

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ



*Shandi University*

**Faculty of post graduate studies  
and scientific research**

***knowledge and performance of endotracheal tube suctioning among  
intensive care nurses in intensive care unit Omdurman military  
hospital (August 2017)***

***Athesis Submitted In Partial Fulfillment of The Requirements For The MSc Degree In Critical  
Care Nursing***

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# الاستهلال

قال الله تعالى :

( أَفَرَأَىٰ مَا خَلَقَ الذَّكَرَ ۚ إِنَّهُ يَخْلُقُ مَا يَشَاءُ وَيَخْتَارُ ۚ إِنَّ إِلَىٰ رَبِّهِمْ الْإِتْيَانُ ۚ )

( أَفَرَأَىٰ مَا خَلَقَ الْإِنثَاءَ ۚ إِنَّهُنَّ يُخْلَقْنَ بِاللَّحْيِ وَالسُّجُودِ ۚ إِنَّ إِلَىٰ رَبِّهِمْ الْإِتْيَانُ ۚ )

( التين ١-٣ )

صدق الله العظيم

الآية رقم (1)

سورة التين

# *Dedication*

*To my mother , father and haspend who gives  
me love*

*My brothers , sisters and all family*

*My friends who give me support*

*To everybody who helped me to do the best*

# **Acknowledgement**

**Firstly and lastly thank you my *god*.**

**I would like to express my thanks to my university and**

**all**

**members of nursing faculty. Thank you for hospital and**

**nurses**

**Special thanks to my supervisor :Dr. Mariam Elnageib**

**Thank you for everybody who helped me.**

## ABSTRACT

*ETT suctioning is process in which the catheter inserted in to the endotracheal tube and the secretion of patients lung removed with applying negative pressure . This study is discriptipe crosssectional hospital based study was conducted in Omdurman military hospital , aimed to assess nurses knowledge and practice regarding endotracheal suctioning of mechanical ventilated patient .*

*It involved total coverage to elshellali ICU nurses (n=59).data were collected by questionnaire and check list and analyzed by statistical packages for social science (SPSS).*

*The result showed that the majority of nurses (72.9%) had experience less than one year in ICU and72% of nurses their age ranged between (20-30) . most of nueses 96.6 % have knowledge about the definition of ETTs , more than one third of nurses (42%) their answer about methods of suctioning were close method ,more than half of study group (52.5%)their answer open method and less than quarter their answer both (open and close).*

*About their practice the study showed that most of nurses ( 94.9% ) not perform hand washing and less than quarter( 5.1%)of nurses perform hand washing and 100% of nurses not used sterile suction catheter in their performance.*

*The study concluded that the performance of intensive care unit nurses in their performance of endo tracheal tube suction were not applied some critical elements such as(restrict the time of each suction to10-15second,regulate the pressure according to age and rotated the catheter while with drawing) this lead to ventilator associate pneumonia ,hypoxia and lung tissue damage.*

*My recommended for the head nurses of ICU Omdurman military hospital is perform courses and trained their staff from expertise nurse , if this procedure used effectively decreased the ICU stay ,ICU length and improved the out come of intensive care unit.*

## المستخلص

هي عملية إدخال القسطرة فى الانبواب الرغامى وازالت الافرازات من رئة المرضى مع تطبيق الضغط السلبي اجريت هذه الدراسة الوصفية فى مستشفى امدرمان العسكرى حيث انها تهدف الى تقييم معرفة وممارسة ممرضات العناية الحثيثة حول ما يتعلق بشفط الرغامى لمريض التهوية الصناعية تتضمن 59 ممرض من قسم العناية الحرجة الشلالي وقد تم جمع البيانات عن طريق الاستبيان 72.9% لديهم خبرة اقل من سنة فى وحدة العناية المركزة و72.9% من الممرضات تتراوح اعمارهم بين 20-25 سنة. اكثر من ثلث الممرضات 42% اجابتهن عن طرق الشفط كانت الطريقة المغلقة .

اكثر من نصف مجموعة الدراسة 52.5% طريقة اجابتهن كانت المفتوح واول من الربع 5.1% كانت الاجابة على حد سواء (مفتوح\مغلق).وعن ممارستهم اظهرت الدراسة معظم الممرضات 94.9% لا تؤدى غسل اليدين قبل الشفط 5.1% من الممرضات تؤدى غسل اليدين. و100% من الممرضات لا يحافظين على تعقيم قسطرة الشفط فى ادانهم .

وخلصت هذه الدراسة الى ان اداء العاملين فى وحدة العناية المركزة فى ادانهم لشفط الانبواب الرغامى لم يطبقو بعض العناصر الحرجة مثل(تقييد زمن كل شفط الى 10-15 ثانية \تنظيم الضغط حسب العمر واستدارة القسطرة مع الشفط)وهذا يؤدى الى الالتهاب الرئوى المزمن مع التنفس الصناعى ونقص الاكسجين وتلف انسجة الرئة .

وصيتى لرئيسة الممرضات فى وحدة العناية المركزة فى مستشفى امدرمان العسكرى هو اداء دورات وتدريب موظفيها من ممرضة ذات خبرة .اذا كان الاجراء المستخدم على نحو فعال يقل بقاء المريض فى العناية ويقل بقاء المريض فى جهاز التنفس الصناعى ومن ثم يزيد خروج المرضى من العناية.

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## **Introduction**

Endotracheal suctioning (ETS) is one of the most common procedures performed in patients with artificial airways. It is a component of bronchial hygiene therapy and mechanical ventilation that involves the mechanical aspiration of pulmonary secretions from a patient's artificial airway to prevent its obstruction. The procedure includes patient preparation, the suctioning event, and follow-up care. (1)

Endo tracheal suctioning (ETS) is a process in which the catheter inserted in to the endo tracheal tube and the secretions of patient's lung removed with applying the negative pressure. This process prevents accumulation of the secretion, there by maintains airway patency and ensures optimal oxygenation and saving the patients' lives. However, failure to meet the standards in the implementation of this procedure can have numerous detrimental effects. Possible complications of endotracheal tube suctioning include hypoxia, broncho spasm, atelectasis, tracheal tissue injury, ventilator-associate pneumonia, increase in intracranial pressure, and cardiac dysrhythmia . All intensive care nurses should be aware when performing this intervention of the potential hazards a patient is exposed to, and should Endeavour to prevent or minimize these. Therefore, updating endotracheal tube suctioning practices is considered to reduce the incidence of these complications. (2)

ETS is probably one of the most common invasive procedures performed in patients with an artificial airway. (2)

It's also described by patients as painful and uncomfortable, and may result in choking sensation initiating a violent cough, and also cause an unpleasant sensation that the lungs are actually being suctioned into the catheter. (3)

Despite the discomfort, patients report that the procedure is necessary and subsequently eases their breathing. The discomfort associated with suctioning does

not diminish during the course of mechanical ventilation; on the contrary it may worsen. (4)

Suctioning for intubated and ventilated patients is a routine nursing procedure, yet practices vary among clinicians and hospitals. Some suctioning practices which have little to no evidence to support their use are still being performed. It must be recognized that a lack of research evidence does not necessarily mean that a practice is of no benefit. Alternatively, there may be some practices that continue even when strong evidence clearly indicates either no benefit or actual harm. Invasive techniques such as manual ventilation with abag-valve-mask and instillation of normal saline have been shown to have no benefit to the patient when suctioning yet despite this, these practices continue in some Units. (5)

Endotracheal suctioning is a sterile procedure that nurses must perform efficiently and effectively in order to avoid infections. nurses lack of adherence to aseptic technique is a factor in transmitting infection or cross infection which in turn increases patients length of stay and prone the patients to moreand more risk of infection. Tracheal suction is an important procedure in the management of adults with artificial airways. Tracheal suction through an artificial airway (endotracheal, tracheostomy, or nasotracheal tube) bypasses the normal protective mechanisms such as the cough reflex that the upper airways provide. An artificial airway refers to the plastic tube inserted via the nose, mouth or trachea and located into the trachea of the patient.(6)

## **Justification**

Endo tracheal suction is procedure which aims to keep airway patent by mechanically removing accumulated pulmonary secretion above all in patient with artificial airway .

This procedure important that the nurse has the knowledge based on valid scientific evidence concerning different method of ETT suctioning and aspects related to it.It's. one of most frequent intervention in nursing, and most important responsibility of nurses in ICU.

## **Objectives**

### **General objective:**

1- knowledge and performance of endotracheal tube suctioning among intensive care nurses in intensive care unit Omdurman military hospital.

### **Specific objectives:**

1-To determine the level of nurses knowledge about the endotracheal tube suctioning.

2-To assess nurses knowledge about assess the patient to identify the need for suction .

3-to identify nurse's performance regarding the steps of ETT suctioning.

4-To assess nurses performance in documentation of the assessment and suction procedure.

# REVIEW OF LITERATURE

## Introduction

Review of literature is the key step in the research process which helps to lay a foundation for the study. The literature review provides a background for understanding current knowledge on a topic and illuminating the significance of the study. A literature review is a body of text that aims to review the critical point of current knowledge. Review of literature is an important aspect of any research project from beginning to end. It gives character insight into the problem and helps in selecting methodology, developing tool and also analyzing data.

Artificial airway – tube or tube-like device that is inserted through the nose, mouth or into the trachea to:

- 1-Create a route for mechanical ventilation
- 2-Allow easy access of suctioning
- 3-Relieve mechanical airway obstruction
- 4-Protect the airway from aspiration related to impaired cough or gag reflexes.

Tracheal suction is an important procedure in the management of adults with artificial airways. Tracheal suction through artificial airway (endo tracheal, tracheostomy or nasotracheal tube) bypasses the normal protective mechanisms such as the cough reflex that the upper airways provide. An artificial airway refers to the plastic tube inserted via the nose, mouth or trachea and located into the

trachea of the patient. The major indications for insertion of an artificial airway include:

- 1-To secure or maintain a patent airway.
- 2-To assist in the delivery of mechanical ventilatory support, and where non-invasive ventilation (NIV) has failed.
- 3-To facilitate the removal of tracheal secretions.
- 4-To aid in the management of multi-organ failure/sepsis.
- 5-To reduce the risk of aspiration where patients are unable to protect their own airway (neurological, unconscious).
- 6 -To deliver high concentrations of oxygen .(7)

**Caution:**

- 1-Suspected epiglottitis
- 2-Occluded nasal passages
- 3-Nasal Bleeding
- 4-Acute head, facial, or neck injury (nasopharyngeal suctioning not advisable with basal skull fractures.
- 5-Coagulopathy or bleeding disorder.

**Complications:**

Suctioning is not a benign procedure and adverse physiological effects directly attributed to oral or nasopharyngeal suctioning are well documented e.g: Hypoxia ,atelectasis ,cardiovascular changes ,intra cranial pressure alterations ,Pneumothorax ,bacterial infection ,discomfort/pain ,hypo/hypertension.



Critically ill patients often have increase in the production of mucous and an impaired ability to clear secretions. If secretions are not cleared effectively then the patient may be at risk of infection, atelectasis and alveolar collapse . Appropriate management of the patient with an artificial airway can have an impact on reducing complications (such as the development of ventilator-associated pneumonia (VAP), length of ICU stay, duration of mechanical ventilation and mortality and morbidity. (8)

Tracheal suction is required to maintain a patent airway and assist with preventing hypoxia, infection and atelectasis from retention of sputum. Complications such as hypoxia, cardiac dysrhythmias and mucosal damage have been associated with tracheal suctioning .(9)

Suctioning of a tracheal tube is a frequent, fundamental and clinically significant practice in adult intensive care for those who are mechanically ventilated. The variability of pathophysiology between patients requiring mechanical ventilation and the potential adverse effects of the procedure require that suctioning be customised to the individual patient.(10)

This section of the guideline is organised into three sections , which includes a brief summary of the evidence where available. The three domains :

1- Assessment

2- Clinical practice

3- Infection prevent

## **Assessment**

Clinical indications on the need for suction

1-Assessment of the patient to identify the need to suction a tracheal tube should be continuous with chest auscultation performed every two hours or more frequently as indicated by clinical signs .

2-The decision to suction a tracheal tube must be made on the basis of the clinical need to maintain the patency of the tracheobronchial tree. A tracheal tube should only be suctioned when clinically indicated by signs which could include:

1- visible, palpable or audible secretions (such as sputum, gastric or upper airway contents or blood).

2- respiratory ( desaturation, rising peak inspiratory pressure) during volume-controlled mechanical ventilation/modes ( decreasing tidal volume) during pressure controlled ventilation/modes), increased respiratory rate, increased work of breathing or coarse breath sounds on auscultation.

3- cardiovascular: increased heart rate and blood pressure.

4- other: restless/agitated or diaphoretic patient.

5- a saw-tooth pattern on a flow-volume loop or expiratory flow-time waveform as illustrated on the ventilator graphics.

3-Prior to suctioning, consideration should be given to the potential complications and contraindications in individual patients.

To reduce patient anxiety and to promote patient understanding of and compliance with the suctioning procedure patients should be given clear information regarding the suction procedure including: the need for suction, the consequences of not suctioning when it is required and the effects of suctioning. Furthermore, this information should be repeated with each suction procedure as some patients may not recall previous instructions.

4-Patient assessment before, during and post suction should include an evaluation of the effects on the patient's pre-suction signs and symptoms. This should include monitoring of cardiac rate and rhythm, blood pressure, pulse oximetry, airway reactivity, tidal volumes, peak airway pressures, or intracranial pressure

5-Some patient groups require constant/continuous monitoring of ECG and pulse oximetry before, during and post suctioning. (11)

6-Documentation and Reporting . Charting on the Progress Record, Flow Sheet or Ventilator Record, as per unit policy, following the procedure. Include the following specifics:

1-Reason for suctioning and Time of suctioning.

2-Amount, consistency, color and odor of secretions.

3-Client response including changes in vital signs.

4 -Client/family education.

5 -If applicable: o Hyperoxygenation

6 -Instillation of sterile normal saline

7-Specimen sent Any complications and actions taken.

Suctioning is uncomfortable and distressing procedure for the critically ill adult with an artificial airway. Nonetheless, tracheal tube suction may be necessary to clear secretions, maintain airway patency and to optimize oxygenation and ventilation.

There are a number of potential adverse effects, however, on several body systems including:

1- Respiratory (e.g. reduction in lung volumes, hypoxia, and alveolar collapse, introduction of infection and trauma to the trachea).

2- Cardiovascular (e.g. bradycardia, hypotension, and hypertension).

3- Neurological (e.g. increase in intracranial pressure and reduction in cerebral blood flow).

## **Using mechanical ventilator waveforms to assist with patient assessment**

1-Assessment of the need for suctioning

**Feature:** saw-tooth pattern on flow-time waveform and flow/volume loop

**Possible causes:** secretion build-up in large airways, ETT/tracheostomy tube

Condensate in ventilator circuit.

2- Assessment of tube patency and large airway obstruction using the expiratory flow waveform. basic things to know about the expiratory flow curve should be triangular in shape expiratory flow should be complete between 1 to 2 seconds 80% of tidal volume should be expired in the first 1 second of expiration obstruction to the small airways, large airways and endotracheal tube and tracheostomy tube will result in changes to the expiratory flow curve.

This practice point addresses the changes that may be seen with significant obstruction to large airways and endotracheal / tracheostomy tube.

3- Partial occlusion of ETT caused by tube kinking. Note prolonged expiration i.e. less than 80% of tidal volume expired in first 1 second of expiration.

Prolonged expiration (less than 80% expired in 1 second) indicating partial obstruction of tube caused by kinked tube.

Normal expiratory flow (80% expired in 1 second) .

### **Clinical practice:**

#### **The suction catheter:**

1- The size of the suction catheter should be less than half the internal diameter of the tracheal tube, Suction catheter size (Fr) = [ETT size(mm) minus 1] then multiply by 2 or 3FG = 1mm diameter (1FG approx. 0.3mm diameter).

For example, for a size 8 ETT:

Using the first formula, {8 minus 1} then multiply by 2 = 14Fr (this formula will give a slightly larger catheter size) or using the second formula half the diameter of 8mm = 4mm. Then multiply this number by 3 = size 12 FG.

2-The total suction procedure (from insertion to removal of catheter) should take a maximum of 15 seconds with negative pressure applied continuously as the catheter is being withdrawn from the tracheal tube. (16)

In patients considered at high risk of adverse events, trauma to, and stimulation of the carina should be minimized to prevent complications. Therefore, the suction catheter should only be inserted down a tracheal tube until it just emerges out of the lumen of the tube. (14)

In patients not considered at high risk of adverse events, the suction catheter may be passed until either a point of resistance is felt or a cough is stimulated, then the catheter should be withdrawn 1-2cm prior to continuous suction.

The maximum occluded suction pressure should be limited to - 80 to 150mmHg (kPa). The wall outlet should have a high pressure gauge attached. (12)

### **Suction catheter insertion depth**

For patients deemed at low risk of adverse events it was agreed at the consensus meeting that the suction catheter may be inserted to the point of resistance or until a cough is stimulated. The catheter should then be withdrawn 1-2cm prior to the application of suction to ensure it is not against the airway wall. Suction should then be held continuously as the catheter is slowly withdrawn from the airway. It may be necessary to hold the suction catheter in the same place for a period of time if a large amount of secretions are present. The consensus opinion of the group is that patient participation always be included when possible with active large inspiration and active cough when possible rather than by catheter stimulation.

To clear secretions from the primary and secondary bronchus into the trachea where they may be removed an intubated patient must cough or provide faster expiratory to inspiratory flow ratios.

It was agreed to at the consensus meeting that patients who are found to have adverse reactions to suctioning, such as those with unstable CVS, high ICP, lack of cough reflex, coagulopathy or high risk of bronchospasm should have the stimulation of their carina avoided. This may be achieved by measuring the length of the suction catheter against the length of the ETT or tracheostomy tube and only inserting until the catheter just emerges out of the lumen of the tube. As no cough will be stimulated, the patient may be encouraged to cough to command, or suction may be combined with expiratory vibrations, assisted cough or other techniques to increase expiratory flow rates to improve suction effectiveness, limiting the number of required passes .(14)

### **Pre-oxygenation**

Pre-oxygenation prior to suctioning has been a standard of care that is not supported by evidence. Moreover, it may be harmful to patients. This practice was based on the assumption that the delivery of an increased fraction of inspired oxygen via the mechanical ventilator or manual resuscitator would prevent instances of hypoxia during suctioning of intubated and mechanically ventilated patients. While routine pre-oxygenation has often been recommended as a precautionary measure to prevent possible instances of desaturation, it cannot be assumed that the administration of high concentrations of oxygen for this use is without risks. It has been demonstrated that high concentrations of oxygen, even for a few minutes, can lead to the development of absorption atelectasis in healthy individuals This effect and subsequent loss of lung volume may be particularly deleterious for the critically ill patient and those with acute lung injury .(15)

Hyperoxygenate clients prior to suctioning if indicated methods of hyperoxygenation include:

- 1-Increasing FiO<sub>2</sub> per ventilator for ventilated clients
- 2-Use of a manual resuscitation device connected to oxygen flow meter at flush
- 3-Increasing the oxygen flow of oxygen device in use
- 4-Having the client take 2-3 deep breaths while receiving a higher than normal concentration of oxygen.
- 5-Check negative pressure of the suction regulator and set suction as low as possible while still keeping it high enough to clear secretions effectively.

Appropriate wall suction range for adults is 80-120mmHg.

Suction on portable suction units may be pre-set or may need to be adjusted.

### **Saline instillation**

To prevent the occurrence of adverse events, bolus instillation of normal saline should not be routinely used prior to suctioning. The administration of saline during the suctioning procedure was evaluated in terms of effect on: haemodynamics, oxygenation, tracheal aspirate yield, ventilator associated pneumonia (VAP) rates and tracheal tube occlusion rates .(16)

Adequate hydration, adequate humidification, use of mucolytic agents and effective mobilisation should be instituted prior to the consideration of saline instillation for patients with increased viscosity of their secretions to prevent the occurrence of adverse events, bolus instillation of normal saline should not be routinely used prior to suctioning .(17)

### **Open versus closed suction**

Closed suction catheter systems should be used as the system of choice for patients with an ETT, NTT or tracheostomy who require suction .(18)

Closed suction catheter systems should be changed as per manufacturer's instructions .Closed suction systems should be cleaned as per the manufacturers' instructions to maintain patency and minimize colonization .(9)

## **Closed Suctioning Technique**

The closed suctioning technique facilitates continuous mechanical ventilation and oxygenation while suctioning.

The catheter is part of the circuit and is changed by RRT with each circuit change and when contaminated. Perform hand hygiene, then apply clean gloves.

Pick up suction catheter enclosed in plastic sleeve with dominant hand

On inhalation, insert catheter until resistance is met, then withdraw 1 cm.

Do not apply suction while inserting catheter. Take care to avoid traumatizing the trachea or carina.

Apply suction while withdrawing and rotating the catheter.

Limit duration of each suction event to less than 15 seconds.

Withdraw catheter completely into plastic sheath so it does not obstruct the airway.

Irrigate the catheter after completion of suctioning or if secretions accumulate. Ensure the catheter is fully retracted out of the airway. Open the cap on the irrigation port and attach a sterile 0.9% saline ampule or syringe with sterile normal saline. Intermittently depress and release the thumb control while squirting saline into the irrigation port until the catheter and chamber are clear. Use caution to ensure irrigation fluid does not enter ETT or tracheostomy tube. After completion, remove and discard the sterile saline ampule or syringe, do not leave attached to the irrigation port. (19)

Open suction systems (OSS) refer to a single-use catheter inserted into the artificial airway either by disconnecting the ventilator tubing or via a swivel



connector. Closed suction systems (CSS) enable patients to be suctioned by a suction catheter enclosed within a plastic sleeve, without the need for ventilator disconnection. (17)

## **Open Suctioning Technique**

Keeping catheter sterile at all times, attach sterile catheter to non-sterile suction tubing.

Don mask and sterile gloves.

Lubricate catheter and tubing by dipping the tip in sterile normal saline and suctioning a small amount of solution (can be done directly from the bottle – discard bottle after each use).

On inhalation, insert catheter until resistance is met, then withdraw 1 cm.

Do not apply suction while inserting catheter. Take care to avoid traumatizing the trachea or carina.

Apply suction while withdrawing and rotating the catheter.

Limit duration of each suction event to less than 15 seconds.

If contamination occurs, change the catheter and sterile gloves before re-suctioning.

Clear the catheter and connecting tubing with sterile normal saline before reinserting and at the end of the procedure. After completion, remove and discard the suction catheter. (19)

Monitoring the following should be monitored before, during and after suctioning procedure:

Breath sounds , Oxygen saturation ,Respiratory rate and pattern ,Heart rate and blood pressure, if indicated ,Sputum characteristics ,Cough characteristics

,Intracranial pressure, if indicated and monitoring capabilities available ,Ventilator parameters, if applicable ,Patient response and comfort.(11)

## **Pre Procedure**

1-Comprehensive respiratory assessment to assess the need for suctioning.

2-Explain procedure to patient / parents to minimize anxiety and stress.

3-Preparation of patient - physical, psychological and pharmacological i.e. sedation to reduce risk of complications .

4-Ensure all necessary equipment is available to ensure effectiveness of procedure and minimise risk of complications .

5-Ensure the correct suction pressure is set

Neonate 50 – 80mmHg

Paediatric 80 – 100mmHg

Older Child 100 – 120mmHg

High negative suction pressures and deep suctioning may cause right upper lobe collapse in children. Also high pressures may damage respiratory mucosa and cause destruction of epithelial cilia of the airways .

6-Calculate appropriate sized suction catheter, double the size of the endotracheal tube to ensure effectiveness of procedure and minimise risk of complications. To guarantee maximum of 50% of internal diameter which creates less negative pressure and prevents hypoxia and right upper lobe collapse / atelectasis . It also limits the risk of mucosal trauma. Too big a suction catheter has been demonstrated to reduce the tidal volume .

ETT Size (mm)	Suction Catheter Size
2.5	5 fg
3.0	6 fg
3.5	7 fg

7-Decontaminate hands prior to procedure Put on apron and goggles.

to Maintenance of asepsis and prevention of cross infection, Protection of practitioner.

8- Oxygen saturations, chest expansion and underlying disease should be used to determine the need for preoxygenation and / or hyperinflation.

Standard suction support hyperoxygenation is patients' baseline oxygen requirements using Servo I ventilation.to prevent hyperoxemia and oxygen free-radical damage which may increase the risk of retinopathy of prematurity (ROP), periventricular leukomalacia (PVL) and chronic lung disease to prevent systemic steal or over perfusion of circulation to the lungs in infants with HLHS.

9-Hyperventilate (up to five breaths) using rebreathing circuit as clinical indicated to prevent hypoxaemia . It also increases the residual capacity of the lungs and reduces the risk of atelectasis and shunting.

10-Apply non-sterile glove to the dominate hand determine insertion approximately 0.5 -1cm beyond the length of the endotracheal tube (*Shallow Suctioning*).

Check against a predetermined length i.e. paper tape measure posted at bedside.

Remove the catheter from its sheath using dominant hand to maintain non-touch technique.

11- Deep suctioning stimulates vagal nerve predisposing infant to bradycardia and hypotension. It prolongs coughing, increasing intrathoracic pressure and decreasing venous return. Also increased risk of mucosal and cilia trauma, inflammation and infection desaturation may also occur .

#### 12-Suctioning Procedure

Two practitioner technique is recommended on infant / child who is acutely ill / unstable and high risk of not tolerating the procedure, without profound decrease in heart rate, blood pressure and oxygen saturation.

#### Monitoring

13-Monitor vital signs i.e. heart rate and oxygen saturations to have a baseline set of observations and allow monitoring throughout the procedure.

Disconnect patient from ventilator and introduce suction catheter gently to required depth to prevent mucosal damage .(20)

14-Withdraw the suction catheter gently applying continuous suction pressure by placing the thumb over the suction control port, maximum 5-10 seconds.

Observe the secretions for colour, consistency and amount to ensure patency of endotracheal tube and prevent hypoxia take into consideration the patient's own respiratory / ventilation rate and clinical state

Suction catheters have multiple - eyes in their diameters and therefore the rotating method is not necessary.

15-Recovery period should be given when more than one catheter pass is needed and no more than three passes during any one suctioning session to allow oxygen levels to return to baseline and minimise mucosal damage

16-Attach manual rebreathing circuit to patient and provide manual ventilation following suctioning as clinically indicated, observing airway pressures on manometer dial for infants to reduce the amount of negative pressure in the lung and to reduce the level of hypoxia .

Re-oxygenating to reverse hypoxia or hypercarbia that may have developed to reduce the risk of barotraumas reconnect patient to ventilator

No increase in amount of secretion obtained when saline instilled It adversely effects tissue and arterial oxygenation

Infants / children have experienced significantly greater desaturation following Normal Saline 0.9% instillation and may last up to 2 minutes . It dislodges bacterial colonies contributing to lower airway contamination . Increased incidence of bradycardia and need for increased. (16)

#### Post Procedure

1-Monitor the infant / child's oxygen saturation levels and heart rate for any decrease indicating hypoxaemia throughout the procedure. Early and timely intervention for instability to reduce risk of complications

2-Wean oxygen if increased, to baseline to prevent cross infection

3-Dispose of the suction catheter in the clinical waste bin and rinse tubing by dipping it in a small container of sterile water, dispose gloves in the clinical waste bin adhering to universal health and safety precautions.

Evaluate effectiveness by conducting a comprehensive post suctioning respiratory assessment, including breath sounds to ensure effectiveness of the procedure.

4-Wash hands after procedure Maintenance of asepsis

5-Document procedure and findings – colour , consistency and amount of secretions. Document effectiveness of procedure . Continuation of nursing care and maintains accountability through accurate recording of nursing intervention.

6- Allow patient 20-30mins before taking a blood gas to ensure an accurate sample. (21)

### **3-Infection Control**

Perform hand hygiene before and after client contact. septic technique will be used for suctioning artificial airways.

The use of personal protective equipment (PPE) for staff performing suctioning is mandatory. This includes face/eye protection and sterile/non-sterile gloves as appropriate (i.e. open vs. closed technique). The use of other appropriate equipment for standard precautions may be considered (i.e. gown).

Elevate head of bed (HOB) 30-45° unless contraindicated.

All equipment and supplies should be appropriately disposed of or disinfected .(22)

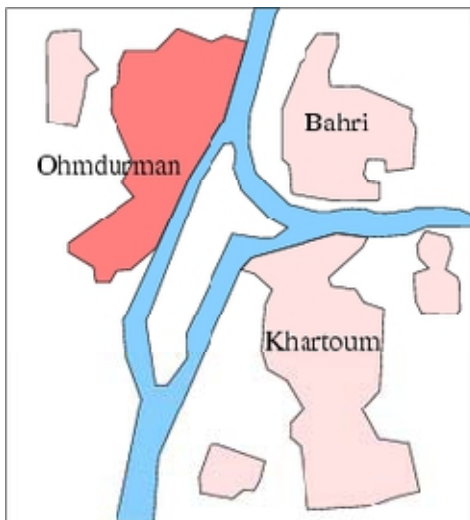
## Methodology

### Study design:

Descriptive /analytic hospital based study design .

### Study area:

The study was conducted in Omdurman military hospital, Omdurman military hospital, located in Omdurman city. Is the second largest city in sudan and Khartoum state ,lying on the western banks of the river Nile ,opposite the capital ,Khartoum. Omdurman has a population of 2,395,159(2008)and is the national center of commerce .with Khartoum and Khartoum north or Bahri , it forms the cultural and industrial heart of the nation.



**Setting:**

Omdurman military hospital, located in Omdurman city. It contains many departments (ER, Obstetrics, Pediatric, Dental, psychiatric, orthopedic, Medicine, Surgical, ENT, Ophthalmic and Dermatological) department. And (Dialysis, nursery, CCU, and ICU) UNITS. The study was conducted in Elshellali ICU, It contains 15 beds medicine Elshellali ICU.

**Study population:**

Nurses who work at the ICU in Omdurman military hospital during the period of study (August 2017).

**The sampling size:**

Total coverage (n=59).

**Data collection tools:**

Closed ended question questionnaire and check list.

**Data collection technique:**

The data was collected from morning shift nurses staff and after noon night shift nurses staff by questionnaire and checked list.

**Data collection tools:**

Closed ended question questionnaire and check list

**Data management and analysis:**

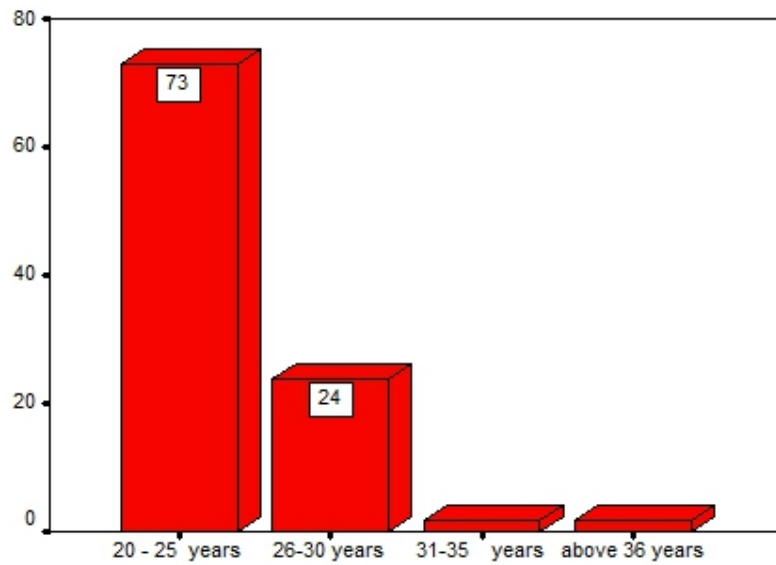
By Statistical package for social sciences (SPSS).



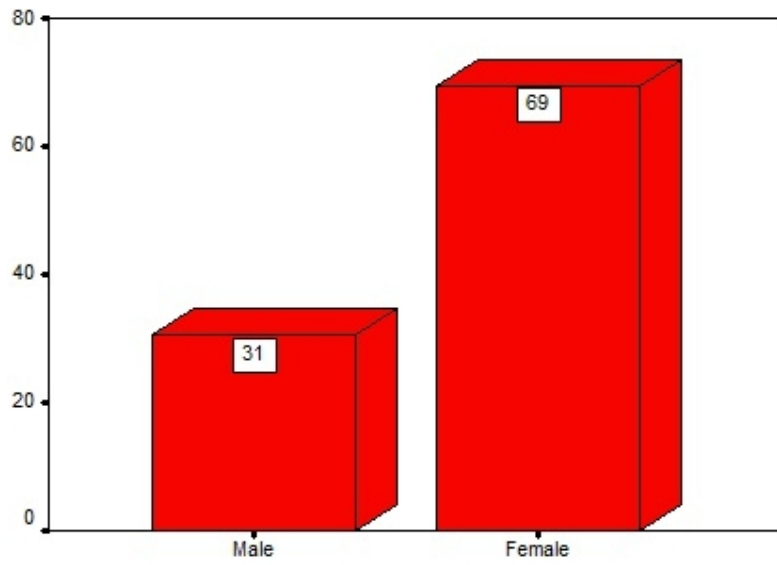
**Ethical consideration:**

The researcher took permission from the hospital of the study with an official letter from the Faculty of Nursing Sciences to the director of the hospital with the agreement of the target population, every individual observed once. Verbal consent from the interviewed persons was also taken after explaining the study and its objectives to them. Confidentiality was given consideration and the information is used for the research purpose only.

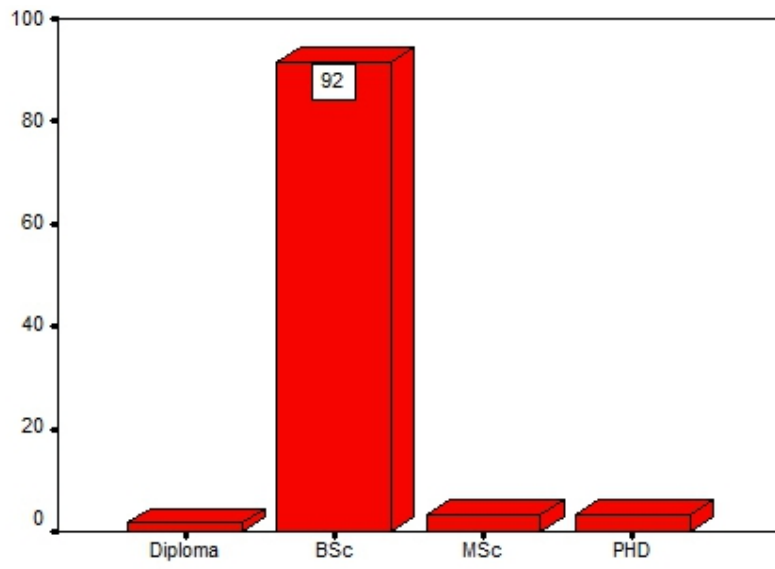
## Results



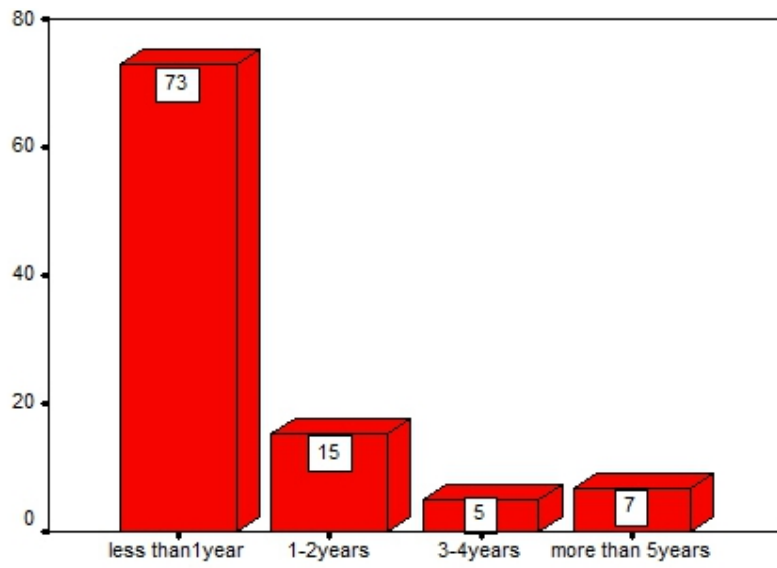
**Figure No (1) Disterbuation of study group according to their age .**



**Figure No(2)Disterbuation of study group according to their grnder**



**Figure No(3)Disterbuation of study group according to their qualification**



**Figure No(4)Disterbuation of study group according to their expreince**

**Table No(1)** Disterbuation of study group according to their knowledge about the definition of ETTTS

	Frequency	Percent
<b>Yes</b>	57	96.6
<b>No</b>	2	3.4
<b>Total</b>	59	100%

**Table No(1)** showed that the most of study group (96.6)%their knowledge about the definition of ETTS were removed the accumulate secretion from the lung of patient and some of study group(3.4)% their answer were not aware.

**Table No (2)** Disterbuation of study group according to their knowledge about The frequency of endotracheal tube suctioning when patient required

	Frequency	Percent
<b>Yes</b>	57	96.6
<b>No</b>	2	3.4
<b>Total</b>	59	100%

**Table No(2)**showed that the (96.6)% of study group about their knowledge of frequency suction were when patient and less than quarter(3.4)%of them their answer about this knowledge were not know.

**Table No(3)** Disterbuation of study group according to their knowledge about The method of suctioning are

	Frequency	Percent
<b>closed method</b>	25	42.4
<b>open method</b>	31	52.5
<b>All above</b>	3	5.1
<b>Total</b>	59	100%

**Table No(3)** showed that the two third of nurses(42.4)% answer about methods of suctioning were close method ,more than half of study group (52.5%)their answer open method and less than quarter (5.1) their answer both (open and close).

**Table No (4)** Disterbuation of study group according to their knowledge about Size of ETS catheter

	Frequency	Percent
Less than half the internal diameter of the tracheal tube	15	25.4
[ETT size(mm) minus 1] then multiply by 2	23	39.0
half the diameter Then multiply this number by 3	13	22.0
All above	8	13.6
Total	59	100%

**Table No(4)** showed that the less than one third(25.4)%of nurses their answer were less than half internal diameter of ETT ,more than one third(39)%their answer were [ETT size(mm) minus 1] then multiply by 2,less than quarter(22)% their answer were half the diameter Then multiply this number by 3 and the nurses who answer all above were as(13.6)%.

**Table No (5)** Disterbuation of study group according to their knowledge About Maximum time for an endotracheal suctioning is 10-15 sec

	Frequency	Percent
<b>Yes</b>	57	96.6
<b>No</b>	2	3.4
<b>Total</b>	59	100%

**Table No(5)**showed the most of staff (96.6)%their answer were restrict time of suction and less of quarter (3.4)%of study group about their knowledge of time restricted not applied.

**Table No(6)** Disterbuation of study group according to their knowledge About The appropriate position for endotracheal suctioning

	<b>Frequency</b>	<b>Percent</b>
<b>Yes</b>	57	96.6
<b>No</b>	2	3.4
<b>Total</b>	59	100%

**Table No(6)** showed that the (96.6)%of study group their answer were semi fowler position and some of this group (3.4)% their answer were not used it.

**Table No(7)** Disterbuation of study group according to their knowledge about During suctioning the suction catheter has to be rotated at 360

	<b>Frequency</b>	<b>Percent</b>
<b>Yes</b>	48	81.4
<b>No</b>	11	18.6
<b>Total</b>	59	100.%

**Table No(7)** showed that the majority of nurses (81.4)% their answer about this knowledge were used it and less than quarter (18.6)% their answer about this knowledge were not used it.



**Table No(8)** Disterbuation of study group according to their knowledge about Successful suctioning is confirmed by

	<b>Frequency</b>	<b>Percent</b>
<b>auscultation of the lung</b>	9	15.3
<b>no visible secretion in the ET tube</b>	6	10.2
<b>improvement in SPO2 level</b>	35	59.3
<b>All above</b>	9	15.3
<b>Total</b>	59	100.0%

**Table No(8)** showed that the more than(59.3)%of nurses their answer were improvement in SPO2 level ,less than quarter (15.3)%their answer were auscultation of the lung,(10.2)% of nurses their answer no visible secretion in the ET tube and less of quarter (15.3)%of nurses their answer were All above.

**Table No(9)** Disterbuation of study group according to their knowledge about Vagus nerve is stimulated during endotracheal suctioning

	<b>Frequency</b>	<b>Percent</b>
<b>Yes</b>	53	89.8
<b>No</b>	6	10.2
<b>Total</b>	59	100%

**Table No(9)** showed that the (89.8)% of study group their answer were yes and less than quarter (10.2)% of them their answer were not known.

**Table No(10)** Disterbuation of study group according to their knowledge about complication of suctioning due to irritation of Carina is paroxysmal cough

	<b>Frequency</b>	<b>Percent</b>
<b>Yes</b>	57	96.6
<b>No</b>	2	3.4
<b>Total</b>	59	100.0%

**Table No(10)** showed that the (96.6)% of staff their answer were know the complication of the carina irritation and less than quarter (3.4)% of the nurses their answer were not aware .

**Table No(11)** Disterbuation of study group according to their knowledge about The recommended suction pressure for endotracheal tube in

	<b>Frequency</b>	<b>Percent</b>
<b>Yes</b>	54	91.5
<b>No</b>	5	8.5
<b>Total</b>	59	100%

**Table No(11)** showed that the most of nurses(91.5)% their knowledge about pressure were applied it and (8.5)%of them their knowledge about pressure not applied in their performance .

**Table No(12)** Disterbuation of study group according to their knowledge about The ET suction catheter must be changed after each suctioning

	<b>Frequency</b>	<b>Percent</b>
<b>Yes</b>	45	76.3
<b>No</b>	14	23.7
<b>Total</b>	59	100%

**Table No(12)** showed that the (76.3)% of nurses their answer about when changed the catheter of suction were after each suction and less than quarter of study group their answer were not know.

**Table No(13)** Disterbuation of study group according to their knowledge about Absence of hyperventilation before suctioning lead to hypoxia

	<b>Frequency</b>	<b>Percent</b>
<b>Yes</b>	51	86.4
<b>No</b>	8	13.6
<b>Total</b>	59	100%

**Table No(13)** showed that the most of study group(86.4)%were their answer about complication of suction was hypoxia and some of them (13.6)%of study group their answer were not know .

**Table No(14)** Disterbuation of study group according to their knowledge about Instilled of Sodium bicarbonate through ET tube caused lung tissue damage

	<b>Frequency</b>	<b>Percent</b>
<b>Yes</b>	50	84.7
<b>No</b>	9	15.3
<b>Total</b>	59	100%

**Table No(14)** showed that the majority of nurses (84.7)% were aware about the complication of sodium bicarbe and less than quarter(15.3)% of staff not aware .

**Table No(15)** Disterbuation of study group according to their knowledge about Suction catheter insertion depth until cough is stimulated

	<b>Frequency</b>	<b>Percent</b>
<b>Yes</b>	57	96.6
<b>No</b>	2	3.4
<b>Total</b>	59	100%

**Table No(15)** showed that the most of nurses(96.6)%during the suction were stimulated the depth and less than quarter of study group(3.4)% not performed.

**Table NO(16)** Disterbuation of study group in their performance about Wash hands

	<b>Frequency</b>	<b>Percent</b>
<b>done</b>	3	5.1
<b>not done</b>	56	94.9%
<b>Total</b>	59	100%

**Table NO(16)** showed that the most of nurses( 94.9% ) not perform hand washing and less than quarter( 5.1%)of nurses perform hand washing.

**Table NO (17)** Disterbuation of study group in their performance about Explain procedure to patient

	<b>Frequency</b>	<b>Percent</b>
<b>done</b>	55	93.2
<b>not done</b>	4	6.8
<b>Total</b>	59	100.%

**Table NO(17)** showed that the (93.2)%of nurses were explain procedure to patient and less than quarter(6.8)% of them were not explained procedure to patient.

**Table NO (18)** Disterbuation of study group in their performance about Prepares ambubag and oxygen supply

	<b>Frequency</b>	<b>Percent</b>
<b>done</b>	52	88.1
<b>not done</b>	7	11.9
<b>Total</b>	59	100%

**Table NO(18)** showed that the majority of study group (88.1)were prepare oxygen and ambubage and less than quarter (11.9)%of sample were not prepare its.

**Table NO (19)** Disterbuation of study group in their performance about checks suction device with connecting tubing

	<b>Frequency</b>	<b>Percent</b>
<b>done</b>	57	96.6
<b>not done</b>	2	3.4
<b>Total</b>	59	100%

**Table NO(19)** showed that the most of nurses (96.6)%were checked the suction device and less than quarter (3.4)% of them were not sure .

**Table NO (20)** Disterbuation of study group in their performance about Attaches sterile suction catheter

	<b>Frequency</b>	<b>Percent</b>
<b>done</b>	0	0
<b>not done</b>	59	100%
<b>Total</b>	59	100%

**Table NO (20)** showed that the100% of nurses were not used sterile suction catheter in their performance .

**Table NO (21)** Disterbuation of study group in their performance about Check the availability of sterile normal saline

	<b>Frequency</b>	<b>Percent</b>
<b>done</b>	51	86.4
<b>not done</b>	8	13.6
<b>Total</b>	59	100%

**Table NO (21)** showed that the less than quarter (13.6)% of nurses were not prepared sterile normal saline before procedure and most of nurses(86.4)%were checked the normal saline in their performance .

**Table NO (22)** Disterbuation of study group in their performance about Wear sterile gloves and mask

	<b>Frequency</b>	<b>Percent</b>
<b>done</b>	52	88.1
<b>not done</b>	7	11.9
<b>Total</b>	59	100%

**Table NO(22)** showed that the most of sample (88.1)%were don gloves and mask in their performance and (11.9)%of study group were not don mask and gloves in their performance .

**Table NO (23)** Disterbuation of study group in their performance about Checks to make sure suction pressure at 80-120mm Hg

	<b>Frequency</b>	<b>Percent</b>
<b>done</b>	7	11.9
<b>not done</b>	52	88.1
<b>Total</b>	59	100%

Table NO(23)showed that the less than quarter (11.9)%of nurses were checked the pressure in their performance and the majority of nurses(88.1)%were not performed .



**Table NO (24)** Disterbuation of study group in their performance about Detaches the patient circuit and maintain its Sterility

	<b>Frequency</b>	<b>Percent</b>
<b>done</b>	48	81.4
<b>not done</b>	11	18.6
<b>Total</b>	59	100.0%

**Table NO(24)** showed that the majority of nurses(81.4)%were maintain Sterility of patient circuit and less than quarter of nurses(18.6)%were contaminated circuit during procedure .

**Table NO (25)** Disterbuation of study group in their performance about (using ventilator 100% O2 setting and manual/sigh breaths or ambubag).

	<b>Frequency</b>	<b>Percent</b>
<b>done</b>	56	94.9
<b>not done</b>	3	5.1
<b>Total</b>	59	100.0%

**Table NO (25)** showed that the most of the study group(94.9)were used ambubag with oxygen before suction in their performance and(5.1)%of group were not used it in their practice.

**Table NO (26)** Disterbuation of study group in their performance about Applies no suction while inserting the catheter

	<b>Frequency</b>	<b>Percent</b>
<b>done</b>	54	91.5
<b>not done</b>	5	8.5
<b>Total</b>	59	100.0%

**Table NO (26)** showed that the most of nurses(91.5)%were stopped the suction while inserting the catheter in their performance and (8.5)%of nurses were suctioned during insert the catheter .

**Table NO (27)** Disterbuation of study group in their performance about Applies suction ,in 360o rotation while withdrawing the catheter

	<b>Frequency</b>	<b>Percent</b>
<b>done</b>	5	8.5
<b>not done</b>	54	91.5
<b>Total</b>	59	100.0%

**Table NO (27)** showed that the (91.5)% of nurses were not rotated the suction catheter while withdrawing in their performance and less than quarter of nurses(8.5)% were did its.

**Table NO (28)** Disterbuation of study group in their performance about Restricts Suction time to 10-15 seconds

	<b>Frequency</b>	<b>Percent</b>
<b>done</b>	3	5.1
<b>not done</b>	56	94.9
<b>Total</b>	59	100%

**Table NO (28)** showed that the most of nurses(94.9)%were not restricted the time of suction to(10-5)seconds and less than quarter(5.1)%were applied this procedure.

**Table NO (29)** Disterbuation of study group in their performance about Resumes oxygen delivery system

	<b>Frequency</b>	<b>Percent</b>
<b>done</b>	59	100%
<b>not done</b>	0	0
<b>Total</b>	59	100.0%

**Table NO (29)** showed that the all of study group (100)% were resumed the oxygen in their practice

**Table NO (30)** Disterbuation of study group in their performance about Flush catheter and suction tubing until clear

	<b>Frequency</b>	<b>Percent</b>
<b>done</b>	59	100%

**Table NO (30)** showed that the all the of study group (100)%were cleaned the suction catheter in their procedure.

**Table NO (31)** Disterbuation of study group in their performance about Hyperoxygenates and hyperinflates after suctio.

	<b>Frequency</b>	<b>Percent</b>
<b>done</b>	59	100.0

**Table NO (31)** showed that the all study group (100)%were used hyper oxygenate ,hyper inflate the patient in their performance .

**Table NO (32)** Disterbuation of study group in their performance about Reassesses patient's respiratory status

	<b>Frequency</b>	<b>Percent</b>
<b>done</b>	52	88.1
<b>not done</b>	7	11.9
<b>Total</b>	59	100.0%

**Table NO (32)** showed that the most of staff(88.1)%were assessed the respiratory status in their performance and(11.6)%of nurses not assessed the patient during their practice.

**Table NO (33)** Disterbuation of study group in their performance about Discards used supplies after the procedure

	<b>Frequency</b>	<b>Percent</b>
<b>done</b>	55	93.2
<b>not done</b>	4	6.8
<b>Total</b>	59	100%

**Table NO (33)** showed that the nurses were discarded supplies after procedure as(93.2)%and less than quarter of nurses(6,8)% not applied this after procedure.

**Table NO (34)** Disterbuation of study group in their performance about hand Wash

	<b>Frequency</b>	<b>Percent</b>
<b>done</b>	55	93.2
<b>not done</b>	4	6.8
<b>Total</b>	59	100%

**Table NO(34)** showed that the most of nurses (93.2)%were washed the in their practice and (6.8)%o nurses were not hand wash after procedure.

**Table NO (35)** Disterbuation of study group in their performance about Document need for any change.

	<b>Frequency</b>	<b>Percent</b>
<b>done</b>	53	89.8
<b>not done</b>	6	10.2
<b>Total</b>	59	100%

**Table NO (35)** showed that the most of nurses(89.8)%were applied report any change in their performance and less than quarter(10.2)% of nurses wer not applied

## Discussion

Endotracheal suctioning (ETS) is one of the most common procedures performed in patients with artificial airways. It is a component of bronchial hygiene therapy and mechanical ventilation that involves the mechanical aspiration of pulmonary secretions from a patient's artificial airway to prevent its obstruction. The procedure includes patient preparation, the suctioning event, and follow-up care.

This study is a descriptive cross sectional hospital based study was conducted to assess ICU nurses knowledge and practice regarding the endo tracheal tube suction in Omdurman military hospital from. The researcher went through the result and elected the following facts and information. This study Showed that the majority of nurses(72.9)% had age ranged between (20-25), less than quarter (23.7)of study group had age ranged between(26-30) and both had age ranged between (31-35)(above 36years as(1.7)% ,also two third of them(69.5)% were femal, According to this study most of nurses (91.5)%BSc holder and majority (72.9)%of study population had experience in ICU less than one years, Regarding their knowledge about definition of endotracheal tube suction the study showed that the most of nurses(96.6)% had knowledge about the definition and knowledge regarding the methods of suction the study showed that the less than two third of nurses (42%) their answer about methods of suctioning were close method ,more than half of study group (52.5%)their answer open method and less than quarter(5.1)%of study group their answer were both (open and close) the nurses not awared both(open and close) because the close system not available in ICU , in this study showed that the less than one third(25.4)%of nurses their answer were less than half internal diameter of ETT, ,more than one third(39)%their answer were [ETT size(mm) minus 1] then multiply by 2, less than quarter(22)% their answer were half the diameter Then multiply this number by 3 and the nurses who answer all above were as(13.6)% regarding who to calculate the size of suction catheter were only some nurses had knowledge about the catheter

calculation and regarding their performance about the hand washing the study showed that the most of nurses( 94.9% ) not perform hand washing pre procedure and less than quarter( 5.1%)of nurses perform hand washing ,regarding the dons mask and sterile gloves the study showed that the less than quarter (11.9)%of nurses were checked the pressure in their performance and the majority of nurses(88.1)%were not performed this result is danger for patient because may transmitted organism during contaminated procedure and their performance about the respiratory assessment to assess need for suction .The study showed that the most of staff(88.1)%were assessed the respiratory status in their performance and(11.6)%of nurses not assessed the patient during their practice this result improved ICU outcome ,low adverse efect ,less ICU date ,decrease mortality rate. and their about the restrict time of suction the study showed that the most of nurses(94.9)%were not restricted the time of suction to(10-5)seconds and less than quarter(5.1)%were applied this procedure regarding the rotated suction ,checked the pressure this study showed that the (91.5)%of nurses were not rotated the suction catheter while withdrawing in their performance , less than quarter of nurses(8.5)%were did its and showed that the less than quarter (11.9)%of nurses were checked the pressure in their performance and the majority of nurses(88.1)%were not performed .on conclusion that the study gr0up in their performance were not applied some critical elements such as(restrict time of each suction to10-15second,regulate the pressure according to age and rotated the catheter while with drawing) this lead to ventilator associate pneumonia ,hypoxia and lung tissue damage. my recommended for the head nurses of ICU Omdurman military hospital is perform courses and training for their staff from expertise nurse , if this procedure used effectively decreased the ICU stay ,ICU length and improve the out come of intensive care unit.



## **Conclusion**

The study concluded that the performance of intensive care unit nurses staff in their performance of endo tracheal tube suction the nurses were not applied some critical elements such as(restrict the time of each suction to10-15second,regulate the pressure according to age and rotated the catheter while with drawing) this lead to ventilator associate pneumonia ,hypoxia and lung tissue damage . my recommended for the head nurses of ICU Omdurman military hospital is perform courses and trained their staff from expertise nurse , if this procedure used effectively decreased the ICU stay ,ICU length and improved the out come of intensive care unit.

## **Recommendation**

This study it carried out to assess the nurses knowledge and practice of endotracheal tube suction the nurses were not applied some critical elements such as(restrict the time of each suction to10-15second,regulate the pressure according to age and rotated the catheter while with drawing) this lead to ventilator associate pneumonia ,hypoxia and lung tissue damage. . my recommended for the head nurses of ICU Omdurman military hospital is perform courses and trained their staff from expertise nurse , if this procedure used effectively decreased the ICU stay ,ICU length and improved the out come of intensive care unit.

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## Appendix

### Nurses knowledge regarding endotracheal tube suctioning in omdurman military hospital 2017

#### Section 1: Demographic data

##### 1. Serial number ( )

2. Age : 20 - 25 years ( ) 26-30 years ( )

31-35 years ( ) above 36 years ( )

3. Sex : Male ( ) Female ( )

4- Qualification : Diploma ( ) BSc ( ) MSc ( ) PHD ( )

5- Experience in ICU: less than 1 year ( ) 1-2 years ( ) 3-4 years ( )  
more than 5 years ( )

#### Section 2: Knowledge assessment

6- The frequency of endotracheal tube suctioning when patient required.

a) Yes b) No

7- The method of suctioning are ...

a) closed method b) open method

8- Calculation of suction catheter size by  $((\text{tube size} - 1) / 2)$

a) Yes b) No

9- Maximum time for an endotracheal suctioning is 15 sec.

a) Yes b) NO

10- The appropriate position for endotracheal suctioning semifowler position .

a) Yes b) No

11- During suctioning the suction catheter has to be rotated at 360°.

a) Yes ( ) b) No ( )

12- Successful suctioning is confirmed by ...

a) auscultation of the lung ( )

b) no visible secretion in the ET tube ( )

c) improvement in SPO2 level ( )

13- Vagus nerve is stimulated during endotracheal suctioning .

a) Yes ( )

b) No ( )

14- complication of suctioning due to irritation of Carina is paroxysmal cough.

a) Yes ( )

b) No ( )

15- The recommended suction pressure for endotracheal tube in adults patient is 80 – 120 mm hg .

a) Yes ( )

b) No ( )

16- The ET suction catheter must be changed after each suctioning .

a) Yes ( )

b)No ( )

17-Absence of hyperventilation before suctioning lead to hypoxia.

a) Yes ( )

b)No ( )

18-Instilled of Sodium bicarbonate through ET tube caused lung tissue damage.

a) Yes ( )

b) No ( )

## Check List

Nursing check list about an adults endotracheal suctioning

check the practice of endotracheal suctioning among nurses.	done	Not done
1- Wash hands		
2- Explain procedure to patient.		
3- Prepares ambu bag and oxygen supply		
4- checks suction device with connecting tubing		
5- Attaches sterile suction catheter .		
6- Checks the availability of sterile normal saline or distilled water for cleaning tubing.		
7- Wears sterile gloves and mask		
8- Checks to make sure suction pressure at 80-120mm Hg		
9- Detaches the patient circuit and maintain its Sterility		
10- Hyperoxygenates and hyperinflates before and suctioning (using ventilator 100% O2 setting and manual/sigh breaths or ambu bag).		
11- Applies no suction while inserting the catheter		
12- Applies continuous suction ,in 360o rotation while withdrawing the catheter.		
13- Restricts each suction time to 10-15 seconds		
14- Resumes oxygen delivery system		
15- Flush catheter and suction tubing until clear.		
16- Hyperoxygenates and hyperinflates after suctioning (using ventilator 100% O2 setting and manual/sigh breaths or ambu bag).		
17- Reassesses patient's respiratory status for expected and unexpected outcomes.		
18- Discards used supplies after the procedure		
19- Wash hands		
20- Document need for suctioning and results in the nurse's note at least once per shift and with any changes.		