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Research Article

Intensive Care and Ward Nurses Knowlegde Level and Scope of Practice on Oral and Airway Suctioning in Korle- Bu Teaching Hospital

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ABSTRACT

Background: Suctioning of respiratory secretions in intubated or tracheostomized patients is a common procedure within Intensive Care Units (ICUs) and Wards. Effective suctioning is an essential aspect of airway management in the critically ill. However, there are many associated risks and complications. These patients may be unable to clear their own airway due to several different problems, including neuromuscular disease, sedation or neurological deficits. Studies aiming to determine the knowledge and practices of nurses regarding endotracheal suctioning methods indicate that their training and experience of suctioning is far from sufficient. Moreover, most nurses are inclined to rely on personal experience and ward routine to inform practice over any other source.

Aim: The study aimed to assess the knowledge and practices of oral and airway suctioning among nurses in Korle -Bu Teaching Hospital (KBTH).

Method: This is a quantitative cross-sectional study looking at the Knowledge level and Scope Practices of oral and airway suctioning among nurses in Korle-Bu Teaching Hospital using self-administered questionnaire in the data collection.

Results: Majority of Nurses, (55%) knew the action to take in case of abrupt changes in Electrocardiogram (ECG) monitor but not doing the procedure as per guidelines. However, (45%) of Nurses did not know what actions to take. About 33% of Nurses chose the appropriate catheter size for a child and an adult (46%) of Nurses did not know the appropriate way of suctioning the children. There was no significant difference in knowledge among the Nurses with different levels of nursing ranks and ICU experiences (p-value 0.73). However, nurses who had received ICU training demonstrated significantly higher knowledge than ward Nurses. Also, in scope of practice, ICU nurses recorded a greater scope of practice as compared to the ward nurses with an average 57% for ICU nurses and 37% for ward nurses with a p-value of 0.542 .This implied that though

ICU nurses have some knowledge in suctioning, the routine practices give them better understanding of the procedure. Few Nurses (13%) were able to identify indications for suctioning, 42 % of nurses identified complications of oral and airway suctioning and 43% of nurses knew how often to suction a patient. (33%) of Nurses had knowledge in catheter selection for adult s and children (47%) knew the normal negative pressures for adult and children. 55% knew the action to take in case of abrupt change in the ECG monitor; however, 80.6% demonstrated undesirable knowledge on Endotracheal suctioning evidence-based recommendations. Nurses with ICU training (57%) significantly demonstrated higher knowledge of ETS than Ward nurses. This concludes that though ward nurses have some knowledge in oral and airway suctioning they do not practice suctioning often as ICU nurses who practice suctioning as their routine work.

Conclusion: Most Intensive Care Units and Ward nurses did not have knowledge and skills (Practice) on Oral and Endotracheal Suctioning (ETS) and are currently not following current ETS recommendations. This study has shown that training on Suctioning skills have positive influence to recommended Endotracheal Suctioning knowledge.

Keywords: Knowledge level, Practices, , Endotracheal Suctioning, Intensive Care Unit, Nurses

ABBREVIATIONS

ENT	-	Ear nose and throat
ECG	-	Electrocardiogram
FiO_2	-	Fractional Inspired Oxygen
ICU	-	Intensive Care Unit
MRB	-	Manual Rebreather Bag
PIP	-	Peak Inspiratory Pressure

PEEP	-	Peak End Expiratory Pressure
PaO2	-	Partial Pressure of Oxygen
SpO_2	-	Saturation of oxygen pressure
SaO2	-	Oxygen Saturation

CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND

Airway management is a unique aspect of care for patients admitted in the Intensive Care Units and Wards. (Murgo, 2016). It includes maintenance of suctioning procedures of oral and nasal care, the artificial airway, management of equipment and endotracheal suctioning (Murgo, 2016). Airway Suctioning is a procedure for removing substances from the trachea, pharynx, nose or mouth either through a natural orifice (nose or mouth) or artificial tubing (endotracheal tube, tracheostomy tube, nasal or oral airway). Physiotherapists, Respiratory Therapists, Nurses and Physicians use suctioning to promote secretion clearance (pulmonary hygiene) and /or maintain a patent airway (Patak *et al.*, 2004).

History of Suctioning

Invented circa 1907, the Yankauer suction tip remains the most commonly used piece of suctioning equipment in the world. Sidney Yankauer began work in the outpatient surgery department at Mount Sinai Hospital in New York in the late 1800s, specializing in ENT. He invented many medical devices that greatly affected the profession during that time, but he is best known for his rigid suctioning catheter, the Yankauer tip. It was originally designed to help clear the surgical field during a tonsillectomy. However, its use has expanded to include many surgical procedures, as well as in-hospital and prehospital oropharyngeal suctioning. Often made of plastic

or stainless steel, the Yankauer catheter is characterized by small holes in a bulbous tip designed to remove fluid while minimizing damage to the surrounding tissues. The catheter is curved, making it maneuverable and easy to grasp.

1.2 SUCTIONING

The purpose of oral and airway suctioning is to maintain a patent airway and improve oxygenation by removing mucous secretions and foreign material (vomit or gastric secretions) from the mouth and throat (oropharynx) (Perry *et al*., 2014). Oral suction is the use of a rigid plastic suction catheter, known as a Yankauer to remove pharyngeal secretions through the mouth (Perry *et al.*, 2014). The suction catheter has a large hole for the thumb to cover to initiate suctioning, with smaller holes along the end, which mucous enters when suctioning is applied. The oral suctioning catheter is not used for tracheotomies due to its large size. Oral suctioning clears secretions from the mouth when a patient is unable to remove secretions or foreign matter by effective coughing. Patients who benefit the most include those with Cerebrovascular Accidents, drooling, impaired cough reflex related to age or condition, or impaired swallowing (Perry *et al.*, 2014).

Role of Suctioning in Airway Management

A patent airway is crucial to patient survival. Removal of accumulated secretions, blood and vomit increases respiratory efficiency, decreases the risk of complete airway obstruction and improves visualization of the trachea for intubation (Doran *et al.*, 1995). Awareness of the risks involved is the first step toward developing a plan for prehospital suctioning of the critically ill patient (Vandenberg *et al.*, 1999). Together with appropriate use of equipment, this enables provision of the best possible patient care during suctioning (Vandenberg *et al.*, 1999.). Working under local policies and procedures, the Emergency Medical Service (EMS) provider must determine the most

appropriate method for suction, taking into consideration issues of patient safety, time requirements, the suctioning source and patient comfort (Van de Leur *et al*., 2003).

Suction Equipment Checks

Most suction units offer easy-to-use testing to confirm that all functions are in working order: occlusion check, vacuum buildup efficiency, maximum achievable vacuum level and air leakage status. Large dials and single-control units are easier to operate with gloves and in the often-constrained environments of Emergency Medical Service operations (Vandenberg *et al.*, 1999). All suctioning equipment must be checked at the beginning of each shift and after each use, following the manufacturer's recommendations (Vandenberg *et al.*, 1999). Portable and wall-mounted suctioning devices within the ambulance commonly have variable vacuum settings of zero mmHg- 500 mmHg. Suctioning pressure in mechanical, battery-operated units and Venturi systems are regulated with adjustment of a control knob or valve. Suctioning systems incorporate some form of check valve to prevent liquid or particulate matter entering the suctioning line to the pump. Never connect the suction tubing directly to the suctioning source. Bypassing the trap could result in contamination of the pump and associated tubing, degradation of pump performance or complete pump failure Vandenberg *et al.*, 1999).

1.2.1 INDICATIONS FOR SUCTIONING

Clinical indications for suctioning include respiratory distress due to increased copious, retained secretions (Sole *et al*., 2015) Signs of respiratory distress may include increased respiratory rate, tachycardia, gasping and difficulty talking. In the intubated patient, increased resistance, decreased Saturation Oxygen Pressure (SPO_2), increased Peak End Expiration Pressure (PEEP) and an

increasing Fractional Inspired Oxygen (FiO_2) are indications that suctioning may be required. Non-intubated patients with coarse breath sounds should be encouraged to cough before suctioning is performed (Sole *et al.*, 2015).The following are recommendations for endotracheal suctioning from the American Association of Respiratory Care (Sole *et al*., 2015)

- Saw tooth pattern on flow-volume loop on ventilator monitor
- Coarse crackles auscultated over trachea
- Increased peak inspiratory pressure during volume control ventilation
- Decreased tidal volume during pressure-controlled ventilation
- Deterioration in oxygen saturation and/or arterial blood gas values
- Visible secretions in airway
- Patient's inability to generate an effective cough
- Acute respiratory distress
- Suspected aspiration of gastric or upper airway secretions
- . Patient has an ineffective cough and unable to clear the secretion spontaneously (audible secretion sound in patients under mechanical ventilation)

•Retained secretion causing patient distress or physiological derangement (e.g. increased work of breathing, respiratory rate, impaired oximetry or blood gases)

•When all other less invasive secretion clearance interventions has failed (e.g. cough assist (manual or mechanical), positioning, and other breathing/coughing techniques)

- To obtain sputum sample for microbiology or cytological analysis

1.2.2 CONTRAINDICATIONS AND PRECAUTIONS OF SUCTIONING

(NHS document Mar 2015, Andrews et al 2004, Vandenberg et al 1999)

Severe bleeding disorder, unexplained hemoptysis

- Severe bronchospasm or laryngeal spasm, irritable airway
- Epiglottitis or croup
- Basal skull fractures / facial injury
- Cerebral spinal fluid leak
- Recent nasal, oral or esophageal surgery
- Occluded nasal passage, nasal bleeding
- Loose teeth, denture or crown
- Increased intra-cranial pressure
- Severe gag reflex
- Hemodynamic instability and Tracheo/esophageal fistulae

Possible Hazards of Suctioning:

- Mechanical trauma to the airway
- Bleeding
- Hypoxemia/hypoxia
- Cardiac arrhythmias
- Vasovagal stimulation (↓HR/BP)
- Gagging/vomiting
- Aspiration
- Pain/distress/discomfort
- Laryngospasm or bronchospasm
- Respiratory arrest
- Changes in Intracranial pressure (ICP)
- Atelectasis

- Lesions in tracheal mucosa

1.2.3

1.2.4 PRE- SUCTIONING

PROCESS OF SUCTIONING (S.S Celik *et al*, 2000)

1. Thorough chart review, patient & need assessment

a. IPPA (Inspection, Palpation, Percussion, Auscultation)

b. Monitor vitals

c. Monitor oxygen saturation

d. Check effectiveness of huff/cough if possible

e. Be aware of patient's code status (or Goals of Care) and any high risk airways

f. Provide pertinent physiotherapy intervention for airway clearance and secretion mobilization as indicated

g. Check the last time patient was suctioned and frequency & outcome of suction

2. Provide appropriate explanation to patient (and family) and obtain consent

3. Provide adequate sedation or pain relief (and or other medications) if indicated

4. Hand Hygiene

5. Set up & Equipment:

a. Set up a clean bedside table for necessary equipment

b. Turn on suction regulator, check & set negative pressure (-100 to -150 mmHg for adult, set pressure as low as possible and yet effectively clear secretions)

c. Ensure proper working order of collection bottle/device (i.e. not over-filling)

6. Obtain & prepare suction catheters with appropriate caliber (for artificial airway, the outside diameter of the suction catheter should be less than 50% of the inner diameter of the artificial airway)

7. Personal Protective Equipment (mask, eye or face shield, gown, etc) as per infection prevention & control

a. Gloves (clean / sterile as per needs)

b. Water based lubricants for nasopharyngeal suction

8. Cups and clean water for oral suctioning, normal saline for nasopharyngeal suction/ open tracheostomy suction

9. Nasal trumpet/airway, oropharyngeal airway for frequent suctioning, or bite block as indicated

10. Use Pulse oximeter if available

11. Provide pre-oxygenation or supplementary oxygen source, resuscitation bag with mask

12. Other monitors Intracranial Pressure, ECG, etc.as indicated

13. Arrange for help if a second staff if necessary (e.g. for hyperinflation, cough assist, safety, etc.)

14. Ensure adequate lighting

•15Good understanding of emergency protocol & procedure

16. Position patient on side, half-side lying or in half lying and tilt the head slight back if possible.

17. Place a clean towel on patient's chest just in case

18. Prepare sputum trapper if a sputum sample if needed

19. Pause ventilator alarm just before suctioning if patient is on mechanical ventilator

Hyperinflation (Preoxygenation)

Hyperinflation involves inflating a patient's lung with tidal volumes greater than those delivered by the ventilator (Wood 1998). This can be achieved by means of a Manual Rebreather Bag or an

increased ventilator tidal volume (Mancinelli-Van Atta & Beck 1992; Robson 1998; Wood 1998). Hyperinflation is known to increase residual capacity and reduce the incidence of atelectasis and shunting (Fiorentini 1992; Carroll 1994). Moreover, large tidal volumes have been associated with barotrauma (Lookinland & Appel 1991), changes in mean arterial pressure and intrathoracic pressure (Ashurst 1992; Carroll1994), and reduced venous return, resulting in hypotension (Odell *et al*., 1993; Glass & Grap 1995; Wainwright & Gould 1996).

Instillation of normal saline

The instillation of normal saline prior to suctioning has become common practice in some areas (Ackerman 1993; Ackerman *et al*., 1996). However, as Blackwood (1999) argued, this is an example of a widely practiced intervention not supported by research. In fact, there is considerable research evidence against its use (Blackwood 1999). Respiratory secretions and saline apparently do not mix in vitro, and there is no evidence to indicate that they might mix in vivo (Hanley *et al*., 1978), Hanley instilled isotope-tagged 0.9% saline prior to suctioning and found that only 18.7% of the saline was removed. The remaining saline was shown by X-ray to remain in the trachea and bronchi, with none reaching the lung peripheries. In light of the empirical findings, questions raised about the effectiveness of normal saline instillation. One theory is that it elicits a cough reflex (Gibbs *et al*., 1997). However, (Gray *et al*., 1990) observed that a comparable cough could be stimulated by the suctioning procedure alone. Although some authors have continued to support the use of saline (Burton & Hodgkin 1984), this is not based on controlled research studies.

Maintenance of Asepsis

Suctioning is an invasive procedure and, therefore, is associated with an increased risk of infection(Pierce1995).Tracheal or endotracheal intubation prevents an effective cough as the

glottis remains open, which limits the clearance of secretions and promotes pooling at or near the end of the tube (Judson & Sahn 1994; Chatila *et al*., 1995). The tube itself acts as an irritant, leading to inflammation and impaired mucociliary function. All of these factors may lead to an increased risk of infection in a debilitated and immunocompromised patient (Judson & Sahn 1994; Wood 1998). There is little argument that aseptic suctioning should be mandatory in all patients (Luce et al. 1993; Odell *et al*., 1993; Dean 1997). However, there is considerable variation in how this has implemented in practice, ranging from the use of non-sterile gloves (using a non-touch suctioning technique) to sterile gloves (Parker 1999a). The closed method of suctioning has shown to reduce the incidence of nosocomial pneumonia by avoiding opening the airway to contamination (Ashurst 1992). Closed systems also limit exposure of the surrounding area to contamination and protect nearby personnel from exhaled secretions. Parker (1999b) argued that the importance of hand hygiene and the use of protective gloves could not be overemphasized. Universal precautions such as use of gloves, aprons and goggles during open suctioning in order to minimize the infection risks to the practitioner (Wood 1998; Pratt *et al*., 2001). Brooks *et al*., 1999, investigated the suctioning practices of practitioners during suctioning and discovered that glove practices varied from not using gloves, to using two sterile gloves. Surprisingly, 2.8% (n =7) of subjects reported not wearing gloves. (May 2000) argued that infection control is an issue that affects everybody and it should emphasize on clinical practice across the entire spectrum of healthcare management. However, it requires role models for good practice and appropriate training of all professional and ancillary staff.

Catheter Selection

During suctioning Catheter selection, it is widely accepted that the external diameter of the suction catheter should not exceed one-half of the internal diameter of the endotracheal tube (Odell *et al*.,

1993; Glass & Grap 1995; Wood 1998). This allows air to enter the lungs whilst oxygen is removed during suctioning, which guards against excessive negative pressures and potential atelectasis. Larger size catheters has shown to increase the risk of trauma due to greater mucosal contact (Young 1984). In fact, one study identified that all nurses (n =16) used a larger than recommended size suction catheter (Day et al. 2001). Adult size endotracheal or tracheostomy tubes range from 30 to 38 French Gauge (FG), or 7 to 9mm, whereas suction catheters range from 8 to 16 FG, or 2 to 2.5mm (Odell et al. 1993). In order to calculate the maximum size suction catheter to use, Odell *et al*., 1993) recommended the following formula: size of endotracheal/ tracheal tube minus 2 times two.

Depth of insertion

Stimulation of the valgus nerve may result in alterations in heart rate (such as bradycardias) and blood pressure. Prolonged paroxysmal coughing will result in increased intrathoracic pressure, decreased venous return and transient hypotension (Wood 1998). Griggs (1998) suggested that, a few days after tracheostomy formation, most patients are able to cough secretions to the end of the tracheostomy tube and the suction catheter need only be inserted to just beyond the end of the tube (approximately 15cm), thus reducing pain and trauma (Ashurst 1992). This method, although rather subjective, can also be applied to those patients with endotracheal tubes as long as they are able to cough. However, Pierce (1995), Dean (1997),and Wood (1998) all recommended inserting the catheter fully to the carina, which is either felt by resistance or on stimulation of a cough, then withdrawing the catheter1cmpriortotheapplicationofsuction .

Negative Pressure

Significant tracheal damage, ulceration and necrosis were found in an animal study where the effects of continuous and intermittent suctioning in two experimental groups were compared with a control group (Czarnik *et al*., 1991). However, the excessive suction pressures of 200mmHg may have contributed to these findings. Using high negative pressures does not mean that more secretions will be aspirated; therefore limiting pressures to between 80 and 150mmHg is accepted (Boggs 1993; Luce *et al*., 1993). To prevent the suction catheter from adhering to the tracheal mucosa, negative pressure is only be applied during withdrawal (Glass & Grap 1995). Glass and Grap (1995) also advocated the use of continuous suctioning on catheter removal as there is no evidence to suggest that intermittent suctioning reduces trauma and at least one study that has identified it as ineffective (Luce et al. 1993; Thelan *et al*., 1994). Similarly, rotation of the catheter during withdrawal has not been associated with significant increases in sputum removal, and may in fact contribute to further trauma (Glass & Grap 1995). Despite this evidence, practitioners continue to use excessively high suctioning pressures. Celik and Elbas (2000) reported that the patients in their study were being suctioned using a suction machine that delivered a 'minimum' negative pressure of 300mmHg. This is twice the recommended negative pressure. This study also found that 82.6% of suction passes (n =90) performed by nurses involved suction being applied during insertion of the suction catheter, which is also not recommended practice. Suction catheters should have a built-in valve to prevent suction is applied on insertion (Odell *et al*., 1993).

Duration of Procedure

The majority of researchers recommend that suctioning should take between 10 and 15s to perform, as longer durations are associated with an increased risk of mucosal damage and hypoxemia (Boggs 1993; Odell *et al*., 1993; Smith 1993). In Day *et al*., 2001) study all nurses (n =16) failed to suction within this recommended duration.

Number of Passes

(Wood 1998) argued that the number of suction passes in one suctioning event, perhaps due to copious amounts of secretions, might lead to complications. Some authors recommend allowing the SpO_2 to return to pre-suctioning parameters before another suction pass is attempted (Smith 1993), which Pierce (1995) argued should be no less than 30s. However, the majority of researchers advocate that no more than three suction passes should be made per episode and that the number of passes should be kept to a minimum (Fiorentini 1992; Glass & Grap 1995). Monitoring the patient's heart rate and rhythm, arterial blood pressure and SpO_2 during the suctioning procedure is recommended. Suctioning should cease when hyper oxygenation is initiated if any untoward complications are observed (Glass & Grap 1995; Wood 1998)

1.2.5 DURING SUCTION

1. Without applying suction pressure, gently insert catheter into patient's airway

2. Clear any visible secretion before inserting the suction catheter deep into patient's nares, mouth or artificial airway

3. Do not force catheter in when experiencing resistance, reinsert catheter if needed

4. Stimulate cough if it does not occur naturally

5. Withdraw catheter slightly (1-2 mm) prior to applying suction

6. Apply suction only when withdrawing catheter in a rotating manner

7. No need to rotate catheter if using an in-line/closed suction system

8. Total suction duration should not exceed 15 seconds

9. Rest between suction passes; closely monitoring patient vitals, discomfort and condition; calm patient if necessary

10. Observe secretion aspirated (e.g. amount, color, tenacity, any blood in secretion, etc.)

11. Rinse suction catheter if necessary

12. Saline instillation is not recommended as a routine for patients with artificial airway

1.2.6 POST SUCTIONING

1. Ensure patient is safe and stable by auscultating the lungs

2. Monitor oxygen saturations

3. Rinse suction catheter & tubing

4. Discard used catheter and gloves

5. Hand hygiene

6. Reassess patient's cardiorespiratory status; repeat suctioning if indicated

7. Turn off suction source if no further suctioning is needed.

8. Set supplementary oxygen back to normal level if patient is stable

9. Check ventilator setting & alarm if patient is on ventilator support

10. Hand Hygiene

11. Documentation – details of patient response and outcome, time, secretion suctioned (quantities in measurable units such as in mills or teaspoonful, color, tenacity, smell, presence of blood, etc.), number of passes of catheter, preoxygenation needed, etc. Follow site or program specific documentation guideline

12. Liaise with other disciplines (e.g. Nursing, Respiratory Therapists, and Physicians) regarding any pertinent information about suctioning and patient's response

13. Coordinate suctioning with other disciplines if indicated (e.g. medication pre or post suctioning, with Cough Assist and suctioning with Respiratory Therapists, etc

1.2.7 COMPLICATIONS OF SUCTIONING IN CLINICAL PRACTICE

Complications from airway suctioning are relatively uncommon if performed with care and adequate pre-oxygenation. Suctioning can stimulate the vagal nerve, predisposing the patient to bradycardia and hypoxia. Hypoxia can be profound from occlusion, interruption of oxygen supply, and prolonged suctioning. Mucosal trauma, physical injuries, and bleeding can result from blunt or penetrating trauma. Pain and discomfort can result from suctioning. Anxiety can be associated with suctioning

1.3 PROBLEM STATEMENT

Poor practices in airway/oral suctioning leads to infection, bleeding, hypoxemia, arrhythmias, increased intracranial pressures etc., which can lead to life threatening conditions.

There seem to be currently many wards in Korle- Bu Teaching Hospital with hesitance in admitting patients requiring airway and tracheostomy care including suctioning. Lack of competence and fear of complications has been suggested as reasons for this hesitance. There is, however, no documentation of the knowledge and competence level of nurses regarding this very important and often life-saving procedure

1.4 AIM OF STUDY

The study aims to assess the knowledge and practices of oral and airway suctioning among nurses in KBTH

1.5 OBJECTIVES OF STUDY

-To assess knowledge level of oral and airway suctioning among nurses in Korle- Bu Teaching Hospital (KBTH).

- To evaluate the scope of practice of oral and airway suctioning among nurses in KBTH.

CHAPTER TWO

LITERATURE REVIEW

Rapidly clearing the airway to improve ventilation or facilitate breathing is a critical element of airway management (Perry *et al*., 2014). Suctioning in the prehospital environment involves mechanical aspiration of blood, vomitus and pulmonary secretions from the patient's airway. Safe suctioning requires a core knowledge of equipment, techniques, patient preparation and the complications that may occur during the procedure (Perry *et al*., 2014, Sole *et al*, 2015).

In Dar er Salaam - Tanzania , a descriptive cross-sectional study design involving 103 Intensive Care Unit (ICU) nurses was conducted in 2014 by Mwakwanyanga and later published in 2018 (Mwakanyanga *et al*,2018) . Results indicated that majority of ICU nurses (69.9%) knew the indication for the procedure, (77.7%) knew the action to take in case of abrupt change in the ECG monitor; however, 80.6% demonstrated undesirable overall knowledge on ETS evidence-based recommendations. Nurses with ICU training (57.3%) significantly demonstrated higher knowledge of ETS than non-ICU trained nurses while all other factors had no influence. Conclusions and recommendations were that Majority of ICU nurses did not have desirable knowledge and skills of ETS and were currently not following recent ETS recommendations. A study conducted by (Mwakwanyanga *et al.*,2018) at Muhimbili National Hospital on knowledge and practice on prevention of ventilator associated pneumonia among ICU nurses reported only one item of ETS recommendation (practice of hand washing before and after ETS procedure), and only involved a small sample of nurses.

A Multisite survey of Suctioning Techniques and Airway Management Practices conducted by Mary Lou Sole(Sole *et a.,l* 2003) in the United States with a total of 1665 nurses and respiratory therapists respondents at 27 sites recorded only 48% of policies addressed oral care and 37%

addressed oral suctioning. Nurses do oral suctioning and oral care than respiratory therapists did, and respiratory therapists instilled sodium chloride solution more and rinsed the suctioning device more often than nurses did. Conclusions were that policies vary widely and did not always reflect current research. Consistent performance of practices such as wearing gloves for airway management and maintaining endotracheal cuff pressures is to be evaluated(Sole et al 2003) .

In a survey by (Sole *et al.*, 2002)with 85 participants, results indicated improvement in selected practices including increasing oxygen saturation before endotracheal suctioning, maintaining pressure of endotracheal tube cuffs, and providing oral hygiene and suctioning. The practices of registered nurses and respiratory care practitioners differed in many ways. The nurses assumed responsibility for oral antisepsis, whereas the respiratory care practitioners managed the endotracheal tube. The two groups shared responsibility for oral and endotracheal suctioning. Knowledge of current guidelines for endotracheal suctioning was lacking. Conclusions were that practices in airway management had improved, but opportunities exist to develop shared policies and procedures based on current evidence.

In a study conducted by (Day *et al.*, 2002) aimed at exploring nurses' knowledge and competence in performing tracheal suctioning in acute and high dependency ward areas and to investigate discrepancies between knowledge and practice, the findings demonstrated a poor level of knowledge for many subjects. This also reflected in practice, as suctioning was performed against many of the research recommendations. Many nurses were unaware of recommended practice and a number demonstrated potentially unsafe practice. In addition, there was no significant relationship between knowledge and practice. However, during the interviews, many nurses were able to provide a rationale for specific aspects of practice that were perhaps not based on current research recommendations. The study raised concern about all aspects of tracheal suctioning and

has highlighted the need for changes in practice, clinical guidelines and focused practice-based education (Day *et al.*, 2002).

The results indicated a few statistically significant differences between these two groups relating to artificial airways suctioning practices. Differences were observed in awareness of ventilator-assisted pneumonia rates, routine preoxygenation of patients, and awareness of protocols for mouth care and checking of endotracheal tube cuff pressures. When asked about frequency of use of NSI before suctioning, there was a statistically significant difference between the responses from RNs and RRTs (P=0.014). Of the RRTs, 11.5% indicated that they never used NSI, 49.4% used it rarely, 36.8% frequently and 2.3% always. In contrast, RNs indicated that NSI was used in all patients at least some of the time, with 57.8% rarely using NSI, 41.0% frequently and 1.2% always (no RNs indicted they never used NSI). The majority (97.5% of RRTs, 96.4% of RNs) of respondents used sterile nebulae to prepare the normal saline. The remaining (3.6%) RNs used a pre-drawn syringe although the RRTs drew the syringe themselves (2.5%). The volume of saline used was similar between groups, with most using 1 mL to 2 mL (RRT 50.0%; RN 41%), or 3 mL to 5 mL (RRT 46.2%; RN 51.8%); the remaining respondents used >5 ml. Most respondents suctioned the airways immediately following the NSI (RRT 79.2%; RN 67.1%). The remainder waited up to 1 min (RRT 16.9%; RN 30.5%) or 1 min to 2 min (RRT 3.9%; RN 2.4%).

An observational study on the Open-system endotracheal suctioning practices of critical care nurses by (Kelleher *et al*., 2005) found that participants varied in their ETS practices and did not adhere to best practice suctioning recommendations; and consequently provided lower-quality ETS treatment than expected. Significant discrepancies were observed in the participants' respiratory assessment techniques, hyper oxygenation and infection control practices, patient reassurance and the level of negative pressure used to clear secretions (Kelleher *et al*., 2005).

The purpose of suctioning is to remove secretions. However, it is widely accepted that this should be performed only as indicated, and not as a routine intervention (Dolan 1991; Pierce 1995; Glass & Grap1995). Therefore, suctioning procedure follows a comprehensive assessment of the patient's respiratory status, which should include chest auscultation (Glass & Grap 1995; Griggs 1998). However, many nurses fail to perform chest auscultation prior to suctioning (Day et al. 2001). The importance of reducing stress in the critically or acutely ill patient cannot be overemphasized, and the nurse's role is paramount. (Fiorentini 1992) argued that, in unrelaxed patients with acute pain, the suctioning procedure itself and the cough produced might result in physiological and behavioral changes. Suctioning has been identified as a 'frightening and unpleasant experience' (Griggs 1998), and has been described as a feeling of choking or loss of breath (Bergbom-Engberg & Haljamae 1989). (Sawyer1997) gave a descriptive account of his experience as a patient in intensive care. He suggested that endotracheal suctioning was the closest he had come to 'hell on earth'. 'In the hands of a skilled yet sensitive practitioner suctioning need not be more than a very necessary discomfort.' However, on occasions, (Sawyer 1997) stated that it was 'horrific' and the coughing, gagging and choking spasms produced by the sink plunger technique were terrifying. This graphic description of suctioning highlights the importance of patient preparation. However, many nurses still fail to prepare adequately their patients prior to suctioning. In fact one study (Celik & Elbas 2000) identified that all nurses (n =42) failed to explain the suctioning procedure to patients prior to suctioning. It is generally accepted that an appropriate explanation, along with adequate sedation and pain relief, can lead to a reduction in stress, anxiety and pain, and increase the effectiveness of the suctioning procedure (Peruzzi & Smith 1995; Wood 1998). This may be performed before (pre-oxygenation), during (insufflation) and/or after the procedure (post-oxygenation). Several researchers have examined this issue. Harken (1975)

studied the effectiveness of a 30seconds period of pre-oxygenation, delivered by manual rebreather bag (MRB), on suctioning induced hypoxemia in 11 post-cardiothoracic surgical patients. The author reported no significant rise in arterial oxygen tension (PaO2) (P>0.05).

The authors concluded that widespread variation exists in PaO2 alterations and recommended that pre-oxygenation prior to endotracheal suctioning should be used for all patients carried out a study on 17 general ICU patients, and evaluated the effectiveness of two methods of pre-oxygenation: the use of 100% oxygen via the ventilator sigh mode or the MRB(Lucke 1982). The two methods were performed in random order before, during, and after suctioning, and the suctioning technique was identical for both groups. The results illustrated a significantly greater rise in partial pressure of oxygen (PaO2) and oxygen saturation (SaO2) for those pre-oxygenated by the ventilator mode and the author concluded that this method of pre-oxygenation was more effective than the MRB in controlling hypoxemia in critically ill patients.

All of the earlier studies reviewed have involved the administration of 100% oxygen as a means of pre-oxygenating patients was the first to compare hyper oxygenation at 100% to hyper oxygenation with 20% above the patient's baseline, FiO2 in 11 patients with chronic obstructive pulmonary disease (COPD). Four hyperinflations were given at 1.5 times the calculated tidal volume with either 100 or 20% above the baseline via a MRB. 10seconds of continuous endotracheal suctioning followed this, and the sequence was repeated three times (Rogge *et al*., 1989). No significant differences were found in SaO_2 levels between the two protocols (P>0.05). The authors concluded that hyper oxygenation at 20% above the baseline FiO2 should be sufficient to prevent hypoxemia, but strongly recommended replication before clinical implementation(Rogge *et al.*, 1989). There is also evidence to suggest that hyperinflation is rarely achieved in clinical practice (Glass *et al.*, 1993; Robson 1998). In their study of 100 nurses, Glass

et al. (1993) found that only 30% were able to achieve the patient's current tidal volume, with an overall mean delivery of 17% lower than current tidal volumes. (Robson 1998) argued that the question of 'to bag or not to bag 'has no clear answer, yet the technique continues to be widely used by physiotherapists who cite anecdotal evidence of its effectiveness (King & Morrell 1992). However, it is recommended by some authors that hyperinflation should be delivered by ventilator mode only (Glass *et al*., 1993; Grap *et al*., 1994; McKelvie 1998). (Robson 1998) nevertheless suggested that until there is a definitive validation of the effectiveness of hyperinflation by MRB, it might be a useful technique for treating atelectasis, mobilizing secretions and improving oxygenation. Robson (1998) recommended adequate training and the use of in-circuit monitoring of tidal volumes, airway pressures and a positive end expiratory pressure (PEEP) valve, if appropriate.

(Gray *et al*., 1990) compared the physiological effects of suctioning with and without normal saline instillation. The study indicated that there were no differences in respiratory mechanics, airway pressures or gas exchange. However, other researchers have shown conflicting results. In their study of 26 critically ill patients, Ackerman and (Gugerty 1990) studied the effects of normal saline instillation on oxygen saturation (SpO2). SpO2 levels fell significantly after suctioning, and those who had received a bolus of normal saline beforehand suffered a much greater fall in SpO2.

In an observational study, 35 critically ill adult patients, all of whom had undergone coronary bypass grafting, were assigned to one of two groups. One group of patients had 5 ml of normal saline instilled at the start of suctioning; the other group had the same procedure without the use of saline. The results demonstrated that the time required mixed venous oxygen saturation to return to baseline values after suctioning was an average of 3.78min longer when saline was used. The authors concluded that the use of saline had an adverse effect on oxygenation (Kinloch and Rock

1999). The effects of normal saline instillation on the amount of sputum aspirated have also been investigated. (Bostick and Wendelgass 1987) measured sputum weight with and without normal saline, and found the group receiving the normal saline bolus had the greatest weight of sputum. Similarly, (Ackerman and Gugerty 1990) showed an increase in weight of sputum when normal saline was used. However, both authors state that the weight increases were small, and of neither statistical nor clinical significance. It is also important to note that assessing the weight of sputum can be unreliable, either with or without saline, as there are many factors that could influence how much sputum is aspirated on a single occasion. Other detrimental effects of normal saline instillation include infection control issues and bacterial contamination. (Rutala *et al*., (1984) observed 24 nurses opening 92 normal saline vials, using an ungloved hand to twist or snap the top off the vial. The nurses were then asked to squirt 5ml of the saline into a culture tube. The vials were examined at 24 and 48hours, and the nurses were asked to simulate hand washing in a sterile bag for 15s with a culture medium. The result showed that 23% of the vials were contaminated (the most prevalent bacterium being Staphylococcus epidermidis) and that 46% of the nurses had contaminated at least one of the vials during the study.

Many authors now argue that, if the premise of saline is to moisten thick secretions, attention should be diverted towards the humidification of inspired gases and systemic hydration of the patient (Ackerman 1993; Schwenker *et al*., 1998; Blackwood 1999).

Despite the complications associated with suctioning, few studies (Day *et al*., 2001; Celik & Elbas 2000; Donald *et al*., 2000) have investigated actual suctioning practices. Furthermore, all of these studies have identified that suctioning practices are potentially unsafe and not based on current research recommendations. In order to improve standards of care, it is imperative that nurses are aware of research evidence. This will enable nurses to make informed decisions about their own

suctioning practices, based on the individual needs of the patient. All healthcare professionals are responsible for the quality of their clinical practice (Crinson *et al*., 1999; DoH 1998; Wilson 1998; UKCC 1992a, b). Therefore, nurses need to ensure that their knowledge and clinical skills are up to date and evidence-based.

Unlike in Ghana no research has been published on suctioning.

CHAPTER THREE

RESEARCH METHODS

3.1 MATERIALS AND METHOD

Study sites

The study was conducted in the Surgical, Medical and Cardio Intensive Care Units as well as one ward each from Internal Medicine, General Surgery and Ear, Nose and Throat (ENT) departments of Korle- Bu Teaching Hospital in Accra.

Participants

This research comprised of Nurses within the ages of 18 to 60 years with at least 6-month work experience in Intensive Care Units and Wards at the selected study site at the Korle-Bu Teaching Hospital.

Research Design

The study was qualitative cross -sectional descriptive study. This describes the study population and their role in Airway management concerning oral and airway suctioning.

Sample Size

Hundred Nurses were recruited for the study.

Sampling Technique

A purposive sampling technique was used to arrive at the figures. It enables researchers to select a sample based on the purpose of the study and knowledge of a population.

Inclusion Criteria:

Nurses between the ages of 18-60 years working in the selected study sites with at least 6-month duration

Exclusion criteria

Nurses who are not currently working in the selected study sites and students on rotation

3.2 INSTRUMENT FOR DATA COLLECTION

Pilot study

A pilot study was conducted among ten Nurses to familiarize myself (the researcher) with the administration of the instrument and to assess the Nurses understanding of the questions and how it applies to patient care. Prior to the pilot study permission was obtained from the Research and Ethics Unit of the Korle- Bu Teaching Hospital**.**

Data Processing and Analysis

Qualitative analysis method was used in the study. This included the use of graphs and tables i the comparison of responses from the data collected. Tables were drawn using the Statistical Package for the Social Science (SPSS) software program and Microsoft Office Excel (MS Excel) thus the Close-ended question response fields. The questions were coded using numbers to facilitate the capturing of responses. The data collected by means of the questionnaire was captured using SPSS, summarized in frequencies and percentages in a report format and transferred to word document.

CHAPTER FOUR

RESULTS AND DISCUSSION

RESULTS 1

ASSESSMENT OF KNOWLEDGE LEVEL OF ORAL AND AIRWAY SUCTIONING AMONG NURSES IN KORLE- BU TEACHING HOSPITAL (KBTH).

N=100(Nurses) **VA** = Valid Answer

Knowledge Assessment	FREQUENCY (%)	
1. Wh**at is the primary indication for endotracheal suctioning?**		
Presence of pneumonia	3	
Presence of atelectasis	10	
Ineffective coughing	**13**	**VA**
Retention of secretions	74	
Don't know	0	
2. Complications of endotracheal suctioning include all the following except:		
Bronchospasm	8	
Hyperinflation	**42**	**VA**
Mucosal trauma	14	
elevated intracranial pressure	26	
Don't know	10	

3. How often should a patients be suctioned?		
At least once every 2 to 3 hours	22	
More than once every 2 to 3 hours	9	
Once every 6 hours	1	
Only when necessary	**63**	**VA**
Don't Know	5	
4. What is the normal range of negative pressure to Suction an adult patient?		
80 to –120 mm Hg	**45**	**VA**
80 to –100 mm Hg	23	
60 to –80 mm Hg	6	
20 to –30 mm Hg	11	
Don't Know	15	
5. What is the normal range of negative pressure to Suction children?		
60 to –80 mm Hg	**48**	**VA**
80 to –100 mm Hg	15	
100 to –120 mm Hg	18	
150 to –200 mm Hg	4	
Don't Know	15	

6. **You are about to suction a 10-year-old patient who has a 6-mm (internal diameter) endotracheal tube in place. What is the maximum size of catheter that you would use in this case?**

6Fr	22	
8Fr	19	
10Fr	**33**	**VA**
14Fr	14	
Don't Know	12	

7. **You are about to suction a female patient who has an 8-mm (internal diameter) endotracheal tube in place. What is the maximum size of catheter you would use in this case?**

8Fr	17	
10Fr	11	
12Fr	24	
14Fr	**33**	**VA**
Don't Know	15	

8. At what depth should the suctioning catheter inserted in the endotracheal tube?		
At half of ETT	6	
At quarter to ETT	24	
To the length of ETT	**39**	VA
to the length beyond ETT	18	
Don't know	13	
9. Which of the following should the nurse respiratory care practitioner do initially to prevent hypoxemia when suctioning a patient?		
Manually ventilate the patient with a resuscitator.	12	
Pre-oxygenate the patient with 100% oxygen.	**67**	VA
Give the patient a bronchodilator treatment.	11	
Have the patient hyperventilate for 2 minutes	5	
	5	
10. To maintain positive end-expiratory pressure (PEEP) and high FIO2 when suctioning a mechanically ventilated patient, what would you recommend?		
Limit suction time to no more than 5 seconds.	40	
Use a closed-system multiuse suction catheter.	**34**	VA
Limit suctioning to once an hour.	9	
Use the smallest possible catheter.	8	

Don't know	9	
11. The total application time for endotracheal suction in adults should not exceed which of the following …		
20 to 25 seconds	10	
15 to 20 seconds	15	
10 to 15 seconds	**38**	VA
3 to 5 seconds.	24	
Don't know	13	
12. Which is the appropriate way of endotracheal suctioning?		
Suctioning alternatively continuously and intermittently	**19**	VA
Suctioning first continuously followed by intermittently	24	
Suctioning continuously	10	
Suctioning intermittently	35	
Don't know	12	
13. While suctioning a patient, you observe an abrupt change in the electrocardiogram waveforms displayed on the cardiac monitor. Which of the following actions would be most appropriate?		
Change to a small catheter and repeat the procedure	5	
Stop suctioning and immediately administer oxygen	55	**VA**
Stop suctioning and report your finding to the in-charge/supervisor	17	

Decrease the amount of negative pressure being used.	11	
Don't know	12	

14. Which of the following methods can help to reduce the likelihood of atelectasis due to endotracheal suctioning?

1 .Limit the amount of negative pressure used.

2. Inflate the patient before and after the procedure.

3. Suction for as short a period as possible.

1 and 2	10	
1 and 3	42	
2 and 3	14	
1, 2, and 3	20	VA
Don't know	14	

15. Which of the following can help to minimize the likelihood of mucosal trauma during suctioning?

Use as large a catheter as possible

Rotate the catheter while withdrawing.

Use as rigid a catheter as possible.

Limit the amount of suctioning pressure

1 and 2	5	
2 and 4	52	**VA**
2 and 3	10	
1,2 and 4	15	

Don't know	18
16. The instillation of 0.9% sterile saline should not be done on a routine basis but may be required for tenacious secretions. Which of the following is a function of Normal Saline?	
Prevent thick secretions	**28 VA**
Stimulates a cough that moves secretions.	18
Provides a lavage that moves secretion	14
Both b and c	26
Don't know	14
17. At what episode should sterile Normal Saline be instilled?	
During inspiration	**22 VA**
During expiration	27
During quite period	16
A and B are correct	17
Don't know	18
18. What is the normal amount of normal saline?	
0. 3 – 1ml	**18 VA**
0.5 – 1.5mls	31
1.5 – 2mls	20
2 – 3mls	18
Don't know	13

19. What is the normal amount of normal saline to instill in an infant patient?	
0. 3 – 1ml	**47 VA**
0.5 – 1.5mls	23
1.5 – 2mls	14
2 – 3mls	3
Don't know	13

ASSESSMENT OF SCOPE OF PRACTICE OF ORAL AND AIRWAY SUCTIONING AMONG NURSES IN KBTH	
PRACTICE ASSESSMENT	**FREQUENCY(%**
1. How frequent should the endotracheal /tracheal suctioning be done?	
Every two hrs.	20
Every 1 hr.	4
When required	58 **VA**

Don’t know	16

2. Which is the best method of suctioning?

Closed method	53 **VA**
open method	26
Both a& b	10
don’t know	4

3. While giving nasotracheal suctioning to an adult patient,

suction catheter, what should be the depth of insertion?

10 –15 cm	21
16 –20 cm	**50 VA**
21 –25 cm	20
26 – 30 cm	9
don’t know	0

4. Which of the following is true regarding endotracheal suctioning?

To be done while inserting the catheter	68
To be done while withdrawing the catheter	**17 VA**
Both a & b	3
Don’t know	9

5. What is the maximum time limit for an endotracheal suctioning?

15 sec	50 **VA**
20 sec	11
25 sec	16
30 sec	12
don't know	11

6. Which is the most appropriate position for giving endotracheal suctioning?

Semi Fowler's position	31**VA**
right lateral position	10
Supine position	13
left lateral position	37
don't know	9

7. At what angle should the suction catheter rotated during suctioning?

90℃	22
120℃	11
180℃	46
360℃	18**VA**
don't know	3

8. Which method will confirm a successful suctioning is confirmed by which method?

Auscultation of the lung	24	**VA**
No visible secretion in the ET tube	11	
Improvement in SPO2 level	46	
Don't know	19	

9. Which of the nerve is stimulated during endotracheal suctioning?

Facial nerve	7	
valgus nerve	35	**VA**
glossopharyngeal nerve	34	
both b & c	18	
don't know	6	

10. Which will be the possible complication of suctioning due to irritation of carina?

Persistent cough	24	
Paroxysmal cough	**26**	**VA**
Both a & b	34	
Don't know	16	

11. What is the recommended suction pressure for endotracheal suctioning in adults?

60 to -79 mmHg	12	
80 to -120 mmHg	49	**VA**
121 to -180mmHg	13	
181 to -200mmHg	9	
don't know	15	

12. When asked to do an endotracheal suctioning for a patient with ET tube size 8mm. What is the appropriate size of suction catheter to choose for this patient?

10 F	15	
12 F	52	**VA**
14 F	20	
16 F	32	
don't know	7	

13. How frequent should the ET suction catheter be changed?

After each suctioning	41	
After 12 hrs.	**19**	**VA**
After 24 hrs.	34	
After 48 hrs.	6	
don't know		

14. Which one of the following complications can arise due to absence of hyperventilation before giving suctioning?

Hypotension	25	
Hypoxia	59	**VA**
Decreased intracranial pressure	11	
Don't know	5	

15. Why is sodium bicarbonate not to be instilled through the ET tube?

It rises pH of the blood	20	
It damages lung tissue	**28**	**VA**
It accumulates CO2	27	
Don't know	14	
	11	

4.3 ANALYSIS OF BACKGROUND INFORMATION

Socio –Demographic characteristics of the Nurses

Table 1: ***Age & Nursing rank***

		NURSING RANK					Total
		PRINCIPAL NURSING OFFICER	NURSING OFFICER	SENIOR STAFF NURSING OFFICER	SENIOR NURSING OFFICER	STAFF NURSE	
AGE	18-25	1	5	1	0	1	8
	26-35	5	16	21	8	28	78
	36-45	6	2	1	2	1	12
	46-55	2	0	0	0	0	2
Total		14	23	23	10	30	100

Table showing the frequencies of the various ranks of nurses and age group

Source: Field Survey 2019

Table 2: Age and Years of Experience

	YEARS OF EXPERIENCE				
Age	0- 1 year	2-4 years	5 - 10 years	≥11 years	Total
18-25	4	3	1	0	8
26-35	13	40	21	4	78
36-45	0	3	6	3	12
46-55	1	0	0	1	2
Total	18	46	28	8	100

Source: Field Survey 2019

Table 3: Gender & Nursing Rank

	NURSING RANK					
GENDER	PRINCIPAL NURSING OFFICER	SENIOR NURSING OFFICER	NURSING OFFICER	SENIOR STAFF NURSE	STAFF NURSE	Total
FEMAE	12	12	14	9	14	61
MALE	2	11	11	1	16	39
Total	14	23	23	10	30	100

A table showing the frequencies of male and female nurses and their ranks

Source: Field Survey 2019

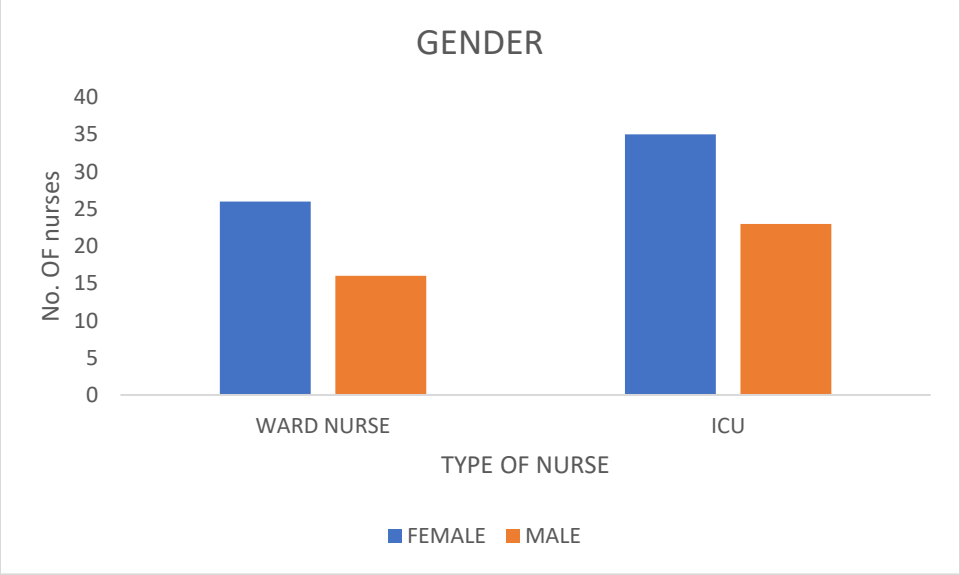
COMPARISON OF KNOWLEDGE LEVEL AND SCOPE OF PRACTICES OF ORAL AND AIRWAY SUCTIONING

Table 4 Gender & Knowledge level and Scope of Practice

	Knowledge		Practice	
	Mean ± SD	% score	Mean ± SD	% score
Male (36)	8±3	43±16	6±2	43±15
Female (58)	8±3	41±17	7±2	45± 16
p-value	**0.993**		**0.665**	

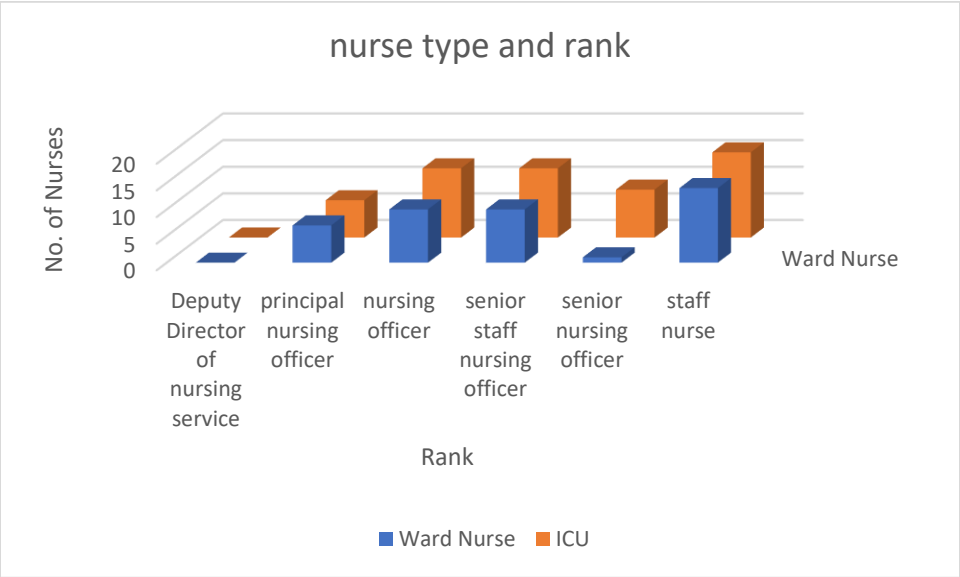
A table showing the mean Knowledge level and Scope of Practice scores of male and female Nurses. There is no statistical significance in their knowledge and practice scope

Figure 1



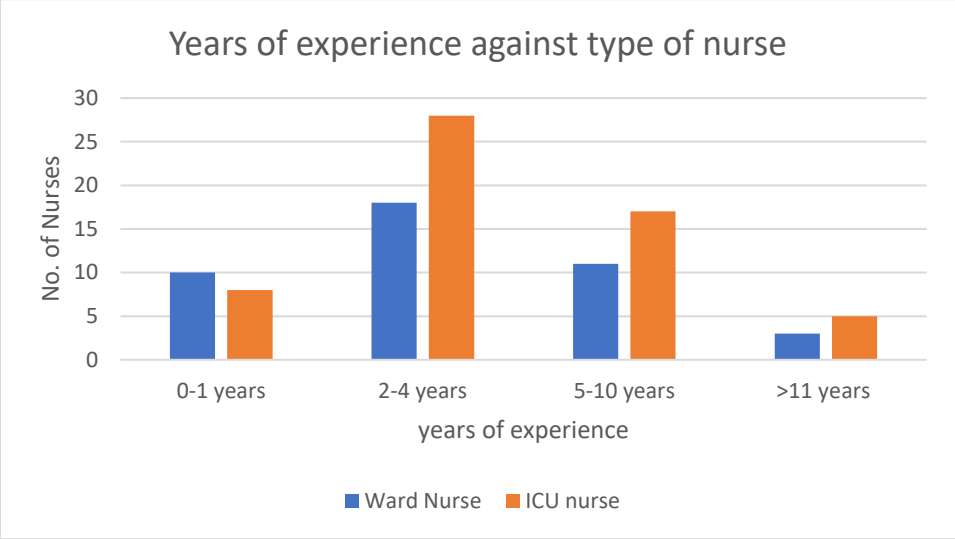
Source: Field Survey 2019

Figure 2.



Source: Field Survey 2019

Figure 3



Source: Field Survey 2019

Table 5 N= number of nurses

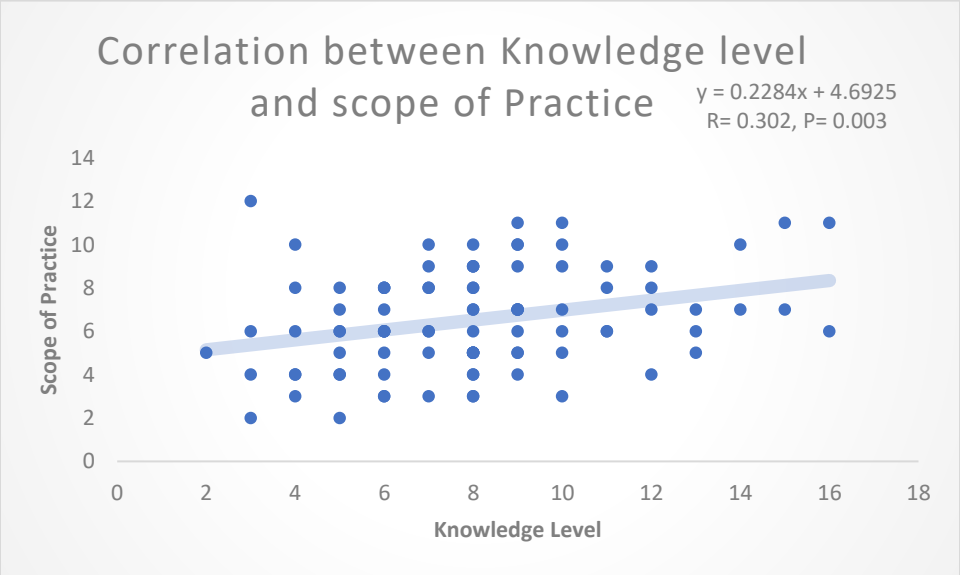
Mean comparison between knowledge level and scope of Practice among ICU and Ward nurses

		N	Mean	Std. Deviation	p-value
Knowledge level	ward nurse	37	8.20	3.04	0.73
	ICU nurse	57	8.00	3.11	
Practice level	ward nurse	37	6.35	2.26	0.542
	ICU nurse	57	6.65	2.36	

Source: Field Survey 2019

A table showing the mean comparison between knowledge level and scope of practices. This shows that Nurses of knowledge on suctioning, in practice there is no statistical significant. The p-values are greater than 0.05 meaning there is no statically significance between knowledge and practice.

Figure 4



Source: Field Survey 2019

Figure four showing the correlation between knowledge level and scope Practice among Nurses in Korle- Bu teaching Hospital. There is a significant association between Knowledge and Practice but it is not a strong one. Knowledge affects the way one practices.

CHAPTRER 5

DISCUSSION

5.1

A perturbing result was observed when I discovered that in the following five areas: routine instillation of saline, use of aspiration catheter of appropriate diameter; maximum time of suctioning with an open void, main adverse effects/ reactions related to Endo Tracheal Suctioning and routine hyperventilation as a way of preventing hypoxemia, the knowledge of the professionals was classified as poor. Knowledge assessment section recorded of 13% of nurses could identify indications ,42 % of nurses identify complications of oral and airway suctioning and 43% of nurses knew how often to suction a patient . Thirty- three percent of Nurses had knowledge in catheter selection for adult s and children while 45 to 48% knew the normal negative pressures for adult and children. During suctioning Catheter selection, it is widely accepted that the external diameter of the suction catheter should not exceed one-half of the internal diameter of the endotracheal tube (Odell *et al*., 1993; Glass & Grap 1995; Wood 1998). This allows air to enter the lungs whilst oxygen is drawn during suctioning, which guards against excessive negative pressures and potential atelectasis. Similar results were found in a study conducted in Spain with ICU nurses, in which 100% (n=34) reported this practice and pointed out some aspects that should be addressed, such as what will be done and why, the sensations that can be felt and which concerns may be minimized with the administration of oxygen.

Knowledge of the Nurses on pre-oxygenation as a way of preventing hypoxemia was encouraging, as only 67% of respondents answered the question correctly. Despite the fact that the optimal technique (gold standard) for the provision of oxygenation in ETS (pre-oxygenation, post-oxygenation, insufflation and hyper insufflation, alone or in combination) remains undetermined.

Fifty eight percent of Nurses answered, “When required” to the question: How frequent should endotracheal /tracheal suctioning be done? In practice 53 % chose closed method of suctioning as the best method of suctioning. Closed system suctioning, on the other hand, is a relatively new method (used after the 1980s) for patients dependent on mechanical ventilators and attached to an endotracheal tube. The suctioning catheter in this system is connected to the ventilator line and is a part of the ventilator circuit; therefore, the patient does not have to be taken off the mechanical ventilator during suctioning (Gunn 1996, Blackwood 1998).

In practice 26% and 59% of Nurses identified Paroxysmal cough as the possible complication of suctioning due to irritation of carina as well as Hypoxia as the main complication that can arise due to absence of hyperventilation before giving suctioning. Fifteen percent of Nurses practice 15 seconds of endotracheal suction. The majority of researchers recommend that suctioning should take between 10 and 15s to perform, as longer durations are associated with an increased risk of mucosal damage and hypoxemia (Boggs 1993; Odell *et al*., 1993; Smith 1993).

Thirty-one percent of Nurses selected Semi Fowler positioning of patient prior to suctioning. This type of positioning create a patent airway, administering oxygen and improving ventilation (Ledwith *et al.*, 2010). (67%) of Nurses in Korle-Bu, teaching Hospital had knowledge in and practice pre-oxygenation with 100% oxygen prior to suctioning. Several researchers have examined this issue. Harken (1975) studied the effectiveness of a 30seconds period of pre-oxygenation, delivered by manual rebreather bag (MRB), on suctioning induced hypoxemia in 11 post-cardiothoracic surgical patients. The author reported no significant rise in arterial oxygen tension (PaO2) (P>0.05). The American Association of Respiratory Care Guidelines recommend pre-oxygenation at 100% in pediatric and adult patients for 30 to 60 seconds, especially in hypoxemic patients and in those whose oxygen saturation decreases during sucking. However,

studies conducted with intensive care nurses showed that most of them know the importance of pre-oxygenation, but few use it routinely. Airway aspiration is required when there is a need to remove accumulated lung secretions, therefore recommended that pre-oxygenation prior to endotracheal suctioning must be used for all patients. Fifty- seven % of Nurses will stop suctioning and immediately administer oxygen to the patient, when an abrupt change in the electrocardiogram waveforms displayed on the cardiac monitor observed.

COMPARISON OF KNOWLEDGE LEVEL AND SCOPE OF PRACTICES OF ORAL AND AIRWAY SUCTIONING

In table four the mean Knowledge level of the nurses were (8.00±3) with a p-value of 0.993.The p- value is greater than 0.005 implies there is no statistical significance to their knowledge level. Female Nurse (7±2) practice well than male Nurses (6 ±2) with a p-value of 0.665. A p- value of 0.665 implies that their scope of practice is not statistically significant to their knowledge level.

Table 5 showed a mean comparison between knowledge level and scope of Practice among ICU and Ward nurses indicating knowledge level of ward and ICU nurses as 8.20 and 8.00 with a standard deviation of 3.04 and 3.11 respectively. A p-value of both set of nurses at 0.73 concludes that though ward nurses have some knowledge in oral and airway suctioning but they do not practice suctioning often as ICU nurse who practice suctioning as their routine work.

More so, in scope of practice ICU nurses recorded a greater scope of practice as compared to ward nurses with an average 57% for ICU nurse and 37% for ward nurses with a p-value of 0.542 .This implied that though ICU nurses have some knowledge in suctioning they practice more and have a better understanding of the procedure.

CHAPTER SIX

LIMITATIONS, CONCLUSION AND RECOMMENDATIONS

6.0 LIMITATIONS

Most of the Nurses were not willing to take the questionnaires

6.1 CONCLUSION

Majority of ICU nurses do not have desirable knowledge and skills (Practice) of Oral and Endotracheal suctioning (ETS) and are currently not following current ETS recommendations. This study has shown that training on Suctioning skills have positive influence to recommended ETS knowledge.

6.3 RECOMMENDATIONS

1. Provision of clinical guidelines and adequate training on oral and airway suctioning for Nurses and other health care team employed in Korle –Bu Teaching Hospital.
2. In addition, further studies using analytical approach to identify other factors beyond the scope of this study and testing the best approach in fostering adherence to ETS evidence-based.

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