

Improving Internship Knowledge and Performance about Oral Hygiene Bundle for Mechanically Ventilated Patients

Marwa M. Abd Elbaky, Ibrahim Abbas Youssef, Azza Hamdi El-Soussi,

Mervat Anwar Abd El-Aziz

Assist Lecturer of Critical Care Nursing,

Prof. of Anesthesia.,

Prof. of Critical Care Nursing. &, Lecturer of Critical Care Nursing

Abstract: Oral hygiene is an integral part of care in ICUs, Nurses rank oral care a high priority, there is a theory-practice gap in relation to nurse administered oral hygiene and oral care methods are not consistent with the current research. This gap has attributed to inadequate training or lack of written protocols. **Aim of study:** is to improve internshiop nurse's knowledge and performance about standardized oral hygiene technique for traumatic mechanically ventilated patients. **Patients and method:** a quasi experimental research was conducted in trauma intensive care unit at Mminia university hospital in Egypt. Convenience sample of all available internship nurses (about 50 nurse). Two tools, tool I pre/post questionnaire sheet for assessment of nurses knowledge, too II pre/post observation checklist to assess nurse skills. Comprehensive oral care bundle proceures was used to improve nurses' knowledge and performance. **The results of this study** indicated that more than halve of the group was female (68%), (66%) of nurses did not know how to asses the oral cavity or use the (BOAS) assessment tool, it was observed that all internship nurses in ICU did not perform oral care using tooth brush or perform ETT cuff for critical patient (100%) but after educational intervention a higher percentage of nurses perform oral care for critical ill patient using standardized brushing technique. **Conclusion:** The study concluded that comprehensive education program lead to significant improvement in nurse's knowledge and performance about oral care bundle procedures for critically traumatic patients.

I. Introduction

Oral care bundle is a basic nursing activity that provides relief and comfort to patients who are seriously ill and cannot perform the simple activity by themselves. Oral care should be provided for all critically ill patients and especially those whom are intubated and mechanically ventilated (**Prendergast, et al., 2013**).

Oral care bundle is very important as VAP bundle in decreasing colonization and pneumonia. Oral care bundle includes the use of both tooth brush in combination with antiseptic solution as well as cuff pressure control, suctioning and elevation of the head of the bed at 35 to 45 degree. Oral care bundle should be provided on regular frequency according to unit's policy and patient's care needs (**Johnstone et al., 2010**).

Tooth brushing was included in oral care bundle because it assists in removing plaque and other debris from the tooth surfaces which can readily become a host for pathogens, the mechanical cleansing of the tooth surface and the resultant inhibitions of plaque development have the potential to reduce bacterial load in the oral cavity as well as VAP prevention (**Berry, M.A. 2013**).

Using a soft pediatric toothbrush in oral care bundle for intubated patients, to prevent mouth injury and decrease bleeding. Using ultra soft toothbrush if patient's mouth is very sore or inflamed The mechanical action of a toothbrush to remove dental plaque has been recommended and is considered as a standard in applying oral hygiene (**Pobo, A. 2009**).

Nurses may be hesitant to provide oral care to patients who are intubated because endotracheal tubes (ETT) may limit access to the oral cavity. The fear of dislodging or displacing the tube is also restriction. Provision of oral care may be affected by the perception that oral care contributes less to patients' health and well-being (or has lower priority) than other nursing interventions for critically ill patients. (**Grap, J.M., et al 2004**). Oral care policies appear to be present but not well used by ICU nurses. Nurses also are not aware of published guidelines and a gap exists between national oral care standards, reported oral care practices, and unit-level oral care policies (**Feider, L.L. et al 2010**).

The shortage of nurses in critical care units can result in the reprioritizing of patient care versus tasks to be completed, with activities considered to be more urgent taking priority over activities (such as oral care) that are viewed as basic nursing, and it has been reported that when nurses' time is rationed, oral care is often the first practice to be deferred (**Ames, J. et al 2011**).

Mechanical barriers crowd the mouth of the ventilated critically ill patient. These may include an endotracheal tube, oral airway, oral gastric tube, and temperature probe. Delivering effective oral hygiene in this confined, occupied space will challenge even an experienced critical care nurse (**Berry & Davidson, 2006**).

Nurses in critical care units are in the ultimate position as the primary caregiver and member of the professional team able to identify patient stressors, implement primary and secondary preventions and interventions to provide ideal care for patients (**Garland, J. S., 2010**). Despite the evidence regarding how to provide oral care and VAP preventive measures, research on how to increase nurses' adoption of VAP preventive practices has been minimal. Also improving the internship knowledge and performance considered vital for both the in unit staff and patients in providing oral hygiene and they will be responsible in the future. They should be well trained in order to deliver highly competent nursing care with the best outcome (**Fishbein & Ajzen, 2010**).

The aim of the study: The aim of this study is to improve internship nurses knowledge and performance about oral care bundle for mechanically ventilated patients.

Significance of the study

Oral care is most commonly performed by critical care nurses however, nurses compliance with performing oral care protocols were ranged from (49.8 %) to (96.5 %) adherence to oral care varied substantially according to individual nurse's characteristics as nurses age, gender, ICU position and academic degree. Also many nurses found to be had not any knowledge about oral care protocol (**Lin, H. L., et al 2014**). Nurses in many critical care units use Saline as a mouth wash solution while others use tap water and not on a regular base. This may be due to unavailability of written oral care protocols in addition to the loss of nurses' awareness about the benefit of delivering timely oral care and its relation to the incidence of VAP (**Alhirishi, 2010 , & Scott & Vollman, 2011**).

Hypothesis

- There will be statistical significance difference between the internship knowledge score about oral care strategy before and after the educational intervention.
- There will be statistical significance difference between the internship performance score of oral care bundle before and after the educational intervention.

Subject and Method

Design: Quasi experimental research design was used in this study.

Setting: The study was conducted at the ICU of Minia university hospital. The ICU is located in the second floor; it consists of four rooms with a total bed capacity of 12 beds and the total number of internship student nurses is 50.

Sample of the study:

A convenience sample of all available internship student nurses of the academic year from (2012-2013) (about 50 nurse) having bachelor degree, while there training in the ICU of Minia university hospital.

Tools: Data pertinent to the study were collected, utilizing the following two tools.

First tool: Questionnaire sheet about oral care strategy (pre\post test)

- A questionnaire sheet. It consisted of (25 questions) related to the frequency, methods of oral care, assessment of oropharyngeal cavity, respiratory tract infection and care of mechanically ventilated patients, in addition to the socio demographic data as (name, age, sex, and years of experience).
- Each right answer was given score according to answer the total scores were 50 degree those who obtained <60% were considered having unsatisfactory level of knowledge. While those who obtained > 60 were considered having satisfactory level of knowledge.
- **Second tool: Internship performance check list (pre\post test)**
- Observational checklist includes three different procedures: (oral care procedure by brushing technique (31 steps checked), suction technique (21steps checked), and cuff pressure monitoring (22 steps checked). The scoring is ranging from (1) to (0.5) point. The higher the score, the higher the level of performance as: the internship that had a total score more than 60 % of the performance, considered satisfactory; but those who a total score 60% or less, considered unsatisfactory.

II. Methodology

- Study was applied after an official approval for data collection was obtained from faculty of nursing dean and ICU director and ethics committee in ICU of Minia University Hospital.
- Tools were developed by the researcher after reviewing the related literature.
- Tools were tested for content clarity and validity by a jury of (7) experts in the field of the study (three nursing professional staff, three medical staff and one expert in statistics) and the necessary modifications were done.
- Permission for voluntary participation was obtained from nurses and the nature and purpose of the study was explained.
- Pilot study was conducted on random sample of 5 nurses to test the feasibility and applicability of the tool and the necessary modifications that were done.
- The educational program was conducted in seven sessions as three theoretical sessions and four clinical sessions.

-Three theoretical sessions' topics:

- 1- Mechanical ventilator and the care of mechanically ventilated patients (it takes 60 minutes).
 - 2- Oral care definition, importance and frequency using three different antiseptic agents (Alcohol-Free Chlorhexidine (0.2%), Hydrogen Peroxide (1.5%) & Sodium Bicarbonate (0.1%) and its effect in preventing bacterial colonization, oral inflammation and VAP (it takes 60 minutes).
 - 3- Using the tools of the study during care of mechanically ventilated patients (Bacterial Colonization Indicators, Beck Oral Assessment Score & Mucosal-Plaque Score) (it takes 60 minutes).
- The Researcher started the educational program with the theoretical topics at 20th of August 2012 before starting their actual training to provide an orientation of the topics and bias of knowledge.
 - The theoretical sessions started with discussion (5-10 minutes) to assess students' feedback knowledge about the related topics, then researcher started the training time. After each session, break time was given to them (10 to 15 minutes) followed with discussion to assess students level of understanding (10 minutes).

Four clinical sessions' topics:

- 1- Technique of oral care for mechanically ventilated patients was carried out by using soft pediatric tooth brush with the application of three different antiseptic agents according the study. Each solution was introduced to the student in its name, concentration and amount (it takes 20minutes).
 - 2- Suction technique from the oropharyngeal cavity and the ETT (it takes 20 minutes).
 - 3- ETT care and cuff pressure monitoring (it takes 20 minutes).
 - 4- Technique of culture aspiration from the ETT and drawing oropharyngeal swab (it takes 20 minutes).
- Clinical sessions were conducted in the clinical lab (four groups 12 or 13 each one) by using doll.
 - Every session started first with discussion to assess internships' feedback about definition, indication, timing of each procedure (it takes 5 minutes), then the training about technique of each procedures (it takes 10 minutes).
 - Each clinical session was repeated more than one in the same day and in the next day to ensure internship performance of the procedures.
 - Internships demonstrated the procedures more than one under the observation of the researcher.
 - Each theoretical and clinical session was presented in the form of power point presentations, and simulation videos.
 - Each student obtained a copy of the educational program in English language booklet which included all theoretical and practical content.
 - An open communication channel was achieved between the researcher and the internship.

Evaluation of educational program:

Two post tests was conducted

- First posttest was conducted using the same questionnaire sheet to assess internships' knowledge after the educational intervention. it was conducted after (3) months of the educational program implementation.
- Second posttest was conducted using observation checklist to assess internships' performance in providing oral care and to ensure practice until competency. This evaluation started for each one of internship in the second week of their clinical rotation in ICU. The clinical rotation of internship in ICU takes two months.

Statistics analysis: Data analysis was done using SPSS 20.0 application (Statistical package for social science). Qualitative data described by number and percent, where quantitative data described using mean and standard deviation. Chi-square test used to test relation between qualitative variables where independent samples T-test

used to compare between two groups of quantitative data, paired T-test used to compare between pre-test and post-test and person .

Results:

Table (1): Shows socio demographic characteristics of the studied group it was observed that more than halve of the group was female (68%), In relation to the age of the studied group the mean ± SD was (21.2 ± 0.9).

Table (2): Shows nursing knowledge regarding risk factors and assessment of clinical picture of nosocomial oral infection in the pre-and post test group. The risk factors (62 %) answered it correct which elevated in the after education to (90 %). In relation to diagnostic measures that used in diagnosis of VAP more than half (74 %) in the pre test answered it correct and also the majority of them (88 %) in the post test. There were no statistical significance difference between both groups presented by P value (0.07).

Table (3): Shows nurses knowledge about measures that decrease nosocomail oral infection, more than half of nurses (62 %) in the pre test exam answered it incorrect but after the education intervention (92%) of the group answered it correct. In relation to the assessment tool as (BOAS) a high percent of the group (88 %) answered it correctly in the post test there were statistical significant difference between both groups presented by P value (0.001).

Table (4): comparing nurse's performance and knowledge regarding to the education intervention. There were statistical significant difference between both groups presented by P value (<0.001) in all the above mentioned items.

Table (5): shows that there were no correlation between the pre test and performance and there were no statistical significant difference between both items presented by P value (0.8 & 0.9) respectively. Also after the educational intervention it was observed no correlation and significant difference between them presented by P value (0.4, 0.9 & 0.7) respectively.

Table (1): Percent distribution of the Socio demographic characteristics of the intern ship nursing student

Sex	Intern ship nursing (N=50)	
	No	%
Male	16	32
Female	34	68
Years of experience Less than one year	50	100
Age	Mean ± S.D	
	21.28	± 0.90441

Table (2): Percent distribution of nursing knowledge regarding risk factors and clinical assessment of nosocomial oral infections

	Pre Test (N=50)				Post Test (N=50)				P value
	Correct		Incorrect		Correct		Incorrect		
	No	%	No	%	No	%	No	%	
Risk Factor that leads to NI in ICU.	31	62	19	38	45	90	5	10	0.001
Medication type as a risk factor for nosocomial oral infection	8	16	42	84	40	80	10	20	<0.001
Clinical picture of NRTI									
S & S of presence of NRTI	46	92	4	8	49	98	1	2	0.2
skin color and mucus membrane	18	36	32	64	44	88	6	12	<0.001
Diagnostic measures that confirm presence of VAP	37	74	13	26	44	88	6	12	0.07
Chest percussion	26	52	24	48	42	84	8	16	0.001
Breath sounds assessment	24	48	26	52	35	70	15	30	0.02
Assessment of tracheal secretion									
Amount	22	44	28	56	42	84	8	16	<0.001
Color	24	48	26	52	48	96	2	4	<0.001
Consistency	20	40	30	60	38	76	12	24	<0.001

Table (3) Percent distribution comparing level of nursing knowledge in relation to measures that decrease nosocomial oral infections

Items	Pre test (N=50)				Post test (N=50)				P value
	Correct		Incorrect		Correct		Incorrect		
	No	%	No	%	No	%	No	%	
Oral hygiene decrease the incidence of VAP	38	76	12	24	50	100	0	0	<0.001
Measures that decrease bacterial colonization	11	22	39	78	38	76	12	24	<0.001
Oral care procedure									
Frequency of the oral care (2-4 h)	19	38	31	62	46	92	4	8	<0.001
Type of solution best recommended	3	6	47	94	46	92	4	8	<0.001
Best equipment used (tooth brush)	22	44	28	56	42	84	8	16	<0.001
Nursing role for the patient before oral care									
Patient assessment	20	40	30	60	43	86	7	14	<0.001
Precaution to prevent patient aspiration	9	18	41	82	40	80	10	20	<0.001
Patient position	41	82	9	18	48	96	2	4	<0.001
Assessment tool that should be used before and after the procedure as (BOAS)	17	34	33	66	44	88	6	12	<0.001
Oral care procedure									
Technique of Tooth brushing for the intubated patients	9	18	41	82	43	86	7	14	<0.001
ETT cuff pressure level	18	36	32	64	44	88	6	12	<0.001
Frequency of checking ETT cuff pressure	3	6	47	94	33	66	17	34	<0.001
Bilateral chest sounds to confirm tube placement	11	22	39	78	39	78	11	22	<0.001
Suctioning before oral care	4	8	46	92	41	82	9	18	<0.001
Total	14.49 ±6.4				42.14 ±6.7				<0.001

Table (4): Comparison between nurse's performance and knowledge before and after the education program

Number = 50	Total Pre	Total Post	P value
	Mean ± SD	Mean ± SD	
Oral care procedure	4.61 ±1.6	24.04 ± 2.1	<0.001
Cuff pressure monitoring procedure	0 ± 0	16.2 ± 2.04	<0.001
Suction procedure	8.8 ± 2.2	16.1 ± 2.05	<0.001
Oral care strategy (questionnaire)	14.49 ±6.4	42.14 ±6.7	<0.001

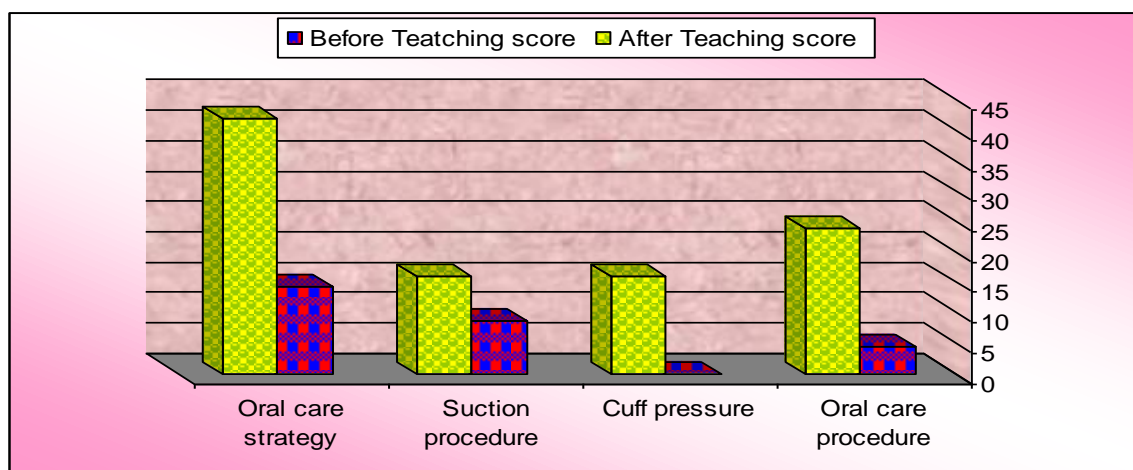


Figure (1): Shows comparison between nurse's performance and knowledge before and after the education program

Table (5): Correlation between nursing knowledge and performance before and after the educational intervention

	Pre test	
	R	P
Pre of oral care	-0.03	0.8
Pre of suction	-0.004	0.9
Pre of cuff pressure	-	-
POST TEST		
Post of oral care	-0.1	0.4
Post of suction	-0.01	0.9
Cuff pressure	0.05	0.7

III. Discussion

Despite the importance of good oral hygiene among critically ill patients, the task is frequently relegated as a low priority (Grap et al., 2004) or else delegated to junior nurses. However, studies indicated that nurses lacked the evidence-based knowledge to deliver effective oral care. Findings also revealed many inconsistencies in the practices among nurses in terms of assessment, frequency, and type of requisites used for cleaning the oral cavity (O'Keefe et al, 2009).

This study focused on the nursing role in reducing dental plaque and colonization of bacteria, the researcher observed great malpractice in the development of oral care and the loss of knowledge about VAP preventive guide lines also the lack of oral assessment or any item of assessment that should be done for the mechanical ventilated patients, which reflect the great number of cases that developed pneumonia as the results of mechanical ventilation and lack of infection control measures in ICU of Minia university hospital.

Researcher observed the internship student before and after starting the study. The observation directed on the internship knowledge about oral care strategies and their level of practice to provide it. The finding revealed lower mean score and S.D in relation to oral care procedure, suction procedure, cuff pressure maintaining and nurses knowledge regarding to the oral care strategy and VAP preventive guide lines. This results were improved and their mean score \pm S.D were elevated after providing the educational intervention. There were statistical significant difference between both groups presented by P value (<0.001) in all the previous mentioned items. This study supported by (Ali, S.N., 2013) which reported that all critical care nurses with different educational levels, irrespective of their years of experience or area of work had unexpectedly unsatisfactory knowledge scores about ventilator associated pneumonia and VAP bundle preventive measure. finding also revealed that more than three fourth of nurses had low knowledge regarding predisposing, risk factors, signs and symptoms, diagnosis , treatment and components of ventilator bundle practices in ventilator associated pneumonia ICUs nurses did not maintain adequate pressure in endotracheal tube (ETT) cuff in those patients receiving mechanical ventilation for more than 48 hours which reflects their inadequate knowledge about the importance of this action in prevention of aspiration as well as VAP (Ali, S.N., 2013).

(Gonçalves & Brasil 2012) who studied Nursing actions for the prevention of ventilator-associated pneumonia in an ICU of a teaching hospital in Goiania that revealed an important precaution was not properly done by the team concerning the calibration of intra cuff pressure of endotracheal tube, drawing attention for its low frequency (18.1%) and recommended that this pressure should be measured at least three times per day.

(Grap et al 2011) reported that a cuffed endotracheal tube with at least 20 cm of H₂O should be maintained to reduce the chance that the patient will aspirate secretions that accumulate above the cuff.

(Ali, S.N., 2013) reported lack of asepsis during suctioning care predominated among nurses. (Kandeel and Tantawy 2012) also illustrated that most nurses did not implement infection control measures when applying tracheal suctioning or when dealing with suction equipment and indicated the need for infection control training programs for all critical care nurses working the studied ICU.

Regarding to oral care protocol (Ali, S.N., 2013) showed that there was no oral care protocol available in all the studied ICUs. most nurses in medical critical care unit (61.5%) use Saline as a mouth wash solution while the coronary care unit (35%) and surgical critical care (33.3%) used tap water and not on a regular base. This may be due to unavailability of written oral care protocols in the studied ICUs in addition to the loss of nurses' awareness about the benefit of delivering timely oral care and its relation to the incidence of VAP. This is similar to the findings of a study conducted in Alexandria Main University Hospital in Egypt which reported absence of oral care protocol in the ICUs who found that oral care is carried out without the use of tooth brushing or antiseptic solutions. (Alhirishi, 2010 , Scott, J. & Vollman, 2011).

(Batiha, 2008) in a study conducted at BrinCESS Basma's teaching hospital reported that ICU nurses are hesitant to provide oral care to patients who are intubated because of the concerns of dislodging or displacing an ETT, insufficient tools for mouth care in the hospital especially toothbrushes and oral antiseptic solutions are another concerned. In addition, nurses shortage, overcrowded and having insufficient time is another barrier.

(Batiha, 2008) also reported that nurses are the one who decides when and how often oral care is provided, but nurses that were observed did not have enough training to do oral assessment and follow oral care protocols so the data showed that VAP is a common problem in princess Basma's teaching hospital.

Finally this study stress on the importance of using standard oral care bundle with evidence biased technique and a soft pediatric tooth brush in combination with the antiseptic solutions., the mechanical action of a toothbrush to remove dental plaque has been recommended and in fact is considered a standard in oral hygiene by several authors (Ridley. J. K., (2008). The elimination of dental plaque has been demonstrated to be more effective compared with foam swabs (Ganz, F., 2009). Tooth brushing was included in the study protocol because it is standard oral care and because it assists in removing plaque and other debris from tooth surfaces which can readily become a host for pathogens (Munro et al., 2009) mentioned that mechanical cleansing of the tooth surface and the resultant inhibition of plaque development has the potential to reduce the bacterial load in the oral cavity.

The importance of providing interactive education for internship student help them to participate cooperatively and lead them to be able to demonstrate the procedure effectively. Providing simulation videos and pictures allowed them to understand the importance of the procedure and its effect on the patient very easy. Nurses is the only person who is responsible on providing oral care bundle so they should be well educated and trained on performing this complex and vital activity for the critical ill patients.

IV. Conclusion

It was concluded from the study that the educational program improved the internship nurses knowledge about oral hygiene bundle procedures. Also their level of performance regarding oral care procedures, suctioning and ETT cuff pressure monitoring was improved after providing the educational intervention. Nurses understand the relation ship between good oral hygiene and its effect on VAP prevention.

V. Recommendations

- ✗ Every critical unit should provide nurses with knowledge and training about standardized oral care procedures.
- ✗ Oral care for critical ill patients with ETT should be provided by using tooth brush with antiseptic solutions according to hospital facility.
- ✗ Hospitals should facilitate oral care supplies for every.
- ✗ Providing oral care bundle should include controlling cuff pressure and elevation of the head of the bed at 35 to 45 degree.
- ✗ Providing education program with interactive communication and demonstration will improve nurses level of participation.

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