.5.4 Confirmability

Shenton (2004) suggests researchers must take steps to demonstrate that findings emerge from the data and not their own predispositions or inclinations. The researcher provided an audit trail, by keeping track of all references used, audio recordings, transcripts of interviews with accompanying field notes and all rough copies of data analysis for peer review and member checking in order to validate how the results were obtained.

Table 3.1 Measures applied for trustworthiness

Strategy	Criteria	Application
Credibility	• Information seeking behaviour. • Line of questions. • Prolonged engagement. • Peer examination.	• Rapport building, engaging with participants using follow up questions and probes as they construct reality. • Preparing fairly-fully semi-structured interview questions tailored to research questions and operationalized from previous oral care research. • Researcher engagement over her master's programme establishing a positive relationship and gaining trust. • Peer scrutiny with supervisor and other faculty, refining the study from lessons learned.
Transferability	• Thick descriptions. • Selection of sources.	• Detailed description of the methods. • Specialist experienced nurses in oral care for critically ill patients.
Dependability	• Decision trail.	• Multiple sources of information from interviews and field notes, member checks were used to inform decisions.
Confirmability	• Audit trail	• Full explanation of the steps taken in the design, data collection, analysis and conclusions formulated.

3.6 ETHICAL CONSIDERATIONS

Ethical issues in research are standards of ethical conduct to safeguard the study subjects and integrity of the research process (Polit & Beck 2010). Ethical considerations are discussed under the following headings: permission to conduct research, informed consent and measures to ensure confidentiality and anonymity.

3.6.1 Permission to Conduct Research

Permission to conduct the research was obtained as follows:

- The research proposal was submitted to the University Postgraduate Committee for permission to conduct the study and permission was obtained to ensure compliance with ethical standards.
- Application for permission to conduct the study was made to the management of the hospital and written permission was obtained (Appendix H).
- The research proposal was presented to the Ethics Committee of one of the hospitals and a written permission to conduct the research was given (Appendix J).

3.6.2 Informed Consent

The informed consent was obtained as follows:

- Explaining the anticipated risks and benefits to the participants, giving time to read the consent form.
- Telling the participants that confidentiality will be maintained, information from the interview would not be disclosed to other participants.
- Consent forms and code - labelled transcribed data were separated at the time of data collection to maintain anonymity of participants. Confidentiality was maintained by only the researcher and the supervisor having access to the raw data.
- Participants were told that participation in the study is voluntary and participants may decline to answer any particular question or discontinue participation in the study at any time without incurring any penalty.

- All participants were allowed to ask questions if not clear.
- Informed consent was obtained from all nurse participants and a copy of the consent form containing contacts was maintained.

3.6.3 Anonymity and Confidentiality

- To ensure confidentiality and anonymity of the participants, no names were recorded during data collection and reporting.
- The only people who had access to the raw data were the researcher and her supervisor.
- Data was kept by the researcher in a locked cupboard and essential documents will be discarded after being kept for at least 2 years.

3.7 SUMMARY

This chapter provided a detailed discussion of the research design and methods of the study, inclusive of population, sample and sampling method, data collection and data analysis procedures that were followed. Measures of trustworthiness are discussed. Ethical considerations were addressed.

In the next chapter, the findings of the study will be discussed.

CHAPTER FOUR

FINDINGS

4.1 INTRODUCTION

This study intends to explore and describe factors affecting intensive care nurses in providing oral care in the medical-surgical, neurosurgical, trauma, and cardio-thoracic intensive care units of a public sector tertiary level hospital in Johannesburg. Research design and method are provided in chapter three. This chapter begins by describing participants' demographic profile. A detailed description of findings from the themes emerging from the interview is provided; a summary of findings from the study is then presented.

4.2 RESEARCH PARTICIPANTS

Interviews were conducted in English on intensive care nurses registered with the South African Nursing Council. Participants worked permanently in either the multidisciplinary (general), cardiothoracic, neurological or trauma units of a quaternary academic hospital in Johannesburg.

Nurse informants were chosen at random and voluntarily: those who happened to be on duty on the days for interviewing and were willing to participate at their own convenience with the unit manager's support. Interviews summed up to a total of nineteen (n=19); however field notes of three recordings were used since they could not be retrieved from the recorder.

4.3 DEMOGRAPHIC PROFILE OF PARTICIPANTS

Demographic information on the intensive care nurses' were group, position, education and experience. (See **Appendix D).** Table 4.1 below summarizes the demographics of the nineteen (n=19) participants that were interviewed.

Table 4.1 Demographics of Nineteen (N=19) Nurses

Item	Demographic Characteristics	Frequency	Percentage %
1	**Age group**		
	30-35	3	16
	39-39	0	0
	40-45	2	11
	46-49	4	21
	50-55	5	26
	56-59	4	21
	60-65	1	5
	Total	19	100
2	**Position**		
	Clinical nurse	6	32
	Manager	4	21
	Shift leader	9	47
	Nurse Researcher	0	0
	Total	19	100
3	**Education**		
	Diploma	10	53
	B. Cur	8	42
	MSc	1	5
	Total	19	100
4	**Experience (years)**		
	2-5	4	21
	6-10	5	26
	11-15	6	32
	16-20	4	21
	Total	19	100

Majority (n=5, 26%) were aged between 50-55 years, only one person was aged between 60-65 years. There was no nurse researcher, nearly half (n=9, 47%) of the nurses were shift leaders. Only one nurse had a master's degree, this was in nursing; about half (n=10, 53%) had obtained nursing diploma. Majority (n=6, 32%) had between 11-15 years of experience.

4.4 THEMES EMERGING FROM THE SEMI-STRUCTURED INTERVIEWS

From the data collected, data driven and theory driven codes were retrieved, collated into columns by linking data sets to the literature with an audit trail. The themes Resources and Processes were the two overarching themes that emerged as participants expressed their views on oral care for the intubated patient in the intensive care unit.

Resources are human resources: nurses' attitude, knowledge and skills affecting oral care; and the material resources: what nurses' use in the providing oral care for the intubated patient. Process is the procedure and the roles professionals play in the provision of oral care within the oral care microsystem of these intensive care units. These are presented below in table 4.2.

Table 4.2 Emerging themes and categories from the semi-structured interviews

Themes	Subthemes	Sub-sub themes
Theme 1 Resources	1.1 Human	1.1.1 *Attitude*
		1.1.2 *Knowledge*
		1.1.3 *Skills*
	1.2 Material resource	
Theme 2 Process	2.1 Procedure	
	2.2 Professional Roles	

Findings are presented under themes, sub-themes and sub-sub themes from participants' significant statements. Each significant statement is described, quoted and the participant who contributed information indicated by 'P' followed by a number. For example, P2 means participant 2.

4.4.1 Resources

4.4.1.1 Human resource

4.4.1.1.1 *Attitude*

- **Perception that oral care is basic**

Oral care was said to be a basic nursing skill, taught only in the first year and not during specialist training. One participant said:

> *'...I did oral care when I was doing basic nursing….I think it was first year… That's when you were termed competent or non-competent in performing oral care… it is very basic…..'*
>
> *P3*

Another participant agreed:

> *'...that's what we do when we are doing our first year in general nursing…'*
>
> *P16*

Participants also said basic training was on non-intubated patients, coming to the intensive care unit to nurse a patient could be the first time of seeing the ventilated patient.

A participant said:

> *'...maybe you are from the ward, you don't know anything about doing mouth care on a ventilated patient it is the first time that you see a vent….'*
>
> *P11*

- **Senior nurses**

Many senior nurses assumed that any nurse working in the intensive care units knows oral care for the intubated patient. Senior nurses saw no need for training during orientation or as specialist education.

A participant said:

'...maybe I assume that everybody has been trained to do oral care…I don't think they need training because number one, it is brushing of the tube teeth, care of the tongue .....so the tongue and the tube you need to check them cos as you are brushing them ...you are also examining if there are no tooth decay, you know so I think those are the most important parts….'

P4

Another participant agreed saying the nurse should use common sense:

'…We are the specialists….there is no need [for training]…you just use your common sense…'

P16

A participant said nurses use their discretion.

'...we nurses just use their [our] discretion…'

P6

During orientation in the intensive care unit, there was more emphasis on suctioning; oral care was 'brushed upon'.

A participant said:

'…orientating ...the point of oral care is ...brushed upon- ... not mentioned…I will emphasize more on suctioning ….than oral care which should also be done'

P6

Another participant agreed that oral care was mentioned and not taught:

'...And here when I arrived I was taught to do oral care just before suctioning. That's all I have been taught…'

P7

A participant said that training on oral care and suctioning did not quite include ventilator associated pneumonia.

> *'...in services are about suctioning and oral care…not ventilated associated pneumonia as such…'*
>
> *P17*

Participants said they had not attended any workshops on oral care; there was lack of demonstration and supervision.

They said:

> *'...I never had training that this is how you do it... [not in basic, not in specialist]…'*
>
> *P12*

> *'...we get the lectures on how to do it, but not the demonstration part of it…'*
>
> *P10*

> '… *[senior nurse] will just sign off that book without direct supervision or assessment that I really know what I am doing…'*
>
> *P5*

- **Priority**

One participant said nurses neglect oral care in the intensive care unit.

> *'...it is….often neglected especially in our ICU…'*
>
> *P6*

Another participant agreed saying it may be due to lack of training.

> *'...they are not mostly trained to work in ICU. So, some they don't even see the importance of doing..... mouthwash…*'
>
> *P14*

Only one nurse mentioned assessment as part of oral care:

'…assessment first, going to assess…'

P5

A participant questioned the need for an assessment tool or protocol.

'….what is it that you are checking in the mouth?'

P18

The same participant however acknowledged that oral care should be done during every shift as part of the patient needs.

'…that is why in the morning when you come to work, the first thing you do, you do …patient assessment will tell you the needs of the patient, there are needs of the patient that you don't need to assess before you can know they should be done there is what you call objective and subjective data when you do assessment,…automatically I see this patient is already fully dependent cannot do mouth care for themselves…I already know that I need to do mouth care …patient is ventilated I already know that I need to do mouth care…'

P18

A participant said oral care has a high priority in the unit; to her, it is one of the procedures carried out frequently.

'…because that is one of the things that I see is mostly done quite often. So I can say it is given high priority…'

P7

Oral care for the intubated patient is seen as basic nursing training because it was learnt during first year, this agrees with previous findings. In a South African survey (Perrie, Scribante, Windsor *et al.* 2011); majority of the nurses had received oral care training only in basic school. In another study most of the nurses mentioned basic nursing school as the source of learning oral care (Chan & Hui-Ling Ng 2012).

Senior nurses are seen to be a major source of learning in the critical care unit. Most intensive care nurses responded, stating that their learning was from senior nurses as there was low emphasis on oral care training in specialist school (Lin, Chang, Chang *et al.* (2011). Attitude of senior nurses to teaching oral care during specialist training, as found in the study agrees with the finding that barriers to intensive care nurses' knowledge on evidenced based oral care practice exists during specialist training (Binkley, Furr, Carrico *et al.* 2004). There is greater focus on technology and nurse tutors assume students already know oral care for mechanically ventilated patients, despite the general approach to oral care in basic nursing education.

Perrie, Scribante, Windsor *et al*. (2011) found that most nurses perceived that oral care as high priority in the intensive care unit. The finding of this study concurs with low oral care priority found in previous studies: Jones, Newton, & Bower (2004) found oral care training on oral needs assessment or oral care methods as absent or given low priority; it was also shown in an exploratory qualitative study, that no nurse mentioned oral assessment as part of oral care in the intensive care unit(Yeung & Chui 2010).

4.4.1.1.2 *Knowledge*

- ***knowledge on lotions***

Many nurses lacked knowledge on the characteristics of lotions used for oral care. A participant mentioned that there was alcohol in chlorhexidine, also that alcohol was the active ingredient for preventing infection.

> *'…oh….I think chlorhexidine also has this antiseptic thing in order it does prevent infections…yeah….like spirit inside….'*
>
> *P17*

To another participant, the difference between chlorhexidine and glycol thymol is alcohol; a local anaesthetic agent inside chlorhexidine for pain:

> *'….chlorhexidine has got a local anaesthetic agent inside…with this one [glycol thymol]… no alcoholic….no anaesthetic …'*
>
> *P16*

A participant said it was possible to use almost all the lotions mentioned in the study at once:

> *'...I will start by brushing the teeth and the tongue using toothbrush and Colgate [toothpaste]... rinse it with the Corsodyl [chlorhexidine 2 % mouthwash] combined with peppermint water just to freshen…use normal salt water to rinse it all out…'*
>
> *P19*

Another participant showed a lack of knowledge on the difference between glycol thymol and chlorhexidine.

> *'...in the ward we use glycol thymol here; in the private we use Corsodyl mouth wash [Chlorhexidine Digluconate 0.2]. ..... so I don't know what is the difference because Corsodyl needs to be used undiluted and the glycothymol needs to be diluted with water. I don't know what is glycol thymol ...'*
>
> *P12*

However some participants showed knowledge about chlorhexidine. One participant knew the concentration supplied to the unit.

The participant said:

> *'...The 2 percent chlorhexidine...is the preferred one…'*
>
> *P9*

Another participant knew that a combination of toothpaste with chlorhexidine as found in the literature becomes ineffective.

The participant said:

> *'...you're not supposed to mix the two ... chlorhexidine counteracts the effect of the toothpaste or the toothpaste will counteract the effect of the chlorhexidine. Then you find that maybe you are just washing the patient's mouth with something that*

you don't know that is just neutral because it is not helping anymore but the aim is to decrease the number of bacteria in the mouth of the patient …'

P14

- ***knowledge on preventing ventilator associated pneumonia***

Non-sterile suctioning and prolonged ventilation were identified as reasons for patients having ventilator associated pneumonia.

The participants said:

'…complication of the ventilated patient ….whereby…. sterile procedure [suctioning] was not followed…'

P10

'…patients who stay for a long time...those fractured ribs…to get out of the ventilator...those are the ones that could be affected…'

P15

There was general lack of knowledge on strategies for the prevention of ventilator associated pneumonia. Some prevention strategies against ventilator associated pneumonia were mentioned. Closed suctioning was well advocated.

A participant said:

'…[nurses] were not maintaining aseptic technique so that caused our rates to go up and so we opted for the closed suctions as which up until now we are still using closed suctions and they are working very well until now…'

P14

Some participants said raising the head of bed. A participant said elevating the head of bed and aspirating stomach contents:

'…you aspirate [stomach] if the patient is feeding well to prevent the patient from regurgitating and aspirating and you elevate the head of the bed because when the patient is also lying flat, it is easy for the patient to vomit…'

P18

Another participant mentioned tracheostomy care, change of catheter mount and filters.

The participant said:

'…to prevent this ventilator associated pneumonia….. making sure that you do trachy care if the patient is on tracheostomy, changing of the filters, and the catheter mount…'

P17

Then, a participant said there was no research which said ventilator associated pneumonia was because of oral care:

'…there is no research that was ever done that could indicate that patients maybe with problems with the lungs is due to oral care…. I wouldn't say…… But I… suspect that there could be problems that could be caused by poor oral care or no oral care at all…' *P6*

Nurses were involved in research to prevent hospital acquired infections at some time. Some nurses participated in the early diagnosis of patients with ventilator associated pneumonia.

A participant from the trauma unit said:

'…you check the changes in the x-ray after.48 hours...and then you check the secretions of the patient if they change from the time of admission, you check the temperature if the temperature goes up, you check the ...the...when you do the gas if the oxygenation goes down and the PCO2 goes up, and then you compare every day....'

P15

To a participant, feedback used for root cause analysis came only from doctor's rounds when patients were discovered to have ventilator associated pneumonia.

> *'…when there are patients who are having ventilator associated pneumonia; the doctors will just tell us during the ward rounds...that is the only feedback that we will get …we would realize that we are having so many patients with ventilator associated pneumonia let's go back to our basics…we start checking…are we having more staff, more new staff…do they need….maybe you just check, are they able to suction nicely, correctly, are they able to do oral hygiene, then you check , there and then you go back, ...if there is a problem then you start teaching'*
>
> *P17*

Feedback on monthly statistics was also pasted on the notice board by the clinical facilitator. Even though some nurses may not check to know, feedback on decreasing rates improved compliance and motivated the hospital management to provide closed suction catheters.

> *'…I haven't checked for this month but it is there at the .....they normally put it at the notice board...'*
>
> *P10*

> *'... [I] give them feedback every month so that helps to encourage them… realizing now that those infection rates drop that encourages them to do more and also to be…'*
>
> *P14*

When asked how often feedback on ventilator associated pneumonia rate is given, responses varied as.

A participant from the multidisciplinary unit said:

> *'…no, we don't [get feedback]… I don't know if it is because we are forever busy....I don't know....'*
>
> *P13*

Another participant said:

> *'...yes, they do give feedback on that....I wasn't around , I just came back so I am not updated of what happened last year...but we don't have many ....it was maybe once, three months...year before last year...it used to be like that…'*
>
> P11

Ventilator associated pneumonia rate is assumed to be 2-3 out of 10.

A participant from the trauma unit said:

> *'...the rate I can say out of 10, maybe it is 3 or 2…'*
>
> *P16*

Another participant from the same unit agreed, saying the ventilator associated pneumonia rate in the unit was not bad:

> *'...for now, I can say maybe out of 10 maybe we have 2 patients…* which is not bad*…'*
>
> *P17*

Poor communication, lack of feedback on infectious diseases within the unit exists in the collaboration among nurses and between professionals.

A participant in the multidisciplinary unit emphasized:

> *'...yo! Communication in this hospital is very poor… whatever they get from the patient, they don't even come and tell you… even if it is those infectious diseases'*
>
> *P13*

Many nurses saw the need for training so everyone can understand best practice for oral care in the unit.

A participant said:

> *'... how to identify if a patient has got a problem with the mouth tube, maybe something that can lead to that lung infection... they must just show us... the markers...what to check...so that we can....avoid...but if we don't have protocols you know you just do something because it is a procedure, it is a routine, that is not helping but if you know the reasons why and how to follow the correct procedure that is followed by everyone not just one person…'*
>
> *P11*

In earlier studies, nurses were found to lack knowledge on the characteristics of chlorhexidine, normal saline and other solutions they use (Chan & Hui-Ling Ng 2012; Lin, Chang, Chang *et al.* 2011). In another study, nurses lacked knowledge on preventing ventilator associated pneumonia, only nurses that had access to a protocol showed compliance (Cason, Tyner, Saunders *et al*. 2007).

Muscarella (2004) pointed out the necessity of precautions to prevent the introduction of microorganisms during suctioning and bronchoscopy. Strategies mentioned by the nurses were part of the Institute for Healthcare Improvement 2014 guideline and the Centers for Disease Control and Prevention 2003 guideline recommendations for preventing ventilator associated pneumonia (Tablan, Anderson, Besser *et al*. 2004).

Dube (2013) also found that nurses showed awareness of ventilator associated pneumonia rate from research involvement; which is contrary to a finding in the United States where most nurses were not aware of the ventilator associated pneumonia rates in the unit (Feider, Mitchell & Bridges 2010).

Many studies have researched nurses' involvement in preventing hospital acquired infections (Grap, Munro, Hamilton *et al.* 2011; Berry, Davidson, Nicholson *et al.* 2011; Dube 2013). A root cause analysis in a randomised control trial (Heck 2012) picked up poor hand washing technique among nursing staff in the intensive care unit as reason for a critical incident of ventilator associated pneumonia which had been controlled to zero.

4.4.1.1.3 *Skills*

- **Handling the endotracheal tube**

Less experienced nurses often have fears about doing oral care in the presence of an endotracheal tube.

A participant said:

> *'... [students, never worked in ICU, overtime (agency staff)] scared that how can you do mouth care with a patient having a tube…'*
>
> *P4*

Another participant said the presence of the tube had been accustomed.

> *'...maybe if I'd work in ICU for the first time maybe I will be able to tell you ok, this is how I feel [feeling about the presence of the oral care tube] ...I've got so used to it that it is like ... normal…'*
>
> *P6*

Another participant said it was a 'duty':

> *'...it [feeling about the presence of the oral care tube] is a need, it's a must and that's why I say I don't want any doctor to remind me of my nursing duty… others [students, never worked in ICU, overtime (agency staff)] are scared that how can you do mouth care with a patient having a tube. That's when you teach, that's when you explain that no, you can brush the teeth or you can use the gauze with the mouth pack…'*
>
> *P4*

- **Troubleshooting**

Participants said oral care is difficult. One participant said difficulty with cleaning was because of lack of patient cooperation. Placing an artificial airway [to prop open the mouth] in addition to the endotracheal tube makes oral care more difficult.

The participant said:

> *'....it is difficult to make the person cooperate to open the mouth ... when you put the airway, it makes it more....even…it is been more difficult to clean.....'*
>
> *P7*

- **Need for skills**

A participant said the difficulty is with patients with maxillofacial injuries.

> *'...difficult for me to clean the mouth thoroughly when the patient has got fractures of the mandible…'*
>
> *P15*

For uncooperative and fighting patients, a participant wished for special skills to be taught.

The nurse said:

> *'... confused and fighting maybe someone will teach us the special skills…'*
>
> *P7*

A participant pointed to the need for experience:

> *'...when the patient is intubated, it is not easy to do the oral care, but we do it. It depends. You need experience…'*
>
> *P11*

The presence of the endotracheal tube poses the challenge of fear of dislodgment during oral care (Johnson & Chelmers 2002). Fear and difficulty for oral care on intubated patients which affects skill is a similar finding in previous studies (Perrie, Scribante,

Windsor *et al.* 2011; Rello, Koulenti, Blot *et al.* 2007). Head and neck patients were more predisposed to oral problems (Jones, Newton & Bower 2004); also special positioning of patients like the prone position, special equipment and lack of cooperation posed difficulties with oral care (Chan & Hui-Ling Ng 2012).

4.4.1.2 Material resource

- **Lotions**

Oral care lotions mentioned in the study are chlorhexidine, glycothymol, peppermint water. Participants said oral care lotions are often diluted without consideration to proportion.

One participant said:

> *'...I don't remember seeing it that you must pour this much with this much...* So sometimes we overdo so we pour too much or we pour little.*'*
>
> *P6*

Another participant suggested a reason for in proportionate dilution of the oral care solutions to be lack of measuring equipment.

The participant said:

> *'...We don't have medicine glasses. So, we just pour whatever amount that we think is suitable...'*
>
> *P3*

Participants said oral care lotions may not be available and normal saline or tap water is often substituted.

One participant said:

> '*...if it is out of stock, normal saline is still good for me....'*
>
> *P13*

'...because of the lack of resources and the funds you find that we don't have it [oral care lotions] and we end up using just tap water to do oral care on intubated patients…. but with tap water, it works very well when we put the toothpaste with it. And sometimes you find that sterile water is not available so we opt for the tap water…'

P14

- **Toothbrush, toothpaste**

Toothbrush and toothpaste were not supplied by the management. Tooth brushing was done if patient relatives provide. Waiting on patients to bring toothbrush and toothpaste could delay oral care.

A participant said:

'...like sometimes we are running short of glycothymol, peppermint water, and then during admission while we are still waiting for the relatives to bring toothbrush and toothpaste, you find that….you don't have those things in the hospital…'

P17

At times other patients or nurses could be the source of material.

A participant said:

'...we steal from other patients…. here for a long time and they don't have families, and it is an unknown patient….we do sacrifice' *P11*

Another participant agreed:

'...So in the hospital unfortunately we don't have toothbrushes and even if you have toothbrushes it means you must also as a nurse pop out money to buy Colgate…'

P4

Toothbrush provided by the patient's relatives was often too big.

A participant shared:

> *'...some of the patient's toothbrushes are so big…. Then you know when a patient is ventilated you will be able to just brush the teeth …and then the brush will have to compete with the ETT tube in the mouth….'* *P3*

- **Lubricant.**

A participant spoke on the non-availability of lip lubricant from the pharmacy:

> *'...we don't get Vaseline or petroleum jelly often from the dispensary from the pharmacy...'*
>
> *P3*

- **Mouth packs**

Participants said mouth packs may not be available for all patients.

> *'...patients who have got mouth packs will be the lucky ones…'*
>
> *P3*

When there are no mouth packs the mouth is only rinsed with saline.

A participant said:

> *'...by the time you suction at 10 o'clock there are no mouth packs. What are you going to do? You are just going to flush the mouth with saline…'*
>
> *P3*

- **Protocols**

There were contrasting views on the availability of an oral care protocol.
Participants said:

'...No [protocol]... the procedure for suctioning includes oral care...'

P3

'...there is mouth care [protocol]...'

P4

Another participant promised to show the researcher an oral care protocol.

'...Yes, there is a [mouth care] procedure file for the unit....when you are done and then I show it to you....'

P9

- **Patient's Chart**

Participants did not say that there was a dedicated space on the chart for detailed documentation of findings for oral care. Nurses 'tick' in the chart or write 'mouth care done' in kardex.

Some nurses said:

"...you just tick or ..... Kardex ...indicate there that 'oral care done'..."

P11

"...You always tick that. You can still write 'oral care done'. It is on our ICU chart top right... then you still write it in our nurses' report..."

P13

When asked about oral care documentation, another nurse exclaimed:

'...documented how? I have not seen it documented anywhere in the unit. It is not documented anywhere!...'

P10

The documentation space given in the chart shows the importance attached to oral care.

A participant said:

> *'…There is a portion of it allocated on the chart…So I guess it is important somehow…'*
>
> *P6*

- **Hospital management support**

There were contrasting views on hospital management support for oral care supplies. Some nurses, especially in the general intensive care unit said that adequate oral care supplies were ensured by the management.

A participant said:

> *'…we do [adequate supplies]. Yes, sometimes solutions…because we use two types of solutions chlorhexidine and glycol thymol so it never happens that we run out of both, sometimes we run out of one, but the supply always is for one. So we always, always, if we check the patient, all of them we have that solution. One or the other…'*
>
> P6

Another participant perceived lack of supplies as no reason for not doing oral care:

> *'...you will always have the mouth packs… you always have the forceps, you always have the gauzes, you always have the saline. I can't remember when we didn't have saline. So we even use saline if there is no glycol thymol. Anyway, you can still use sterile water with the patient's toothbrush and tooth paste. I absolutely don't see any reasons for not doing oral care. Suction points are working, if they are not working, we always have the mobile one…'*
>
> *P13*

Some nurses said they struggled with availability of resources. The operational (nurse) manager was seen as being the only management that was supportive.

A participant said:

> *'....yeah I can say there is administrative support maybe from the sister* -in-charge [operational manager]*...when we struggle... [she will take the matter up], but not from higher management...those ones, they will keep on saying...'if you are running short of something, write it down'; you keep on writing and they don't give us [laughs]...they don't help us with the other things....*
>
> *P17*

Some nurses said the government had insufficient funds for oral care.

A participant said:

> *'... I am working with a government hospital so therefore there are limited resources to oral care...'*
>
> *P19*

The same participant pointed out that previously, there were more supplies for oral care:

> *'...I've been in nursing for like maybe 22 years now, previously when I started in this hospital, we used to have oral care kits so in fact in the kit you will find a little solution that have got some antiseptic in it, with a small brush and some gauze and some small Colgate [toothpaste] as well, so, I think those days are gone now...'*
>
> *P19*

Another participant said the hospital management gave greater support when changes lead to an improvement:

> *'... Yes [there is hospital management support]. Because previously, before we started ...checking of statistics for ventilator associated pneumonia. They will say...the closed suctions are very expensive... so looking at the catheter which costs R 150 a catheter, and let's say a bottle of Vancomycin costs R 750. So when we weighed that we see that it is better for us to opt for the closed suctions...'*
>
> *P14*

A participant said the hospital management was planning to implement a hospital bundle for preventing ventilator associated pneumonia soon.

> *'…….but now apparently in the hospital said it was a WITS thing, it was not a hospital thing and so they were still going to still look at it and come up with a hospital bundle so that we can start identifying patients with VAP…'*
>
> *P19*

Soh, Soh, Japer *et al.* (2011) found that there was lack of materials such as lotions and tools in the intensive care unit; there were big sized toothbrushes, lack of documentation space; lack of evidenced based protocol and assessment tool guiding oral care in the intensive care unit. Perrie, Scribante, Windsor *et al.* (2011) found a contradiction in the responses of nurses to the availability of materials: majority said they had adequate materials while others said they needed better materials for oral care. In a critical ethnographic review of literature on oral care for intubated patients (Dale, Angus, Sinuff *et al.* 2013), a general lack of tooth brushing was found. Small sized toothbrushes are recommended for oral care on intubated patients (Canadian Intensive Care Unit Collaborative Faculty 2012; Registered Nurses' Association of Ontario 2008).

In a review of documented oral care practices in the intensive care unit, it was found that nurses did not document the specifics of oral care in the intensive care unit (Goss, Coty, & Myers 2011).

In several studies such as in the United States, Australia; there had been no oral care protocols (Berry, Davidson, Nicholson *et al.* 2011; Cutler & Davis 2005). Lack of awareness of the existence of an oral care protocol by nurses has been found (Feider, Mitchell & Bridges 2010)**.**

4.4.2 Process

4.4.2.1 Procedure

- **Purpose**

Several participants said infection prevention was the purpose for oral care in the intensive care unit.

They said:

> *'...So it is important for us to do oral care for the patient to prevent any colonisation of the mucous causing any infection…'*
>
> *P5*
>
> *'...then also, you know the infection…'*
>
> *P11*

A participant said reason for oral care is to reduce cost:

> *'...it will also help the government as well because medicine nowadays is costly, so to me it is a number one priority…'*
>
> *P19*

Another frequently mentioned reason for oral care was thrush.

> *'...oral thrush also is a challenge…'*
>
> *P4*

Halitosis, comfort, hygiene; to remove secretions and for the patients dignity.

They said:

> *'...Maybe, there is halitosis or maybe the tongue looks dry, or the patient has got secretions drooling around…'*
>
> *P9*

'…its hygiene, its VAP, patient comfort… that's what I'm thinking… about oral care…'

P3

'…and also for dignity, if the breath is smelly and all that the family members when they come they will actually not going to be happy to hear that bad smell from the patient's mouth…'

P14

Perrie, Scribante, Windsor *et al*. (2011) had similar findings in a survey on nurses' oral care practices in South Africa. Most nurses were aware that oral care was essential and prevents the ventilator associated pneumonia infection.

- **Frequency**

Participants mentioned varied oral care frequencies and were uncertain on what was acceptable in the unit for both day and night shifts.

A participant said:

'…4 hourly; so it means at night it is supposed to be three times. So, but I think mainly it is done when the patient is bathing in the morning maybe at 3 in the morning or at 6 in the morning….'

P3

Some participants said frequency should be individualistic, depending on the patient needs and not routine.

They said:

'…it depends on your patient…'

P6

'…. I hate the word routine because it makes you be stereotyped…. if …we say that the routine we have to do oral care at 10, so even if you see that the patient is drooling or whatsoever, you cannot strictly wait for 10 O'clock to do your oral care….'

P5

Another participant agreed to individual frequency saying neurology patients had more secretions compared to other patients:

'…you see we suction more in neuro than in other departments, they accumulate secretions…'

P11

Patient stability was included as a factor influencing frequency of oral care. In the cardiothoracic unit, patients were first stabilized before having their oral care after the first six hours of admission post-surgery.

A participant said:

'…It will start 6 hours post op… our patients are mostly cardiac patients… for the first 6 hours, this patient is still unstable… after 6 hours you should just do oral care for the patient….'

P4

Another participant said oral care frequency depends on prescription.

'… sometimes the doctors, if they want strictly the glycothymol, they prescribe that they want glycothymol and so we mix glycothymol maybe 6 hourly or 8 hourly or maybe twice, you have to mix glycothymol…..and so if they have prescribed, it means even if the patient has the toothpaste, you still have to use the glycothymol…'

P7

Oral care frequency varied like it did in a Malaysian observational study (Soh, Soh, Japer *et al.* 2011) where nurses provided oral care only at night in one hospital; in another hospital no oral care was observed. This was also a finding in a previous study in South Africa (Perrie, Scribante, Windsor *et al*. 2011).

- **Technique**

Oral care was said to be a clean procedure.

A participant said:

> *'...it's a surgical clean procedure…'*
>
> *P6*

Another participant said hands are washed:

> '…you must wash your hands…'
>
> *P15*

Gauze was wrapped around the forceps, dipped into the solution and excess lotion squeezed off.

> *'... you wrap the gauze sort of ..... , around the artery forceps…*and then you squeeze off excess water against the wall of the mug in the mouth pack...'
>
> *P3*

Tooth brushing was done if a patient had a toothbrush. A participant spoke about her preference for tooth brushing:

> *'...when you brush… you are removing all the debris on the teeth. So I prefer toothbrush more than this ....what is it? ....gauze and forceps…'*
>
> *P4*

The mouth was rinsed by pouring in the lotion using a syringe and suctioning out at the same time to prevent aspiration.

A participant said:

> *'…all that you need to ensure is that your patient does not aspirate, you prevent aspiration pneumonia so when you squeeze the water …..into the mouth rinsing, the yankuer suction should be in the mouth already while due suctioning apt...'*
>
> *P3*

Participants described their experience with oral-pharyngeal suctioning. The rigid yankuer suction catheter is preferred to flexible suction catheters and care is necessary when descending towards the pharynx.

A participant said:

> *'..., we don't use the suction catheter because it is more trauma and stuff and it pulls on the patient palate and the tongue itself so preferably we use the Yankuer to do mouth care…'*
>
> *P5*

Another said:

> *'…and when you are suctioning with the yankuer suction which is more rigid, you need to be careful not to apply more pressure when you are going downwards, suctioning the oropharyngeal secretions…. because if you go more deep you, may rupture the bulb in the tube…when the bulb is ruptured…the patient is not going to ventilate because the air will be escaping the you will start hearing noises as well. …after mouth care or suctioning, you need to check the pressure of that bulb as well because you don't want the pressure in the bulb to be very high and you don't want it to be very low. Because if it is low, the patient is not ventilating if it is very high then it is occluding the blood circulation [points to throat-here]...and it can cause pressure sores, internal pressure sores that can eh...tracheal oesophageal fistula…'*
>
> *P12*

Maintaining correct positioning of the tube, preventing transoesophageal fistula by deflating and re-inflating the cuff within therapeutic pressures and prevention of aspiration were said to be nursing skill required for the intubated patient.

A participant said:

> *'...you need to be careful not to move the tube around because you need to consider that the tube must stay in the same position like when you started because when you start working you have to check the tube position….'*
>
> *'...support the tube position… you check your pressure and after...cuff manometer… therapeutic pressure'*
>
> *P12*

A participant spoke about the challenge in deflating the cuff of the endotracheal tube and precautions that may be taken:

> *'…Sometimes we don't deflate the cuff because we are working with inexperienced people and so we are scared that we might deflate the cuff and then we end up with accidental extubation. Sometimes we do that if the doctor is here, standing here then we deflate the cuff needs to be deflated a bit then with the doctor being there so that if anything happens they can act promptly isn't it?*
>
> *P5*

A participant talked on dryness of the mouth (xerostomia) and keeping the mouth moist

The nurse said:

> *'…You need to do every 2-4 hours to keep the mouth moist because whenever there is saliva that is accumulating in the mouth, you suction the mouth then the mouth dries out..'*
>
> *P12*

On the challenge with maxillofacial injuries, another participant expressed:

> *'…you try to open and you try to instil water deep inside and use a smaller catheter to …to make it easy for you to clean…. or if you get a small gap within the teeth. just put that small catheter in between the teeth…'*
>
> *P15*

When faced with the challenge of raised intracranial pressure, one participant said:

> *'…so when we do the activity…just like suctioning and oral care….we…sedate those patients so they can be calm…'*
>
> *P9*

Another nurse said minimal oral care is done when a patient has tendency for raised intracranial pressure.

The nurse said:

> *'…the patient with increased ICP, it is minimal suctioning, it is minimal mouth care because, any stimulus increases the ICP…'*
>
> *P10*

The tube is secured; lips and surrounding areas are taken care of.

One participant said:

> *'…We secure the tube to check that it is still well secured too tight and then we try and protect the side of the lips… that is our mouth care…'*
>
> *P5*

When asked about oral care, nursing actions for suctioning were mentioned.

A participant said:

> *'...So once you prepared and opened that in a sterile manner, you don your gown and your mask, you wear your sterile gloves and then you start your suctioning…'P10*

> *'... how you go about doing it the mouth care you need to pre - oxygenate the patient..'*
>
> *P5*

A participants said oral care precedes suctioning.

> *'...It's a sterile procedure and then when you suction… then after that is when you do the mouth wash…'*
>
> *P15*

Not everybody does so.

A participant said:

> *'...we don't all do it the same…..others they suction first, they clean the mouth so after…'*
>
> *P11*

In a survey of nurses' oral care practice in the South Africa, United States and Europe, nurses responded that oral care is done using tooth brushing, toothpaste, swabs with a solution to rinse the oral cavity while suctioning (Perrie, Scribante, Windsor *et al*. 2011; Feider, Mitchell & Bridges 2010; Rello, Koulenti, Blot *et al.* 2007). Recommendations on oral care and strategies to prevent ventilator associated pneumonia are outlined in literature (Booker, Murff, Kitko *et al.* 2013; Tablan, Anderson, Besser *et al*. 2004; Aliso 2010; Registered Nurses' Association of Ontario 2008; Institute for Healthcare Improvement 2012; American Thoracic society/The Infectious Diseases Society Of America 2005).

4.4.2.2 Professional Roles

- **Nurses' role**

Oral care was seen as primarily the registered nurses' role.

A participant said:

> *'…if the patient is intubated, it will be the registered nurse…'*
>
> *P14*

> *'…if the patient is not intubated the enrolled nurse and the enrolled nurse assistant can do mouth care…'*
>
> *P14*

Nursing students were assigned to more experienced nurses for learning. Senior nurses such as clinical facilitators and operational managers did the teaching. Oral problems found during a shift were reported to the shift leader.

A participant said:

> *'…..so in all the ICU we do have clinical facilitators… operational managers… which it is their duty to teach a novice nurses…'*
>
> *P14*

> '*…abnormalities you report to the shift leader … '*
>
> *P14*

Role confusion exists on the availability of clinical facilitators for teaching in the unit.
A participant said:

> *'…in our institution, the clinical facilitators are not only allocated for teaching …part of the quality assurance ….new staff members …interview them…they end up not coming to the ICU to teach…'*
>
> *P14*

Bingham, Ashley, De Jong *et al.* (2010) note that despite a unit based strategy on the provision of directed and resourceful education using a team based approach, patient outcomes and staff compliance with oral care protocols did not improve significantly because the institution frequently changed personnel and leadership.

- **Other professionals**

Nurses liaise with other professionals and higher management to meet patient oral care needs and prevent ventilator associated pneumonia. Doctors and dentists contribute in treating oral problems.

A participant in the cardiothoracic unit said:

> *'…it [tooth decay] will be escalated to the consultant then the consultation form will be completed…the dental doctors, they will come and check the patient in the unit, then after …extubation… the patient can be referred …'*
>
> *P4*

Physiotherapists assist during suctioning when they come for chest physiotherapy in the mornings.

Another participant said:

> *'… Physiotherapist … they do assist …'*
>
> *P19*

Microbiologists give information on antimicrobial resistance in the unit:

> *'…the microbiologists...they also come and tell us if there is the antibiotics…'*
>
> *P15*

Oral care solutions were ordered from the pharmacy by the operational manager.

> *'…not like our manager here does not order stock…maybe the stock is unavailable from the pharmacy…'*
>
> *P10*

The Central sterile services department (CSSD) processes the mouth packs for use. Oral care mouth packs are changed every 24 hours before the day nurse resumes. The night staff places sterile packs by the patient's bedside and sends unsterile mouth packs to the central sterile services department.

A participant said:

> *'…the night staff have sent the …mouth packs to CSSD [central service sterile department]…'*
>
> *P3*

Participants in the cardiothoracic unit said that there were problems with nurses recycling packs for return to the central service sterile department after usage. Mouth packs may not be available the next morning for use.

A participant said:

> *'…we do run short of mouth packs because we are having a little challenge with the staff not taking care of the pack that they use [for return]….'*
>
> *P4*

Different suppliers handle the tenders for supplying lotions to the pharmacy; the type of lotion available varies.

A participant said:

'…because we buy different ah...solution…. this month it will be a supplier, next month it will be another supplier. So they bring different solutions but they all have one ingredient which is chlorhexidine yes…'

P10

Majority of nurses in a study responded that nurses were responsible for oral care (Perrie, Scribante, Windsor *et al*. 2011; Binkley, Furr, Carrico *et al.* 2004) but when open ended questioning was used in another study (Pettit, Mccann, Emet *et al.* 2011), findings were dissimilar. There was a lack of agreement among nurses, some stating they were unsure about who should be responsible for oral care. Nurses' suggestions included nurse technicians and respiratory therapists.

Williamson, Almaskari, Lester *et al.* (2015) note that putting evidence successfully into practice requires the synergistic effort of a multidisciplinary team. Browne, Evans, Christmas *et al.* (2011) describe collaborative efforts for improving oral care practice: the nursing team collaborated with the infection control coordinator, the medical director, pharmacists, therapeutic committee and director of critical care services. Data monitoring was enhanced by electronic records. A quality institute and hospital association in Rhode Island also formed a quality improvement collaborative (Cuccio, Cerullo, Paradis *et al.* 2012).

4.5 SUMMARY OF MAIN FINDINGS

Most nurses recognise the importance of oral care as a means of preventing infection. One major barrier to intensive care nurses' oral care knowledge and practice is the perception that oral care training for the intubated patient is for first year in basic nursing school, and that nurses are competent in oral care from learning in the general or medical wards and using common sense. This affects specialist training, continued education and priority of oral care practice for the intubated patient. Nurses lack knowledge on the characteristics of lotions used in the unit and the ventilator associated pneumonia bundle. Some nurses experience fear and difficulty with oral care on the intubated patient. Many nurses say the public hospital does not have the resources for oral care. Materials such as oral care lotions and mouth packs may not be available, but hospital management could be influenced by evidence to make provision.

According to the participants, oral care may not be assessed. Oral care is a clean procedure, hands are washed; gauze is wrapped around forceps dipped in diluted oral care lotion for cleaning. Nurses may prefer tooth brushing but toothbrush availability depends largely on provision by patient relatives; and at times, nurses' personal sacrifice if the patient is unknown. The oral cavity is rinsed with dilute oral care lotion poured around the cavity using a large 60ml syringe with simultaneous suctioning. Suctioning is preferably done using a rigid yankuer catheter because it has fewer tendencies to pull on the tissues in the oral cavity from negative pressure.

Proceeding from the oral cavity towards the pharynx; care is taken not to apply pressure while suctioning the oropharynx to avoid tearing the endotracheal cuff. Suctioning within the endotracheal tube is done after oral care, although one participant says this order is not strictly followed in the unit. In maintaining the position of the tube, it is checked before and after oral care. During oral care, a manoeuvre to prevent of tracheoesophageal fistula is done by first deflating, then re-inflating the cuff pressure to a therapeutic pressure of 20-30 cm H_20 measured using a cuff manometer. This manoeuvre may be avoided by less experienced nurses for fear of unintentional extubation. One participant suggests it is more cautious to do the manoeuvre during doctor's rounds for immediate backup in case of emergency.

Nurses gave ideas on troubleshooting for oral care. Frequencies for oral care vary and are dependent on numerous factors. One nurse suggests oral care should be done 2-4 hourly to prevent dryness. In patients with fractures of the mandible, smaller-sized catheters are used to gain entrance through any possible gap to suction the mouth after instilling some lotion. Not all patients have intracranial pressure monitors attached, but patients who have tendencies for a raised intracranial pressure have minimal suctioning, minimal oral care and are often sedated during the procedure. Patients in the cardiothoracic unit are pre-oxygenated, and the electrocardiogram monitor is used as reference on how a patient tolerates the procedure.

Documentation of oral care findings is not detailed. Even though communications of findings on infection control is poor; informal direct and indirect collaborative links between professionals are noted within the oral care microsystem of the intensive care unit.

4.6 SUMMARY

Participant demography was described, results were presented under the themes: resource and process, which emerged from the participants in the interview. Consistent oral care practice reduces ventilator associated pneumonia; factors that affect oral care on intubated patients in an academic hospital were explored. Perceptions, barriers and facilitators of oral care for intubated patients were explored as a major strategy in the inhibition and control of infection in the intensive care unit within the South African context. Perceptions, facilitators and barriers related to processes within the oral care microsystem were iterated in a summary of findings. The next chapter gives a discussion of these findings.

CHAPTER FIVE

DISCUSSION, LIMITATIONS, RECOMMENDATIONS AND CONCLUSION

5.1 INTRODUCTION

In this final chapter, findings are discussed in detail describing barriers and facilitators of nurses' oral care practice followed by application to theory. A summary of the study, its limitations and recommendations for further research, practice and education is then presented.

5.2 DISCUSSION OF FINDINGS

Dale, Angus, Sinuff *et al.* (2013) point to the necessity of taking social and technical contexts of providing oral care into consideration as this could inhibit how nurses understand, question and perform oral care in the intensive care unit. Findings will be discussed under the respective themes that emerged from the interview data. These are Resources and Process.

5.2.1 Resources

The theme 'Resources' emerged from human resource and material resource sub themes.

5.2.1.1 Human resources

Nurses' attitude, knowledge and skill are the main human resource for oral care. Perceptions of nurses were among the strongest predictors of quality of oral care in a survey of intensive care units in the United States (Furr, Binkley & McCurren 2004). Participants reveal their perceptions and priority for oral care within this qualitative study. The significance of this perception is explored on how it affects priority.

Even though intensive care nurses responded that oral care had a high priority in a South African survey (Perrie, Scribante, Windsor *et al.* 2011), findings in this this study show that oral care training is seen a competency requirement for the first year of nursing school and not part of specialist training. This perception is conclusive without consideration that there may be little or no foundation in basic school, and also affects the priority specialist nurses give to oral care education and practice for intubated patients. Some participants in this study do not recall oral care education in basic or specialist school. The specifics regarding oral care for the intubated patient may not be written in the books or stressed during basic nursing training (Booker, Murff, Kitko *et al.* 2013; Sole, Byers, Ludy *et al.* 2003). Rello, Koulenti, Blot *et al.* (2007) found that most registered nurses disagreed to receiving oral care training during nursing school.

The American Association of Critical Care Nurses' prevention of ventilator associated pneumonia alert recommends oral care training during orientation (Martin 2008). In this study, senior nurses do not teach oral care during orientation or as continued education. They assume that student nurses in the intensive care unit already know and sign off their student experience books without confirming if they know. Oral care is merely mentioned, formal educational opportunities are not being provided as no participant had attended any workshop or conference on oral care for the intubated patient. Even though senior nurses were seen as an important source of learning in closing the gap between school and workplace oral care education needs in the intensive care unit (Lin, Chang, Chang *et al.* 2011), Yeung & Chui (2010) note that there is lack of literature on attitude and interaction between senior and junior intensive care nurses for oral care on intubated patients recommending further research.

According to Munro & Grap (2004), neglect is the paying of less attention to detail for oral care and education on the mechanically ventilated patient. Where poor foundation is laid during specialist training for the development of clinical judgement and expertise, intensive care nurses culture a 'common sense' attitude to oral care for intubated patients as they grow in the profession, relying on basic oral care knowledge for non-intubated patients in the general wards. Even though a participant said there is high priority for oral care because nurses on resumption of duty predict that the mechanically ventilated patient needs 'oral care' and carry out the procedure frequently; endotracheal tube suctioning is rather seen, recalled and described in more detail as specialist practice and acceptable oral

care. Specialist nurses are yet to conceptualize evidenced based oral care within the context of the intensive care unit. This should not be so. Perrie, Schmollgruber, Bruce *et al.* (2014) argue that advanced knowledge required by intensive care nurses is specific to a particular context and different from basic generalised knowledge.

The finding that most nurses acknowledge oral care as an infection prevention measure agrees with Perrie, Scribante, Windsor *et al.* (2011) and is in tandem with the global shift of focus to oral care as a lifesaving vehicle for preventing ventilator associated pneumonia (Dale, Angus, Sinuff *et al.* 2013). Nurses were involved in an observation for the early discovery of patients who had developed ventilator associated pneumonia, they attached high priority to sterile suctioning and were excited when recounting their experience in previous research in preventing hospital acquired infections. The perception that oral care is for prevention of infection is a facilitator of clinical inquiry, nurses' shift of focus could be harnessed to encourage evidenced based oral care practice in the intensive care unit.

The finding on nurses' knowledge in this study partially agrees with a study that seniority correlates with increased oral care knowledge although this had no effect on providing evidenced based oral care (Labeu, Van de Vyver, Brusselaers *et al.* 2008). In this study, increased oral care knowledge by senior nurses is questionable because of the general lack of knowledge on the lotions used, evidenced based oral care and other preventive strategy against ventilator associated pneumonia. Only two out of five strategies in the Institute for Healthcare Improvement guideline to prevent ventilator associated pneumonia were mentioned; two more strategies from the several recommendations by the Centers for Disease Prevention and Control were mentioned. Nurses did not show knowledge on antibiotic use. One participant did not know research exists to show relevance of oral care in preventing ventilator associated pneumonia. In a survey of some intensive care units in Taiwan (Lin, Chang, Chang *et al.* 2011), low evidenced based oral care knowledge scores below the sample average corresponded with less frequency and low priority given for oral care.

Feedback on ventilator associated pneumonia rates is not similar in each unit. Some nurses may not be getting any feedback on the rates in their unit and may not check the statistics pasted notice board to know what the current rate is. In a previous study, nurses were not aware of the ventilator associated pneumonia rate; the institutions did not disclose their

rates so as not to discourage patronage of their services (Feider, Mitchell, & Bridges 2010). Where knowledge transfer is lacking, there is less tendency to evidenced based oral care. Ventilator associated pneumonia rate in the unit is seen as normal and best at 20- 30 % which is a possible sign of learned helplessness warranting training on evidenced based oral care. Benchmarking to some hospitals that achieved zero rates could motivate nurses to less ventilator associated pneumonia rates. Large differences in nurses' knowledge on preventing ventilator associated pneumonia supports the need for a multi strategic approach to education in the intensive care unit as recommended in the partial success of a national effort towards translating evidenced based education on oral care guidelines into practice (Ganz, Ofra, Khalaila *et al.* 2013, Goss, Coty, & Myers 2011).

Fear and difficulty with oral care was measured in a survey first utilized in an American study and has been replicated in Europe, Malaysia and South Africa (Binkley, Furr, Carrico *et al.* 2004). This study asserts to the fact that some nurses see oral care on the intubated patient as difficult, requiring skill. Both junior and senior nurses saw oral care as difficult due to unavoidable patient factors such as lack of cooperation and maxillofacial injuries. Some senior nurses saw the presence of the tube as normal, a 'duty' accustomed from several years of practice and dissipated fear in less experienced nurses.

5.2.1.2 Material resources

Some nurses say there is adequate provision, others say the government does not have the funding to provide necessary materials for oral care. The perception of the government is another sign of learned helplessness. The availability of a unit protocol could serve as step to the realisation of adequate resources in the unit, a revised protocol was found to motivate hospital management in ensuring resources for oral care (Stout, Goulding & Powell 2009). Amidst the varied opinions on the availability of an oral care protocol for the intensive care unit, the researcher was shown a protocol for oral care. This shows that some nurses are not aware of the existence of an oral care protocol within the unit which is similar to findings in previous studies (Perrie, Scribante, Windsor *et al.* 2011; Rello, Koulenti, Blot *et al.* 2007; Binkley, Furr, Carrico *et al.* 2004).

Nurses in developed countries are less likely to use thymol, hydrogen peroxide, sodium bicarbonate during oral care on an intubated patient. In this study, nurses diluted oral care

lotions to their personal convictions and were comfortable with saline or tap water when oral care lotions were not available. Although peroxide and bicarbonate, which could erode the mucosa if not in the right proportion were not among the lotions mentioned (Registered Nurses' Association of Ontario 2008); saline predisposes the oral cavity to dryness and tap water could be a source of infective organisms.

Tooth brushing is advocated (Aliso 2010). Patient relatives' assistance and nurses' personal sacrifice contribute in providing toothbrush and toothpaste. At times, the patient relative may not afford resulting in delayed care and the use of an improper sized toothbrush. According to participants, hospital funding for oral care formerly included provision for tooth brushing which must have been stopped possibly because the government does not have the funds to provide oral care. Coffin, Klompas, Classen *et al.* (2008) acknowledge that the external environment – contaminated air, water, staff, and equipment could serve as reservoirs and habitat for causative organisms to grow and multiply before the oral cavity becomes colonised. Delay in reducing the bacterial load in the oral cavity within the critical first 48 hours of admission while waiting for relatives to provide gives room for colonisation and multiplication of virulent microorganisms in the oral cavity from air with subsequent aspiration and poor patient outcomes.

Even though one participant said that the hospital management gives high priority because of the availability of space on the chart to tick that it was done, broken communication links among professionals within the oral care system still exist due to lack of detailed documentation of findings. Ganz, Ofra, Khalaila *et al.* (2013) observed that lotion, tools, techniques, frequency of care are not well detailed within care plans to provide patient sensitive data such as ventilator associated pneumonia rates, oral health status, oral microbiota and nurse sensitive data such as details of the procedure, nurses' competence and compliance (Soh, Soh, Japer *et al.* 2011; Feider, Mitchell & Bridges 2010). The use of institution specific data to guide antibiotic use is advocated (American Thoracic Society/The Infectious Diseases Society of America 2005). Lack of information from charts is a communication barrier and impedes sufficient data collection in order to understand the contextual trends for specific patient management.

A broken communication link is evident between the nurse and the different monthly suppliers of oral care lotion in the unit and results in inconsistent supply of lotion for the

intubated patient. This link could also be explored and the reason for variations in oral care supplies traced to understand the supplier's perspective. Essential knowledge on lotions for oral care could enhance nurses' active contribution in the supply of lotions for oral care. Conscious efforts could be made to strengthen the collaborative links between nurses and pharmacy by which orders are placed for better communication.

A broken logistic link exists between the central sterile services department and nurses in the recycling of mouth packs. There is some concern about care and return of mouth packs to central sterile services department after use so it can be made available to all patients and not just a few 'lucky' ones.

5.2.2 Process

This theme emerged from the categories: procedure and professional roles.

5.2.2.1 Procedure

The researcher notes that the procedure for oral care described by participants is similar to what is detailed in the oral care protocol which was found and may be unknown to some nurses but influences the oral care practice. For instance, the protocol doesn't specify which lotion and what concentration is acceptable within the unit. The American Association of Critical Care Nurses' practice alert recommends 0.12% for chlorhexidine concentration (Berry, Davidson, Nicholson *et al.* 2011; Aliso 2010), in an extensive literature review of clinical trials, the use of chlorhexidine oral care lotion at 2% was found to be 36% more effective in preventing ventilator associated pneumonia in the intensive care unit (Snyders, Khondowe & Bell 2011). Chlorhexidine is supplied as 2% chlorhexidine gluconate mouth wash, nurses may be inappropriately diluting oral care solutions to levels below what is required for effective prevention and control of infection within the unit. According to a participant, lack of measuring glass affects consistency in amount and concentration of lotions.

Frequency of oral care has been a controversial issue, variation in frequency has been found in other studies (Perrie, Scribante, Windsor *et al.* 2011; Rello, Koulenti, Blot *et al.* 2007; Binkley, Furr, Carrico *et al.* 2004). The American Association of Critical Care

Nurses' practice alert (Aliso 2010), recommends brushing 2 times daily with toothbrush and toothpaste to reduce plaque. The exact oral care frequency can only be confirmed by an observational study as nurses say different frequencies from what they actually do (Soh, Soh, Japer *et al.* 2011; Cutler & Davis 2005).

Accumulated secretions around the cuff of the endotracheal tube may dribble into the lungs of the patient. The American critical care nurses' association practice alert on preventing ventilator associated pneumonia recommends endotracheal tubes with in-line and subglottic suctioning (Martin 2008) which though useful, may be expensive (Canadian Intensive Care Unit Collaborative Faculty 2012). There is lack of literature on nurses' practice of subglottal suctioning in the intensive care unit. In this study, endotracheal tubes with subglottic suction capability were not presently supplied. One nurse described her experience when a cuff has been damaged, she said a noise is heard as air escapes from the cuff with subsequent inability to mechanically ventilate the patient. To prevent damaging the cuff, a rigid yankuer catheter is used to suction carefully around the cuff. Although it is difficult to describe the technicality 'careful', it is advocated that a flexible catheter different from the one used for oral care is passed into the pharynx until met with resistance (Booker, Murff, Kitko *et al.* 2013).

5.2.2.2 Professional roles

Even though a participant said oral care for the intubated patient is not delegated to enrolled nurses, she said many nurses in the intensive care unit are not specialist nurses. The protocol included nurse assistants as responsible persons and this may influence oral care practice for the intubated patient. Inexperienced nurses may not see the importance of doing oral care, may avoid deflating and re-inflating the endotracheal cuff to prevent transoesophageal fistula during oral care. The positioning of the tube can be adjusted to another corner of the mouth while the cuff is deflated to reduce pressure on one side of the mouth. Thus, a reason why delegation of oral care to nurse assistants should be discouraged as these beneficial technicalities require advanced skill. Booker, Murff, Kitko *et al.* (2013) detailed reasons why oral care in the intensive care unit should not be delegated to nurse assistants; these include the need for an oral assessment, chlorhexidine application is drug administration and the possibility for aspiration or unplanned extubation. The precaution of manipulating the cuff pressure during doctor's ward rounds

is suggested to improve access to skilled personnel who could immediately intervene in case of emergency.

Professionals mentioned as contributory to the oral care microsystem in this study are doctors, physiotherapists, pharmacists, and microbiologist. Browne, Evans, Christmas *et al.* (2011) described collaborative efforts for improving oral care practice in an institution: the nursing team collaborated with an infection control coordinator, the medical director, pharmacists, therapeutic committee, director of critical care services and data monitoring was enhanced by electronic records.

A formal collaborative needs to be initiated in the hospital to monitor compliance and attend to challenges in the provision of oral care since the hospital has plans of implementing the ventilator associated pneumonia prevention bundle. Hospital management involvement to improve availability of materials such as: mouth packs, lotions, documentation space; also to revise existing protocol for oral care is required. This would enhance synergy between nursing competencies and patient characteristics to prevent neglect and improve outcomes (Soh, Soh, Japer *et al.* 2011).

5.3 FACILITATORS AND BARRIERS: APPLICATION OF THEORY TO FINDINGS

Findings in this study will be discussed using the American Association of Critical Care Nurses' synergy model (Curley 1998) as facilitators and barriers affecting synergy of nurses' oral care competencies with patient characteristics for quality outcomes within the context of an academic hospital in Johannesburg. Nurse competencies outlined in the synergy model are clinical judgement, facilitation of learning, clinical inquiry, systems thinking, advocacy and moral agency; response to diversity and collaboration.

The development of clinical judgement - comprehensive reasoning on oral care practice in the intensive care unit for the prevention of ventilator associated pneumonia is negatively influenced by lack of agreed formal and informal oral care education for the intubated patient. This is evident by participants' lack of knowledge on characteristics of lotions used, preventive strategies for ventilator associated pneumonia, the verbalization: 'there is

no known research that says lung infections are because of oral care' and the verbalization: '2 out of 10 ventilator associated pneumonia rate is not bad'.

Facilitation of learning for self and other nurses is also negatively challenged by nurses' perception that oral care is for basic and not specialist training. This is evident by the attitude of senior nurses to teaching oral care compared with other procedures like suctioning in the unit.

Clinical inquiry and questioning in oral care practice is strongly present. Many nurses show eagerness to know what is current on oral care for the intubated patient by verbalizing the need for training and excitement in their research involvement. This is a positive sign to the possibility of collaboration among nurses for an improvement in oral care practices in the intensive care unit.

Systems thinking, the recognition of holistic relationships across the oral care microsystem was positive, nurses acknowledged the role of the hospital management, other professionals and the family. Advocacy and moral agency, acting as a leader and moral agent; also, the utilization of these relationships was strong with respect to family involvement but requires strengthening of communication and logistic links with other professionals. Advocacy and moral agency seems to be negatively influenced by learned helplessness where some intensive care nurses do not see the possibility that the hospital management would improve funding for oral care. The good news is the tendency for a turnaround in the priority attached by the hospital management in the implementation of the ventilator associated pneumonia bundle.

Despite lack of evidenced based knowledge, senior nurses dissipate fears of less experienced nurses. In response to patient diversity, useful suggestions were given from experience; nurses collaborate and maintain positive relationships with professionals who contribute towards the oral care needs of the intubated patient.

5.4 LIMITATIONS

The researcher was part of the instrument for data collection in this qualitative study. Humans though intelligent, are fallible with tendencies to subjectivity during data

collection (Polit & Beck 2010). Other limitations of the study are selection bias - just one academic hospital was used and the number of people agreeing to participate varied in each unit. The small sample size limits the generalizability of the findings. The challenge of interviewing nurses at their convenience during working hours brings the possibility that some nurses may have controlled their time and engagement during the interviews to get back to their duties.

5.5 RECOMMENDATIONS

According to Polit & Beck (2010), researchers make input to research by making recommendations on how evidence could be used in practice. This study reveals that even though participants acknowledge the goal for oral care to be preventing ventilator associated pneumonia, contextual factors greatly affect its provision. Based on this evidence, improved human and material resources is required to facilitate the process involved in intensive care nurses' provision of oral care. Recommendations from the findings of this study are presented below under subheadings: nursing education, clinical nursing practice, management and further research.

5.5.1 Clinical Nursing Education

The findings of this study indicate that oral care education for the intubated patient is neglected in basic training, specialist training and continued education. Less experienced nurses are afraid of doing oral care on an intubated patient. Nurses verbalized difficulty and there was lack of knowledge on the characteristics of lotions and preventive strategies against ventilator associated pneumonia.

To replace fear with confidence, buttressing the details and technicalities of providing oral care for the intubated patient during training is necessary. Facilitation of learning can be encouraged by using a multi–strategy educational intervention championed by dedicated clinical facilitators in orientation and continuous professional development (Ross & Crumpler 2007; Cutler & Davis 2005). The intensive care unit learning space could be maximized by employing simulation with high tech models for hands on experience. Attaching credit units to continued professional development on oral care would motivate nurses to active involvement in their education and foster positive perceptions. Structured

repetitive training on oral care assessment tools should be part of continued education. Knowledge on the characteristics of lotions and prevention of ventilator associate pneumonia could be improved by updating the protocol or including the information to some other easily accessible place for quick reference within the unit. A tool should be utilised for repeated evaluation of knowledge on oral care for the intubated patient in the career progression of intensive care nurses.

This study shows that difficulty with oral care occurs in relation to patient situation and not seniority, participants gave suggestions on how some difficulties could be resolved. Specialist training in the clinical areas could be improved by keeping record of successful techniques (Registered Nurses' Association of Ontario 2008), creating interprofessional opportunities (Coffin, Klompas, Classen *et al*. 2008), professional opportunities and discussion forums where nurses could share their challenges in the provision of oral care to improve the zone of proximal development, the place where knowledge of senior nurses for the provision of oral care on the intubated patient is sufficient and accessible in meeting the learning needs of junior nurses (Vygotski 1978).

5.5.2 Clinical Nursing Practice

Findings of this study reveal lack of development of expertise in oral care for the intubated patient, implying the need for specialist skill (Perrie, Schmollgruber, Bruce *et al.* 2014). Specialist skill includes preventing transoesophageal fistula, subglottic suctioning and preventing aspiration; maintaining position of the endotracheal tube, maintaining the cuff pressure and other strategies for prevention of ventilator associated pneumonia including antibiotic usage. These need to be developed among intensive care nurses. To standardize practice, oral care on intubated patients should be acknowledged within an agreed unit philosophy as specialist practice based on an evidenced based protocol.

5.5.3 Management

This study identified the need for oral care as infection prevention strategy to reduce cost of hospitalization. It also shows that there are efforts by the hospital management to implement a ventilator associated pneumonia bundle; hence, its timeliness.

The hospital management is charged to support an effective infection control programme (Coffin, Klompas, Classen *et al.* 2008), the revision of an existing oral care protocol based on evidence could motivate the hospital management to improve funding for oral care (Stout, Goulding & Powell 2009). The implementation of an evidenced based oral care protocol requires a sustainable, planned, multidisciplinary quality improvement programme with a dedicated team consisting of both higher and lower management channelling upward and downward feedback to encourage a sense of ownership. More consideration to funding and improving the quality of nurse staffing and support for education is needed so registered intensive care nurses can be the oral care giver of the intubated patient.

Another recommendation from this study is the provision of measuring glasses to encourage the use of appropriate amounts and concentrations of oral care lotions. Provision of toothbrush and toothpaste will reduce the delay in oral care and prevent the growth of more virulent microorganisms which lead to the poorest ventilator associated pneumonia outcomes. The provision of a dedicated space on the chart for detailed documentation of nurses' findings (Soh, Soh, Japer *et al.* 2011; Goss, Coty, & Myers 2011), electronic charting, reorientation of nurses to the standard of documentation practice and exploration of broken links to the supply of lotions and mouth packs are suggested.

5.5.4 Further Research

Parallel to the recommendation that direct care givers in the intensive care units should receive adequate training to prevent ventilator associated pneumonia (Coffin, Klompas, Classen *et al.* 2008), further research on the effects of an educational intervention would be beneficial. Strategies for learning could be implemented based on participant's educational needs, recommendations from the implementation of an effective continuous educational programme and staff evaluation.

This study can be replicated in other public hospitals within the country given the current emphasis on utilizing local microbiological data which is specific to the particular clinical setting in making decisions for infection control (American Thoracic Society/The Infectious Diseases Society Of America 2005; Tablan, Anderson, Besser *et al.* 2004). A clinical trial could identify specific microorganisms that occur in the different intensive

care units and the relationship between chlorhexidine concentrations, antibiotic usage and prevention of ventilator associated pneumonia. This will benefit development of generalisations to a broader context for recommendation to the national guidelines.

5.6 CONCLUSION

This study is built on the synergy model based on the premise that patient's characteristics drive nurses' competencies (Curley 1998). Oral care is essential in the intensive care unit. There is an increased risk for oral mucosal infection and breakdown in the mechanically ventilated patient with a predisposition to ventilator associated pneumonia and this requires great attention to consistent evidenced based oral care (Munro & Grap 2004).

The findings of this study describe how the attitudes of nurses and the hospital management affect oral care practice in the intensive care unit. Major concerns to the participants were the perception that oral care education is not meant for specialist training and lack of human and material resources within the unit. This study demonstrates the need for a positive improvement in knowledge, attitude and skills and the use of a multi educational strategy to the attachment of a high priority to implementing oral care in the intensive care unit.

The researcher's curiosity was met with several challenges during this study. In one occasion, a nurse who had agreed to participate was waited upon from morning until evening when she verbalized personal reservations for recording her voice and declined being interviewed despite assurance of confidentiality. The researcher thanked her, a copy of a continued education article for oral care was given to each unit. The researcher has grown experience in appreciating the rigors of qualitative research, qualitative research requires patience, discipline and time management skills.

It is hoped that the findings of this study will add to the existing body of knowledge for nurses' oral care practice, the prevention of ventilator associated pneumonia to improve the experience of intubated patients in the intensive care unit.

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APPENDIX A

FACTORS AFFECTING INTENSIVE CARE NURSES IN PROVIDING ORAL CARE IN THE INTENSIVE CARE UNITS OF A PUBLIC SECTOR TERTIARY HOSPITAL IN JOHANNESBURG

PARTICIPANTS INFORMATION LETTER

Dear Colleague,

Hello, my name is Afiamma Adiakpantin. I am a Master's nursing student in intensive care and currently registered at the University of the Witwatersrand. My intention to explore factors affecting intensive care nurses in providing oral care in the intensive care units. As a registered intensive care nurses, I would be interested in your viewpoint as an 'expert' or 'clinical nurse specialist'.

Should you agree to participate, I will ask that you allow me to interview you, either individually or in a focused group either with or without other health care professionals at a venue of your choice. I will schedule an appointment at a date and time convenient for you. The individual interview should take a maximum of three hours' duration, whereas the focus group should take approximately thirty minutes. With your permission, I will audiotape the interviews foe transcription and analysis.

Participation is entirely voluntary. You may choose not to participate or withdraw from the study at any time. Anonymity and confidentiality is guaranteed. I will personally transcribe the tape recordings and they will be destroyed once the study is completed. No names or any identifying information regarding the hospital or the intensive care unit will be noted on the transcribed data. I will be happy to supply you with a copy of the transcription of the interview should you wish. Information in the report will be written in general terms and no personal information will be given.

I appreciate that you will derive no direct benefit from participating. However, I hope that the completed study will assist nurses working in the intensive care setting to understand and implement oral care more effectively in the provision of care in the intensive care units.

It is hoped that the results will clarify the practice needs of intensive care nurses on oral care. The appropriate people and research committees of the University of the

Witwatersrand and your health care institution will be asked to approve this study. You may contact Mrs Zanele Ndlovu, secretary of the University of the Witwatersrand, Human Research Ethics Committee (HREC) at (011)7172229.

Thank you for taking the time to read this information letter. If you wish to participate in the study please complete the attached biographical letter. However, should you require any more information, you are welcome to contact me my phone number is 0810048183, email: afiamaa@gmail.com

Thank you.
Yours sincerely,
Adiakpantin, Afiamma
Masters Nursing Student

APPENDIX B

FACTORS AFFECTING INTENSIVE CARE NURSES IN PROVIDING ORAL CARE IN THE INTENSIVE CARE UNITS OF A PUBLIC SECTOR TERTIARY HOSPITAL IN JOHANNESBURG

CONSENT FORM

I , _____ (please print name) give permission to be included in the study.

I have read with understanding the content of the information sheet and I have been given the opportunity to ask questions I might have regarding the procedure and my consent to my being included in the study.

_____ _____

Date Signature

_____ (Witness)

APPENDIX C

FACTORS AFFECTING INTENSIVE CARE NURSES IN PROVIDING ORAL CARE IN THE INTENSIVE CARE UNITS OF A PUBLIC SECTOR TERTIARY HOSPITAL IN JOHANNESBURG

AUDIOTAPING CONSENT FORM

I , _____ (please print name) give permission for audiotaping to be included in the study.

I have read with understanding the content of the information sheet and I have been given the opportunity to ask questions I might have regarding the procedure and my consent to my being included in the study.

_____ _____

Date Signature

APPENDIX D

FACTORS AFFECTING INTENSIVE CARE NURSES IN PROVIDING ORAL CARE IN THE INTENSIVE CARE UNITS OF A PUBLIC SECTOR TERTIARY HOSPITAL IN JOHANNESBURG

BIOGRAPHICAL QUESTIONNAIRE FOR NURSES

Instructions:

Please complete the following biographical questionnaire

1. **What age group to you belong to:**

2. **Please list your academic qualifications**

3. **State the year you qualified as an intensive care nurse**

4. **Indicate your position in the ICU by ticking one of the following:**

ICU nurse	Shift Leader	Manager	ICU researcher

APPENDIX E

FACTORS AFFECTING INTENSIVE CARE NURSES IN PROVIDING ORAL CARE IN THE INTENSIVE CARE UNITS OF A PUBLIC SECTOR TERTIARY HOSPITAL IN JOHANNESBURG

INDIVIDUAL INTERVIEW GUIDELINES

OPENING QUESTION

Can you tell me about the factors that affect the provision of oral care in your intensive care unit?

PROBING QUESTIONS

1. Can you describe how oral care is provided for patients with endotracheal tubes in the ICU?
2. What are your perceptions about oral care in ICU?
3. To what extent do you think oral care is given a high priority in patient care?
4. Can you describe any major factors that affect the way oral care is provided to patients with endotracheal tubes?
5. To what extent have you received training in oral care for patients with ET tubes?
6. To what extent do you feel oral care training for patients with ET tube would affect ICU nurse in providing oral care for these patients?

Thank you for your time.

APPENDIX F

Department of Nursing Education

Faculty of Health Sciences

University of the Witwatersrand

7 York Road

Parktown

2193

The Chief Executive officer

Charlotte Maxeke Academic Hospital

Private Bag X39

Johannesburg 2000

Dear Mrs Gladys Mogopodi-Bogoshi,

Re: REQUEST TO CONDUCT RESEARCH AT THE CHARLOTTE MAXEKE JOHANNESBURG ACADEMIC HOSPITAL

I hereby ask for permission to conduct research at Charlotte Maxeke Johannesburg Academic Hospital. I am a registered Masters nursing student at the University of the Witwatersrand. The research is entitled "*Factors affecting intensive care nurses in providing oral care in the intensive care units of a public sector tertiary hospital in Johannesburg".*

Consistent oral care practice on intubated patients has been proven to reduce length of stays, hospital costs, mortality and morbidity associated with ventilator associated pneumonia. Critically ill patients totally depend on nurses for basic care. The research aims to describe nurse's oral care in the intensive care unit towards improved outcomes.

Approval from the committee for research on human subjects of the University of the Witwatersrand will be sought before commencing the research. The name of the institution, personnel involved will not be involved in the study and will not be divulged in the report, Informed consent will be obtained from all participants. If requested, a copy of the research report will be made available to you.

Thank you.

Yours sincerely,

Adiakpantin, Afiamma Masters Nursing Student Date _____

APPENDIX G

EXAMPLE OF VERBATIM TRANSCRIPT

DATE ID 25/01/16
INTERVIEW ID 03
SITE ID 2/1
AUDIOTAPE LENGTH 0:17.16

I: It's good to have you, what I would like to find out is …..when oral care in the intensive care unit …….is said, what comes into your mind?

P: Hygiene....Hmmm,……. VAP

I: Ok, that's ventilator associated pneumonia?

P: Yes, its hygiene, its VAP , patient comfort, that's what I'm thinking when you talk about oral care

I: Hmm…. So, how Is oral care done in the intensive care unit?

P: On ventilated or non- ventilated patients?

I: On ventilated patients.

P: On ventilated patients, you get a…. mouth pack mmm… .then we have either Glycothymol or we have Chlorohexidine mouthwash. Sometimes if we don't have both agents we use… normal saline. So, before you suction your patient, you do oral care especially in the morning and in the evening. Both times

I: OK, can you elaborate more on the lotions that are used for oral care?

P: Its Chlorhexidine. Chlorhexidine is alcohol based, but I'm not sure of the percentage of alcohol, and also Glycothymol. Glycothymol has glycerine in it to prevent the mouth drying up and the lips and it's much more gentle on the patient

I: How is it used?

P: You dilute err, we don't have measuring…the problem that we have .We don't have medicine glasses. So, we just pour whatever amount that we think is suitable

into the glass and mix it with water, but we don't use sterile water, ordinary tap water.

I: So, can you elaborate more on how the cleaning is done?

P: Ok, in the mouth pack there is gauze and there's mmmm…an artery forceps and there are two mugs, not bowls…not bowls … I mean bowls…two mugs and one kidney dish. What you do, you wrap the gauze sort of ….. , around the artery forceps, it's a matter of artery forceps. Previously we used to have plastic ones but we don't have them anymore. You wrap it around the metal artery forceps, you dip the artery forceps in the cleaning solution - either chlorhexidine, glycothymol or normal saline. And then you squeeze off excess water against the wall of the mug in the mouth pack and then, you brush the teeth… sort of brush. Brush the teeth, brush the tongue. ……and then, after brushing the teeth and the tongue, you take a syringe and squeeze some water in the mouth and then suction it out with a yankuer suction connected to vacuum.

I: So, when doing oral care? What are the things that ….are expected to, that nurses must do?

P: Things like what? The correct patient?

I: hmm skills, mmm techniques

I: Oral care, I think I did oral care when I was doing basic nursing….I think it was first year, first or second year . But more in first year. That's when you were termed competent or non-competent in performing oral care because usually when you do oral care….it will be…. When I remember correctly, it was on unconscious patients in general or medical wards when I was in the first year. So that skill, by the time you become ICU trained, you must have perfected the skill. I mean, It is very basic, all that you need to ensure is that your patient does not aspirate, you prevent aspiration pneumonia so when you squeeze the water …..into the mouth rinsing, the yankuer suction should be in the mouth already while due suctioning apt.

I: Thank you. So, what other information do you get from oral care? Doing oral care

P: What…… what

I: information

P: do I get?

I: Yeah

P: What do you mean.. what information do I get form oral care ?

I: What information …how…hat do you look out for when doing oral care on a patient?

P: Doing oral care in my patient, I'm look at the tongue is it furry, is it dry, is it cracked, are there any caking of…..what do you call that?....when the patient is taking a lot of antibiotics, ….what do we get? Thrush [laughs], you check if the patient has oral thrush. Any…. injuries on the tongue, gingivitis,…. any loose teeth, if the lips also are cracked at the sides…. You know the corner of the lips, and also if the lips are dry, they need to be cleaned, they need to be moisturised. Unfortunately it is very…we don't get Vaseline or petroleum jelly often from the dispensary from the pharmacy.

I: How do you inform the nurses that come on the next shift about… the state of the patient's oral care?

P: There is a report, written. When you develop your nursing care plan, part of patient's… hygiene is also oral care, where you will describe what you are going to do for the patient after bathing in the morning. It also involves even the catheter care. So, after doing whatever in the interventions that you have done to the patient like cleaning the mouth or whatever you are going to write in your evaluation part of the nursing care plan. you are also going to write in the nurses' report where you are going to hand over. So it is written and it is also verbal. So let's say the patient has gingivitis or the patient tends to bleed or whatever; that will be documented in the patient's report; nursing report for the day if I was working day duty, and then night duty, documented on the side for the night duty and then verbal orders. if it's something that needs to be treated with other medication like patient having thrush then it is reported to the doctors and ….maybe Mycostatin or Bacterim gel will be ordered for the patient .

I: Thank you

P: And then the frequency maybe of oral care will change….will increase depending on what has been ordered for the treatment of what particular problem that the patient has

I: Can you describe what factors could discourage oral care in a patient?

P: Factors that would discourage oral care in a patient is lack of equipment, if you…. don't have mouth packs, let's say you come in the morning; the night staff have sent the …mouth packs to CSSD and by the time you suction at 10 o'clock there are no mouth packs. What are you going to do? You are just going to flush the mouth with saline.

I: err

P: And usually we don't get enough mouth packs. So those patients who have got mouth packs will be the lucky ones or the fortunate ones who will get oral care proper, oral care done. Ehrr sometimes, even the patient don't even have toothpaste or toothbrush. Because if the patient had the toothpaste and their own toothbrush you could just use the toothpaste a little bit, you brush the teeth and the tongue and then you just use a plain saline or water to rinse the mouth and suck out with …em .. With the yankuer suction and remember also that the hospital does not supply small brushes, small toothbrushes, and some of the patient's toothbrushes are so big…. Then you know when a patient is ventilated you will be able to just brush the teeth …and then the brush will have to compete with the ETT tube in the mouth….

I: So, apart from….

P: And then another difficult thing, if there is any food stuck in between the teeth we don't have any floss to take that out.

I: I'm still interested , I'm still open for more factors that could…. What factors that could…that encourages it… that makes it easy

P: Ok, one other factor that will discourage a nurse from doing mouth care is the patients who are confused or the patients who continuously bites on the ETT tube and whatever. Because that patient will have an airway …. you know you secure an airway in the patient's mouth so that the patient does not bite when you remove that airway then it's going to be difficult for one to perform oral care on such patient and especially if the that patient said wean sedation or stop sedation as its going to be difficult. And then factors that promote oral care are patients who are cooperative, its availability of equipment, availability of stock or personal toiletries for the patient.

I: How frequent is oral care done at night?

P: At night I think……. it is usually…, I haven't been working night duty for a long time. So, usually the patents are suctioned….. 4hourly; so it means at night it is supposed to be three times. So, but I think mainly it is done when the patient is bathing in the morning maybe at 3 in the morning or at 6 in the morning

I: when a patient is admitted to go to the theatre, when does he receive his oral care?

P: Admitted from theatre?

I: For instance a patient is meant to go from surgery
and has…….. come back from surgery

P: yeah

I: when does the first oral care start?

P: When you……With the first suction that's when you do your oral care

I: Ok, that is, it depends on the condition of the patient, if there are secretions or not

P: But sometimes you know when you see a patient's mouth is not quite nice, I don't think you'd wait for time to suction, you can do it immediately. Once the patient , once you have admitted the patient and settled the patient.

I: Is there any agreed, is there any common way or any protocol that guides in the unit?

P: In the unit? No but when you suction, the procedure for suctioning includes oral care

I: that means most of you use your own discretion

P: but when you suction, the suctioning guideline the suctioning protocol, there is no separate protocol on oral care, the procedure for suctioning involves oral care…..includes oral care

I: what……in performing oral care on unconscious patient, what technique do you think nurses will need more training on?

P: The ICU trained ones, no technique at all because it's just knowing that you brush and you…….clean all the surfaces of the mouth. That's all

I: So, when you see the oral care tube how do you feel?

P: How do I feel doing oral care on a tubed patient?

I: yes

P: It's not easy. You know, number 1 the tube is quite uncomfortable, and performing oral care. Remember when you've got a tube it is not easy for the patient to close the mouth and saliva is just produced and stays at the base of the tongue, you know,…… at the throat. And so to make the patient comfortable, you need to remove that saliva, you need to clean the mouth frequently, so that the tongue does not dry out and so that the saliva that is there at the back does not…..err… pull there and cause maybe aspiration pneumonia if the ….cuff of the ET tube is not inflated ….err…properly. Also, oral care you need to do it to remove you know,…… the phlegm that has bypassed the cuff aybe when the patient coughs

I: How is the oral care training here, within the unit?

P: Oral care training? There is no oral care that has been done…..that was done in basic first year or second year. I don't quite remember the year and that was it…… and it's not one of the procedures for ICU…..it is not one of them

I: what about for a novice nurse?

P: Ok, for the novice nurse when we demonstrate for the novice nurse who comes fresh from school? when we demonstrate the suctioning, we also demonstrate the oral care to the nurse

I: Thank you for your time

P: Is that all?

I: Yes, Thank you

APPENDIX H

EXAMPLES OF EXTRACTED SIGNIFICANT STATEMENTS, CODES, CATEGORIES AND THEMES

NO	SIGNIFICANT STATEMENT	PARTICIPANT	CODES
1	'…I did oral care when I was doing basic nursing….I think it was first year… That's when you were termed competent or non-competent in performing oral care… it is very basic…..'	*3*	Perception on oral care education
3	'…maybe you are from the ward, you don't know anything about doing mouth care on a ventilated patient it is the first time that you see a vent….'	*11*	Lack of knowledge
4	'…maybe I assume that everybody has been trained to do oral care…I don't think they need training because number one, it is brushing of the tube teeth, care of the tongue …..so the tongue and the tube you need to check them cos as you are brushing them you need you are also examining if there are no tooth decay, you know so I think those are the most important parts….'	*4*	Perception on oral care education
5	'… [senior nurse] will just sign off that book without direct supervision or assessment that I really know what I am doing…'	*5*	Lack of supervision (senior nurses)
6	'….what is it that you are checking in the mouth?'	*18*	Low priority
7	'…you check the changes in the x-ray after.48 hours...and then you check the secretions of the patient if they change from the time of admission, you check the temperature if the temperature goes up, you check the ...the...when you do the	*15*	Research involvement

	gas if the oxygenation goes down and the PCO2 goes up, and then you compare every day....'		
8	'…yo! Communication in this hospital is very poor… whatever they get from the patient, they don't even come and tell you… even if it is those infectious diseases'	*13*	Poor communication
9	'….it is difficult to make the person cooperate to open the mouth … when you put the airway, it makes it more….even…it is been more difficult to clean…..'	*7*	Difficulty
10	'… [students, never worked in ICU, overtime (agency staff)] scared that how can you do mouth care with a patient having a tube…'	*4*	Fear
11	'…because of the lack of resources and the funds you find that we don't have it [oral care lotions] and we end up using just tap water to do oral care on intubated patients…. but with tap water, it works very well when we put the toothpaste with it. And sometimes you find that sterile water is not available so we opt for the tap water…'	*14*	Barrier(Lack of resources (lotions) improvising
12	'…like sometimes we are running short of glycothymol, peppermint water, and then during admission while we are still waiting for the relatives to bring toothbrush and toothpaste, you find that….you don't have those things in the hospital…'	*17*	Barrier (Lack of resources toothbrush and toothpaste) delays care
13	'… I am working with a government hospital so therefore there are limited resources to oral care…'	*19*	Perception (Lack of resources)

14	'…So it is important for us to do oral care for the patient to prevent any colonisation of the mucous causing any infection…'	*5*	Perception (purpose of process)
15	'…and also for dignity, if the breath is smelly and all that the family members when they come they will actually not going to be happy to hear that bad smell from the patient's mouth…'	*14*	Perception (purpose)
16	'…4hourly; so it means at night it is supposed to be three times. So, but I think mainly it is done when the patient is bathing in the morning maybe at 3 in the morning or at 6 in the morning….'	*3*	Frequency of oral care
17	'…so when we do the activity…just like suctioning and oral care….we…sedate those patients so they can be calm…'	*9*	Facilitator of oral care
18	'…in our institution the clinical facilitators are not only allocated for teaching …part of the quality assurance ….new staff members ...interview them…they end up not coming to the ICU to teach…'	*14*	Barrier (Role confusion)
20	'…because we buy different ah...solution…. this month it will be a supplier, next month it will be another supplier. So they bring different solutions but they all have one ingredient which is chlorhexidine yes…'	*10*	Barrier(communication)

Codes	**Sub category**	**Category**	**Theme**
Perception on oral care education priority	attitude	Human resources	Resources
knowledge supervision(senior nurses)	knowledge		
Difficulty	skill		
Lack of resources toothbrush and toothpaste) delays care Perception (Lack of resources)		Material resources	

APPENDIX I

GAUTENG PROVINCE
HEALTH
REPUBLIC OF SOUTH AFRICA

CHARLOTTE MAXEKE JOHANNESBURG ACADEMIC HOSPITAL

Enquiries:
Ms. G. Ngwenya
Office of the Nursing Director
Tell: (011): 488-4558
Fax: (011): 488-3786
15 December 2015

Miss Adiakpantin Gabriel
Department of Nursing Education
Faculty of Health Sciences
University of Witwatersrand

Dear. Adiakpantin Gabriel

RE: "Factors Affecting Intensive Care Nurses In Providing Oral Care in the Intensive Care Units of a Public Sector Tertiary Hospital in Johannesburg"

Permission is granted for you to conduct the above recruitment activities as described in your request provided:

1. Charlotte Maxeke Johannesburg Academic hospital will not in anyway incur or inherit costs as a result of the said study.
2. Your study shall not disrupt services at the study sites.
3. Strict confidentiality shall be observed at all times.
4. Informed consent shall be solicited from patients participating in your study.
5.

Please liaise with the Head of Department and Unit Manager or Sister in Charge to agree on the dates and time that would suit all parties.

Kindly forward this office with the results of your study on completion of the research.

Supported / not supported

Ms. M.M Pule
Nursing Director
Date: 14/12/2015

Approved / not approved

Ms. G. Bogoshi
Chief Executive Officer

APPENDIX J

R14/49 Miss Adiakpantin Gabriel

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)

CLEARANCE CERTIFICATE NO. M150770

NAME: (Principal Investigator)	Miss Adiakpantin Gabriel
DEPARTMENT:	Nursing Education Charlotte Maxeke Johannesburg Academic Hospital
PROJECT TITLE:	Factors Affecting Intensive Care Nurses In Providing Oral Care in the Intensive Care Units of a Public Sector Sector Tertiary Hospital in Johannesburg
DATE CONSIDERED:	31/07/2015
DECISION:	Approved unconditionally
CONDITIONS:	
SUPERVISOR:	Dr Shelley Schmollgruber
APPROVED BY:	Professor P Cleaton-Jones, Chairperson, HREC (Medical)
DATE OF APPROVAL:	04/11/2015

This clearance certificate is valid for 5 years from date of approval. Extension may be applied for.

DECLARATION OF INVESTIGATORS

To be completed in duplicate and **ONE COPY** returned to the Secretary in Room 10004, 10th floor, Senate House, University.
I/we fully understand the conditions under which I am/we are authorized to carry out the above-mentioned research and I/we undertake to ensure compliance with these conditions. Should any departure be contemplated, from the research protocol as approved, I/we undertake to resubmit the application to the Committee. **I agree to submit a yearly progress report**.

Principal Investigator Signature Date

PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES

APPENDIX K

POST GRADUATE APPROVAL