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Intensive care Nurses' competence regarding trouble shooting alarm's in mechanical ventilated patient in aliaa specialist hospital in 2017.

Aphesis submitted to graduate college in fulfillment of the requirement for MSC degree in emergency and critical ill patient

by

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الايه

وَإِذْ قُلْتُمْ يَا مُوسَىٰ لَنْ نُؤْمِنَ لَكَ حَتَّىٰ نَرَىٰ اللَّهَ جَهْرَةً فَأَخَذَتْكُمُ الصَّاعِقَةُ وَأَنْتُمْ تَنْظُرُونَ
(55) ثُمَّ بَعَثْنَاكُم مِّن بَعْدِ مَوْتِكُمْ لَعَلَّكُمْ تَشْكُرُونَ (56) وَظَلَّلْنَا عَلَيْكُمُ الْغَمَامَ وَأَنْزَلْنَا
عَلَيْكُمُ الْمَنَّٰ وَالسَّلْوَىٰ كُلُّوَا مِن طَيِّبَاتِ مَا رَزَقْنَاكُمْ وَمَا ظَلَمُونَا وَلَكِن كَانُوا أَنفُسَهُمْ
يَظْلِمُونَ (57)

سورة البقرة - الآية (55) - (57)

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Dedication

This Research is dedication
to my parents who have played a great role in our life.

To my colleagues.

Every person who support me.

Acknowledgement

I am grateful to Allah the almighty

I would like to express my supervisor Doctor Higazi Mohamed , ,Department of Emergency faculty of Nursing science, University of Shendi, For his help, guidance, kind supervision, effort and great full advices.

I am thanks also extend to Aliaa specialist hospital nurses staff .

Abstract

, Use of poster and gaid line in the work area to help in training program , put of *troubleshooting alarms* dealing with common problems in mechanical ventilated patient. . The first priority in dealing with mechanical ventilated problems is to assess the patient. Important of alarms may indicate deterioration of the patient condition, it may indicated an equipment problem that needs to addressed, Trouble shooting alarms is serious emergency procedure to safe life and improve surviving and knowledge of trouble shooting alarms is most important to know and demonstrate.; the aim of this research to assess. nurses' competence regarding troubleshooting alarms in mechanical ventilation patient in ICU ,descriptive cross sectional hospital based study. This study involved(90) qualified nurses from critical care unit, selected from Aliaa hospital , data collected by questionnaire , obtained data was entered into statistical package for social sciences analyzed data by (SPSS version 16)and by chi squire data presentation in tables , The total knowledge in this study (47%) has good. knowledge,(42%) fair and (10%) has poor ,Not association between knowledge with years of experience and qualification because all p value above 0.05.Regarding practical nurse has poor practical regarding action taken by nurse in high pressure alarm(61.1%) , regarding attitude nurse has positive attitude about patient in mechanical ventilator need to (100)–this research recommended Improve practice and knowledge the nurses regarding troubleshooting alarms management in mechanical ventilated patient by more training for nurses, Workshops should be performed to the nurses in the all hospital of the stateyears of experience above 3years as the part of hospital work

الخلاصة

المقدمة: إطلاق أجهزة إنذار هي التعامل مع المشاكل المشتركة في جهاز تهوية المريض، مريض الأولوية الأولى في التعامل مع مشكلة التهوية الميكانيكية هي تقييم المريض. قد تشير الإنذارات الهامة إلى تدهور حالة المريض وقد تشير إلى مشكلة المعدات التي تحتاج إلى معالجة. إطلاق أجهزة الإنذار هو إجراء طارئ خطير يؤدي إلى حياة أمنة وتحسين البقاء إلى قيد الحياة ومعرفة إطلاق أجهزة الإنذار هو الأكثر أهمية - للمعرفة والإثبات.

الهدف: هدفت الدراسة لتقييم كفاءة الممرضين العاملين في وحدة العناية المكثفة فيما يتعلق بإطلاق أجهزة الإنذار للمريض على جهاز التهوية الميكانيكية في مستشفى علياء التخصصي بمدينة ام درمان في سنة 2017

المنهجية: أجريت هذه الدراسة الوصفية بوحدة العناية الحرجة بمستشفى علياء التخصصي حيث شمل 90 ممرض تم جمع البيانات بواسطة استبيان مغلق الاسئلة مكون من 27 سؤال تم تحليل البيانات بواسطة التحليل الإحصائي ومن ثم عرضها في شكل جداول

النتائج: أوضحت ان الممرضين لديهم معرفة حول جهاز التنفس الصناعي المستخدم لتهويه المرضى وايضا أثبتت بانهم ضعيفين في ناحيه الممارسة في كيفية التعامل مع أصوات إنذار جهاز التنفس الصناعي

التوصيات: هذا البحث يوصي بتحسين معرفه وممارسه الممرضين حول أصوات إنذار جهاز التنفس الصناعي المستخدم لتهويه المرضى وذلك بخضوعهم لدورات تدريبه، تحفيز عمليه المشاركة والمعاونة بين مجموعته العمل لتحسين الأداء، استعمال المنشورات الحائطية وموجهات العمل لتحسين مستوى أداء الممرضين، يجب على ادارته المستشفى ان تضع ضمن لوائح قبول الممرضين في العناية المكثفة والعناية القلبية عدد سنين الخبرة وذلك لسلامه المرضى

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List of Abbreviation

AC	Asset control.
APRV	Airway pressure release ventilation.
BIPAP	Bi-level positive airway pressure.
CPAP	Continuous positive airway pressure .
COPD	Coronary obstructive pulmonary
ETT	Endotrachil tube
<i>FLO2</i>	<i>Fraction of inspired oxygen .</i>
PSV	Pressure support ventilator
PEEP	positive end expiratory pressure
ICU	Intensive care unit.
MV	Minute volume
SIMV	Synchronized intermittent mandatory ventilation.

Chapter one

Introduction

Justification

Objectives

Introduction

Mechanical ventilation, is a positive or negative pressure breathing device that can maintain ventilation and oxygen delivery for prolonged period, 1-1 ventilator setting ;The clinician determines appropriate ventilator settings according to the condition and Mechanical ventilation, is a positive or negative pressure breathing device that can maintain ventilation and oxygen delivery for prolonged period⁽¹⁾. **to of breaths**; Also referred to as respiratory rate, breathing rate, or frequency; can be a ventilator setting or respiratory status the ventilator tracks as the patient breathes⁽²⁾. **The settings include:** *Respiratory rate* ; Number of breaths the ventilator delivers per minute; usual setting is 6-20 breaths/min. *Rate.Tidal volume*; Volume of gas/air delivered to patient during each ventilator breath; usual volume is 6-10ml/min. *FIO2; Fraction of inspired oxygen (FLO2) delivered to pt may be set 21% and 100%* ⁽²⁾*Sensitivity* ; This alerts the ventilator when to recognize the start of a patient's spontaneous breath (or breathing effort). When the ventilator recognizes the patient's effort, it triggers a response, either to provide a mechanical breath or to support a spontaneous one. *Positive end Expiratory(PEEP)* ; +2 to +10cm H₂O barotrauma and depressant affect on cardiac output through decreased venous return. *Minute volume(MV)* ; 10-15 ml/kg x 10-15 breath/min=5-15 l/min.⁽³⁾ **1-2.Troubleshooting alarms** ; dealing with common problems in mechanical ventilated patient. or Problem is a situation in which a person finds Discoed or uncomfortable, The first priority in dealing with mechanical ventilated problems is to assess the patient, Important of airway pressure alarm because excessive airway pressure may have adverse effects on the patient, high airway pressure may indicate deterioration of the patient condition, it may indicated an equipment problem that needs to addressed ⁽⁴⁾. **1-3.mechanical ventilation alarms include** ;high pressure limit; causes secretion, coughing or gagging .patient fighting

ventilator, water in tubing, kinked or resistance (bronchospasm), decreased compliance (pulmonary edema, pneumothorax). low pressure limit; total or partial disconnect. Loss of airway (total or partial extubation). ET tube/ track cuff leak (pt speaking, grunting). apnea alarm; respiratory arrest, over sedation, change in patient condition, loss of airway (total or partial extubation). high tidal volume; pain, anxiety, low tidal volume or minute ventilation; change in patient breathing efforts (rate & volume). pt is disconnected, loose connection, or leak circuit. 5-oxygen loss alarm. 6-ventilator inoperative or low battery; machine malfunction, power failure, or internal battery not charged. inappropriate setting or ventilator malfunction), circuit (kinking, pooling of condensed water vapor, wet filters causing increased resistance) end tracheal tube (displacement, kinking, obstruction). ventilator alarms very important items and should be used whenever a ventilator is used, even if the ventilator is being constantly attended to such as in the operating theatre⁽⁴⁾. Boston Globe reports that the problems seem to be related less to the devices themselves and more human related error, the analysis conducted by the Globe and the ECRI institute, a nonprofit patient safety organization, found that 119 people died between 2005 and May 2011 in incidents where ventilator alarms resulted in an actual malfunction of ventilator was cause two of those deaths, all others were the result of caregivers' ignoring alerts, failing to hear them or setting the alarms incorrectly⁽⁵⁾. study done in France in two university hospitals and three general hospital ICUs. result of study 3188 alarms 23% due to staff manipulation. 17,5% to technical problems and 58,8% to pt alarms originated ventilator, 37,8% cardiovascular monitor, 32,7% pulse oximeter, 25% had a consequence such as sensor reposition, suction. the positive predictive value of alarms 27% and negative predictive value 99% sensitive was 97% and specific 58%

(5)

1-4 Justifications.

Ventilator alarms treat as critical incident that needs rapid response and evaluation, More than half of all ICU patients intubated within 24 hours of admission, careful monitoring of these pt can help reduce time of ventilator and prevent or reduce the risk of adverse events, Survival among mechanically ventilated patients depends not only on the factors present at the start of mechanical ventilation, but also on the development of complications and patientmanagement in the intensive care unit ⁽⁶⁾. Amarkan nurse association believes registered nurse is individually responsible and accountable for maintaining professional competence , professions any process for assuring nursing competence, define minimal standards for regulation of practical to protect the public.⁽⁷⁾ I conduct this study because it is very necessary to nurses in ICU to know the trouble shooting in mechanical ventilated patient. patient complete dependant to nurse about care and safety. The nurse should be knowledgeable and practical about ventilator and alarms.

1-5 General objective;

to study nurses' competence regarding troubleshooting alarms in mechanical ventilation patient.

1-6 Specific objective;

- 1- to assess nurses' knowledge regarding troubleshooting alarms in to mechanical ventilated patient.
- 2- To assess nurses' behavior and response regarding troubleshooting alarms in mechanical ventilated patient.
- 3- 3-To assess nurses' practical regarding troubleshooting alarms in mechanical ventilated patient.

Chapter Two

Literature Review

Literature review

Mechanical ventilation; Is process by which the FIO₂ is at 21%(room air) or greater and is moved in and out of the lungs by mechanical ventilator. Mechanical ventilator not curative, It is a means of supporting patient until they recover the ability to breathe independently. It can also serve as a bridge to long term mechanical ventilation.⁽²⁾The mechanical ventilator can maintain ventilation anatomically for prolonged period it is indicated when the pt is un able to maintain safe level of oxygen or CO₂ BY spontaneous breathing even with the assistance of other oxygen delivery device ⁽⁸⁾ .

2-1. Indication of mechanical ventilation;

- 1- Apnea.
- 2- Acute respiratory failure.
- 3- Sever hypoxia.
- 4- Get oxygen to the lung .
- 5- Remove carbon dioxide from the lung.
- 6- Help people breathe easier.
- 7 - Breathe for people who have lost all ability to breathe on their own.
- 8-Respiratory muscle fatigue.

2-2 Classification of ventilators;

Mechanical ventilators were traditionally classified according to the method by which they supported ventilation. The two generate categories ;

1-Positive-pressure ventilators .divided to;

-Positive pressure ventilators

-Negative pressure ventilators

2-Negative –pressure ventilators.

2-2-1Positive-pressure ventilators;

Is inflate the lung by exerting positive pressure on the airway , pushing air in, similar to a bellows mechanism, and forcing the alveoli to expand during inspiration. Expiration occurs passively. End tracheal intubation or tracheotomy is usually necessary.These widely used in hospital setting and are increasingly used in the home for pt with primary lung disease.

Three types of positive-pressure ventilators;

-Volume- cycled.

-Pressure- cycled.

-High frequency oscillatory support.

2-2-1 Volume- cycled ventilators; of Volume –cycled ventilators deliver a preset volume of air with each inspiration . Once this volume preset volume is delivered to the pt, the ventilator cycles off and exhalation occurs passively . From breath to breath, the volume of air delivered by the ventilation is relatively constant , ensuring constant , adequate breaths despite varying airway pressure.

Major disadvantage to using volume-cycled ventilators is that pt may experience barotraumas because the pressure required to deliver the breaths may be excessive⁽¹⁾,

2-2-2 Pressure –cycled ventilators; When the pressure cycled ventilator on , it delivers a flow of air (inspiration) until it reaches a preset pressure , and then

cycles off, and expiration occurs. The limitation is the volume of air or oxygen can vary as pt airway ⁽¹⁾.

2-2-3 High-frequency Oscillatory /Support ventilators; These type of ventilators deliver vary high respiratory rates (180 TO 900 breaths/min) that accompanied by very low tidal volumes and high airway pressures ⁽¹⁾

2-3 Noninvasive Positive-Pressure Ventilation;

Applies negative pressure around chest wall this cause intra airway pressure to become negative thus drawing air into the lung through the pt nose and mouth .

No artificial air way is necessary ,pt must be able to control and protect own air way .Indicated for selected pt with respiratory neuromuscular problem or as adjust to weaning from positive pressure ventilation ⁽¹¹⁾.

2-3-1 Indication for non-invasive positive pressure;-

1-Acute exacerbation of COPD

2-Non –COPD hyperbaric acute respiratory failure.

3-Cardiogenic pulmonary edema.

4-Hypoxemic respiratory failure.

5-Immunocompromised pt.

6-Weaning from ventilator support.

7-Community- acquired pneumonia.

8-Asthma.

9-Post-operative pt ⁽¹²⁾.

Is intended for pt with acute respiratory failure who will benefit from ventilator support ,but may not need conventional mechanical ventilation , NIV is delivered via tight- fitting face mask which obviates the need of endotrachel intubation through NIV has application in the out pt and in pt setting .

2-4 Mode of noninvasive mechanical ventilator ;

- 1- Continuous positive airway pressure (CPAP).
- 2- Bi level positive airway pressure (PIPAP).
- 3- Pressure support ventilation (PSV) ^{(1).s}

2-4-1”Continuous positive airway pressure (CPAP);

Is spontaneous breathing positive end expiratory pressure , it requires only source of oxygen and face mask with an expiratory valve that maintain positive end expiratory pressure .Principal of CPAP is to increase the functional residual capacity (volume in lung at the end of expiration).

CPAP is limited from ventilator support because is does not augment the tidal volume ^{(1).}

2-4-1”Bi level positive airway pressure (PIPAP);

PIPAP result in high mean airway pressure than CPAP and this help to promote alveolar recruitment .PIPAP does not directly augment tidal volume but the effect of PIPAP on alveolar recruitment will increase lung compliance and this will result in large tidal volume at the same change in intrathoracic pres

- 7- Apnea.
- 8- Acute respiratory failure.
- 9- Sever hypoxia.
- 10- Get oxygen to the lung .
- 11- Remove carbon dioxide from the lung.
- 12- Help people breathe easier.
- 13- Breathe for people who have lost all ability to breathe on their own.
- 14- Respiratory muscle fatigue.

2-5 Modes of ventilation;

The mode of ventilation is away in which the patient receives breaths from the ventilator , The common modes.

2-5-1 Assist-control(AC) ventilation; Is the mode used most often as a resting mode. The ventilator take over the work of breathing for the patient. The tidal volume and ventilator rate are preset.If the pt dose not trigger spontaneous breaths, a ventilatory pattern is established by the ventilator. It is prp-grammed to respond to the pt inspiritory effort if he or she begins a breath . In this case, the ventilator delivers the preset tidal volume while allowing the patient to control the rate of breathing ⁽⁹⁾.

2-5-2 Synchronized intermittent mandatory ventilation (SIMV);

Is similar to AC ventilation in that tidal volume and ventilator preset. If the patient dose not breathe, a ventilator pattern is established by ventilator. Unlike the AC mode ,SIMV allows spontaneous breathing at the pt own rate and tidal volume between the ventilator breaths ⁽⁹⁾.

2-5-3 Bi-level positive airway pressure(BiPAP);

Provide noninvasive pressure support ventilation by nasal mask or facemask. It is most often used for pt with sleep apnea but also may be used for pt with respiratory muscle fatigue to avoid invasive ventilation mode. ⁽⁹⁾

2-5-4 Pressure support ventilation (PSV);

Applies a pressure plateau to the airway throughout the pt-triggered inspiration to decrease resistance within tracheal tube and ventilator tubing. Pressure support reduced gradually as the pt strength increases . SIMV backup rate may be added for extra support ⁽¹⁾.

2-5-5Airway pressure release ventilation (APRV); Is a time triggered, pressure –limited, time cycled mode of mechanical ventilation that allows unrestricted ,spontaneous breathing throughout the ventilator cycle. The inflation period is long ,and breaths may be initiated spontaneously as well as by ventilator. APRV allows alveolar expelled through the lungs natural recoil .APRV has the important advantages of causing less ventilator induced lung injury and fewer adverse effects on cardio circulatory function and begin associated with lower need for sedation and neuromuscular block⁽¹⁾.

2-6 Ventilator controls and setting;

The volume –cycle ventilator is the most widely used type in acute care setting. Regarding of the type of volume –cycled ventilator used , the control and type of settings are universal. The physician prescribes the ventilator settings, and usually the ventilator is readied or set up by the respiratory therapy department . The nurse assists in connecting the pt to ventilator and monitors the ventilator setting connection in respiratory therapy. ⁽¹⁰⁾

2-6-1 Tidal volume ;

is the volume of air the pt receives with each breath, as measured on either inspiration or expiration. The average prescribed tidal volume range between 7 to 10ml/kg of body weight.

2-6-2 Rate or breaths/min; is number of ventilator breaths delivered per minute . The rate is usually set between 10 to 14 breaths/min.

2-6-3 Fraction of inspired oxygen(FIO₂); is the oxygen level delivered to pt . The prescribed Fio₂ is based on the ABG value and the pt condition. The range is 21% to 100% oxygen⁽¹⁰⁾.

2-6-4 Inspiratory flow rate and time; Speed with which the tidal volume is delivered usual setting is 40 to 80 l/min and time is 0.8- 1.2 sec.

2-6-5 High –pressure limit; Regulates the maximal pressure the ventilator can generate to deliver the tidal volume when the pressure limit reached , The ventilator terminates the breath and spills the undelivered volume into atmosphere usual setting is 10 to 20 cm H₂O above peak inspiratory pressure ⁽²⁾.

2-3-6 Positive end expiratory pressure (PEEP); Positive pressure applied at the end of expiration of ventilator breaths; usual setting is 5cm H₂O⁽¹⁾.

2-6-7. Pressure support; Positive pressure used to augment pt inspiration pressure ; usual setting is 6-15 cm H₂O ⁽²⁾.

2-6-8;E ratio; Duration of inspiration(I) to of expiration (E) ; usual setting is 1;2 to 1;1.5.

2-6-9 Trigger/ sensitivity; Alter degree of effort required by pt to trigger a positive pressure breath from the ventilator; usual setting 0 to 10 H₂O⁽³⁾

2-7 Trouble shooting alarms in mechanical ventilator

2-7-1 Definition; Anytime that the ventilator is malfunction and cannot be manually ventilator the pt. One person needs to manually ventilated while another troubleshoots the ventilator. The bag valve readily available⁽⁷⁾.

The goal of the ventilator alarm system is to warn of events.

2-8 Events are categorized into mechanical and of priority.

2-8-1 Level 1- ventilator malfunction(life threatening).

- No gas delivery to pt.
- Excessive gas delivery to pt.
- Exhalation valve failure.
- Loss of electric power⁽⁷⁾.

2-8-2 Level 2- Ventilator malfunction (not immediately life threatening).

- Blender failure.
- loss of PEEP or excessive PEEP.
- Autocycline.
- Circuit leak.
- Circuit partially occluded.
- Inappropriate heater/humidifier function⁽⁷⁾.

2-8-3 Level 3- pt event affecting ventilator-pt interface.

- Change in ventilator drive (CNS, peripheral nerves).

Level 4- pt event not affecting ventilator – pt interface.

Change is gas exchange (capnograph, oximeter).

Change in respiratory system impedance.

Change in muscle function.

Change in cardiovascular function ⁽⁷⁾.

2-9Types of ventilator alarms ;.

-ventilator inoperative.

-low pressure alarm;

-low PEEP.

-low exhaled volume.

-Apnea alarm.

-Pressure limit alarm.

-Decreased minute or Tidal volume.

-High pressure limit ⁽²⁾.

2-10 Causes of ventilator alarms;

2-10-1-ventilator inoperative.

Ventilator failure.

2-10-2-low pressure alarm;

pt is losing some or all of his tidal volume.

2-10-3-Apnea alarm;

no spontaneous breath taken in a preset number of second.

2-10-4-Pressure limit alarm;-

Patient PIP reached preset limit.-Tidal volume dumped when limit reached.-patient has obstructive in airway. ⁽²⁾

2-10-5-Decreased minute or Tidal volume;-

- Leak around endotracheal tube, from the system, or through the chest tube.
- Decreased pt- triggered respiratory rate.
- Decreased lung compliance.
- Airway secretions ⁽²⁾.

2-10-6--High pressure limit;

secretion , coughing or gagging .patient fighting ventilator, water in tubing, kinked or resistance(bronchospasm),decreased compliance(pulmonary edema, pneumothorax).⁽²⁾

2-11 Nursing intervention for various causes of ventilator alarm;

Do not rush to the ventilator as soon as it alarms but first check the pt and the monitors , as this will give the most important information need to know about the pt breathing go back to the basics and start with basic assessment of the airway breathing circulation and disability and check monitoring in particular capnography ,oxygen saturation respiratory rate and hemodynamic status.⁽¹²⁾

2-11-1-High pressure alarm

a-Increased amount of secretion or a mucus plug is in the air way

Action : suction as needed

b-The PT cough –gags , or pits on the oral ET tube

action : insert oral air way to prevent biting of ET tube

Provide emotional support to decrease anxiety .

Increase the flow rate .

Explain all procedure to Patient

Provide sedation or paralyzing agent per the health care provider prescription ⁽⁹⁾

c-Air way size decreases related to wheezing or bronchospasm

Action : auscultation breath sound

Collaborate is respiratory therapy to provide prescribed bronchodilator

d-pneumothorax occurs

Action :alter health care provider or rapid health team about anew onset of decrease breath sound or unequal chest excursion ,which may be due to pnemothorax auscultation breath sounds . ⁽⁹⁾

e-artificial air way is displace :the ET tube may have slipped in to the right mainsten bronchus . ⁽⁹⁾

Action :assess the chest for unequal breath sound and chest excursion .

Obtain chest X- ray as order to evaluate position of ET tube

After the proper position is verified ,secure the tube in place .

f- obstruction in tubing occurs because the Patient is lying on the tubing or water or kink in the tubing

Action :

Assess system –beginning with the artificial airway and moving toward the ventilator

g-decrease compliance of the lungs is noted ; a trend og gradually increasing PIP(proximal phalangeal joint) is noted over several hours or a day

Action :evaluate reason for the decreased compliance of the lung increased PIP occurs in ARDS 'pneumonia or any worsening of pulmonary disease

h-there is increased O₂ associated with deliverance of a sigh

Action :empty water from the ventilator tubing and remove any kinks

Coordinate with respiratory therapist or physician to adjust the pressure alarm ⁽⁹⁾

2-11-2 Low pressure alarm;

(sound when there is disconnected or leak in the ventilator circuit or a leak in the patient artificial air way cuff

A-Leak in ventilator circuit prevent breath from being delivered **Action** :assess all connection and all ventilator tubing for disconnection

b-the PT stops spontaneous breathing in the SIMV or CPAP mode or on pressure support ventilation

Action :evaluate the tolerance of the mode

c-cuff leak occurs in ET or tracheostomy tube

Action :evaluate the PT for a cuff leak is suspected when the PT can talk or when the pilot balloon on the air way is flat ⁽⁹⁾.

2-11-3 Apnea alarm;

Action :-Encourage pt to breath or give pt a single breath.

Check pt, ventilate manually as need.May need to switch to mode that provides more ventilation support. Reevaluate need for medications that are depressing ventilation.Low inspiratory pressure; ⁽⁹⁾

Action;- Asses, correct air leaks in endotracheal , tracheotomy cuff ,ventilator system .Recheck ventilator to make sure prescribed tidal volume is delivered. ⁽⁹⁾

2-11-4 Disconnect;

Action;- Evaluate pt for major air leak (ventilator circuit disconnection). Connect the circuit ⁽⁹⁾.

2-11-5 Correct cuff leak problems .

Obtain assistance, ventilate manually as needed.

Ventilator inoperable;-

Action; Ventilate manually, call respiratory therapy .

Respiratory therapist must evaluate/retest ventilator for proper function . ⁽⁹⁾

2-11-6 Air intake block;

Action;- Check pt, ventilate manually as needed.Check for visible occlusion (curtain, clothing, or furniture blocking the air intake at back of machine) do not cover back of ventilator- keep open to air.

Fan failed alter;

Action;- Make sure ventilator has warmed up sufficiently.

Respiratory therapist should check fan filter for occlusion and clean as need ; replace air intake filter if needed.Press alarm rest key ; if this does not resolve problem, change ventilator ⁽⁹⁾.

Chapter three

Methodology

Methodology

Study design;

descriptive Hospital based study. done during the period extended from March to September 2017.

Study setting: The area where the study is to be conducted in Aliaa hospital in Omdurman State Aliaa Hospital; The hospital establish in 17 November 2015 it is governmental hospital located on Omdurman state Near the white river ,contain of : Emergency department , Intermitted coronary care unit , intensive care unit ,and cardiac care unit, General ward of female and male , echocardiogram , X-ray department. This study was conduct in intensive care unit . and cardiac care unit.

Sampling :

All nurses were enrolled in the study

Sample size :

90 nurses were participated in the study

Study population: The target population of this study all eligible nurses in ICUs and CCU .

Inclusion criteria: the nurses working in ICU and CCU department in military hospital with deference's qualification and one or more years of experience.

Variable

Independent variable;

Age

Gander

Qualification level.

Dependant variable;

Knowledge.

Practice.

Attitude

Data collection tools: the data was collected by questioner ,this questioner contain four section ,section one concerned demographic data of nurse (gender – qualification –years of experience –training course of trouble shooting alarm – work with patient in mechanical ventilator),section two concerned assessment knowledge of nurse (what the mechanical ventilator –what is indication of mechanical ventilator –what is type of mechanical ventilator –what is mode of mechanical ventilator –what the ventilator setting –positive ventilator require?-life threating alarm include.....? –type of non invasive mechanical ventilator – invasive mechanical ventilator need to? –non invasive mechanical ventilator require? –low pressure alarm cause by –what is the alarm ?),section three concerned assessment of nurses practice (when the alarm occure the first step

should be done? –what the type of alarm –action taken by the nurse in low pressure alarm ..? – action taken by the nurse in high pressure alarm? _action taken by the nurse in apnea alarm ?),section four concerned assessment of behavior and response of nurse (when the patient need to help by the nurse the nurse should be? –what the nurse should by document ?-nurse role in patient depress about health problem ? –when the alarm occur the nurse should be ..?).

Data collection technique: The data was within two weeks during all shift ,after the purpose of the study was explained to participant ,every nurses were allowed to fill the data by them self no one refuse

Data analysis;

the will be analysis by computer SpsS .

Ethical consideration;

- the proposal was approved by the ethical committee of the faculty
- permission was taken from the hospital director and the head nurse
- verbal consent was taken from participant after explanation the purpose of the study

Chapter four

Result

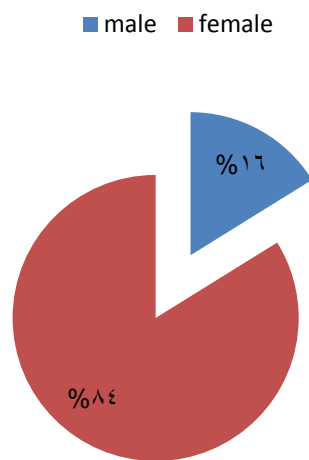


figure (1) gender of the study group

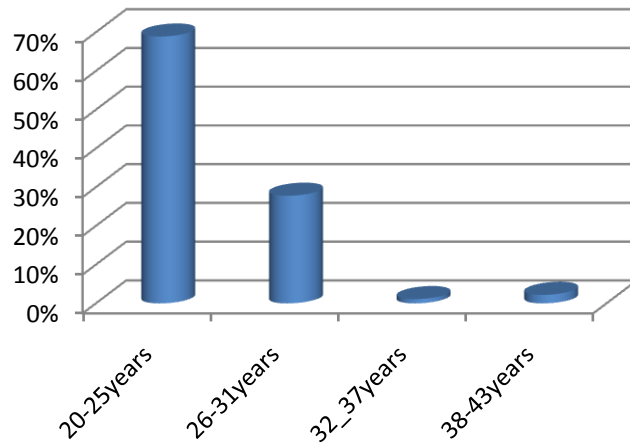


Figure (2) age of staff nurses (N-90%)

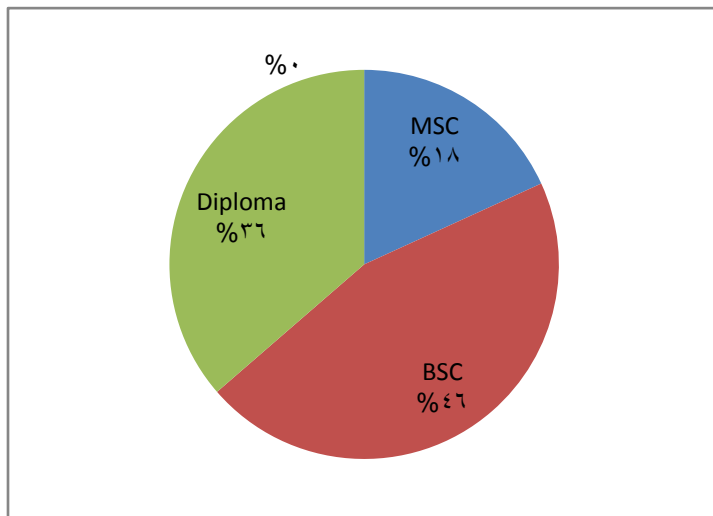
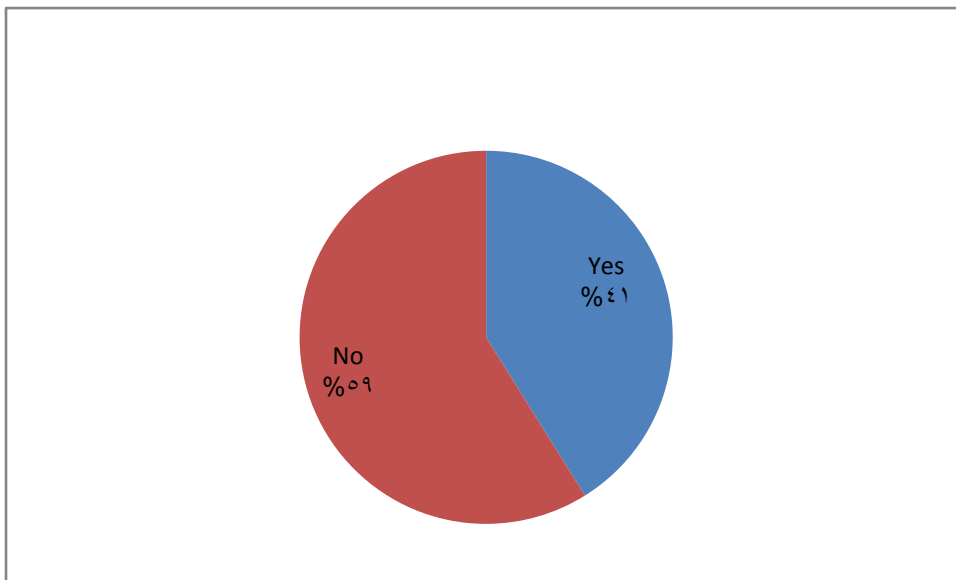


figure (3) Qualification (N- 9

Table (1) years of experience

Years	Frequency	Percent%
1-5	82	91
6-10	7	8
11-15	1	1



figure(4)training course in trouble shooting alarm(N-90)

Table (2) work with patient in mechanical ventilator(N- 90)

Valid	Frequency	Percent%
Yes	82	91.1
No	8	8.9
Total	90	100

Table (3)knowledge about definition of mechanical ventilator ,indication of mechanical ventilator ,positive ventilator require ,life threaten alarm include(N-90)

Valid	Known		Not known	
	frequent	Percent%	Frequent	Percent%
7-definition of mechanical ventilator	72	80	18	20
8-indication of mechanical ventilator	89	98.9	1	1.1
12-positive ventilator require	13	14.4	77	85.5
13-life threaten alarm include	48	53.3	42	46.7
Mean of knowledge	61.6			

Table (4) types of mechanical ventilator(N-90)

valid	Frequent	Percent%
invasive	10	11.1
Invasive and non invasive	80	88.9
total	90	100

Table (5)mode of mechanical ventilator(N-90)

Valid	Frequent	Percent%
AC	83	92,2
PEEP	2	2,2
Tidal volume	5	5,6
Total	90	100

Table (6) ventilator setting (N-90)

Valid	Frequent	Percent%
Tidal volume	47	52,2
Peep	8	8,9
AC	21	23,3
Tidal volume and peep	14	15,6
Total	90	100

Table(7) type of non invasive mechanical ventilator (N-90)

Valid	Frequent	Percent%
CPAP	24	26,7
PIPAP	5	5,6
Pressure cycle ventilator	15	16,7
CPAP and PIPAP	46	51,1
Total	90	100

Table(8)invasive mechanical ventilator need to(N-90)

valid	Frequent	Percent
ET tube	58	64.4
tracheotomy	12	13,3
Face mask	20	22,2
total	90	100

Table(9) noninvasive ventilator require (N-90)

valid	Frequent	Percent
CPAP	19	21,1
oxygen	10	11,1
A and b	61	67,8
total	90	100

Table(10)low pressure alarm caused by(N-90)

Valid	Frequent	Percent
Disconnected or leak of tube	44	48,9
Accumulation of secretion tube	24	26,7
loss of sedation	22	24,4
total	90	100

Table (11)Alarm(N-90)

Valid	frequent	Percent%
Normal sound in mechanical ventilator	1	1.1
Abnormal sound require intervention	88	97.8
Not above	1	1.1

Table (12) when alarm occur first step should occur(N-90)

Valid	frequent	Percent
Evaluate the Pt	48	53.3
mechanical ventilator	36	40
Ignore	5	5.6
total	90	100

Table(13) Types of alarm (N-90)

Valid	frequent	Percent
Apnea alarm	18	20%
Oxygen loss alarm	4	4.4%
Apnea alarm only	11	12.2%
a and b	57	63.3%
total	90	100%

Table(14)actions taken by nurse in low pressure alarm(N-90)

Valid	frequent	Percent
Check if Leak of circuit	9	10%
Loose of connection	4	4.4%
a and b	48	53.3%
Suction	29	32.2%
total	90	100%

Table (15)actions taken by nurse in high pressure alarm(N-90)

Valid	frequent	Percent
Suction	21	23.3%
Suction and sedation	55	61.1%
Emotional support only	10	11.1%
Loss of sedation	4	4.4%
Total	90	100%

Table (16)actions taken by nurse in apnea alarm(N-90)

Valid	Frequent	Percent
Encourage patient to breath	44	48.9%
Suction	31	34.4%
Check pt circuit	15	16.7%
Total	90	100%

Table (17)When the pt need to help by the nurse the nurse should be.....?(N-90)

Valid	Frequent	Percent
rapid response to pt	83	92.2%
Ignore	2	2.2%
manipulation with staff	5	5.6%
Total	90	100%

Table (18)What is nurse should be documented?(N-90)

Valid	Frequent	Percent
Vital signs	2	2.2
pt condition and medication	4	4.4
a and b	84	93.3
Total	90	100%

Table (19)Nurse role of pt depress about health problem?(N-90)

valid	frequent	Percent
discuss about health problem	2	2.2%
support patient and family	2	2.2%
a and b	86	95.6%
Total	90	100%

Table(20)When the alarm occurs the nurse should be.....?(N-90)

Valid	Frequent	Percent
rapid response and intervention	88	97.8%
silent the sound of alarm	2	2.2%
Total	90	100%

Chapter five

Discussion

Conclusion

Recommendation

Discussion

This study revealed that the participations answers were using Standardized evaluation tool by classifying the knowledge level by percentage according to WHO scale; excellent (90%) , very good (89%-80%) , good (79%-70%), variable (69%-60%) , poor (59%or less).This was descriptive cross sectional hospital base study, to assess nurses competence regarding trouble shooting alarms in mechanical ventilated patient .The majority of the study population was female (83.3%)and (68.9%) of between 20-25 years, (2.2%) more than 31 years age group and (44.4%) have qualification (91.1%) from 1-5 years of experience and (41.1%) have training of mechanical ventilator. The nurses in study have excellent knowledge(98.%-90%) regarding the following ;

- Indication of mechanical ventilator (98.9%), Mode of mechanical ventilator (92.2%) and definition of alarm(80.0%). The nurses have excellent knowledge regarding trouble shooting alarms in mechanical ventilated patient because the nurses have information from university.The nurses in this study have very good knowledge with percentage (80%-70%) regarding the following ;

Definition of mechanical ventilator (80.0%), type of mechanical ventilator (88.9%) and positive ventilator require(81.1%). The nurses have very good knowledge regarding trouble shooting alarms in mechanical ventilated patient .The nurses in this study have variable knowledge with percentage (69%-60%) regarding the following; Non invasive mechanical ventilator require (67.8%) and invasive mechanical ventilator need to(64.4%).The nurses have variable knowledge

regarding trouble shooting alarms because most of them have recent experience and fresh knowledge from university .Knowledge is poor with percentage(50%-35.7%) about type of non invasive mechanical ventilator and life threaten (53.3%)Because in mechanical ventilator training course (51.1%) depend on demonstrating and main knowledge of trouble shooting alarms more than history of alarms. The total knowledge in this study (47%) has good knowledge,(42%) fair and (10%) has poor. Not association between knowledge with years of experience and qualification because all p value above 0.05. .The nurses in study have variable practical(69%-60%) regarding, Type of alarms (63.3%) and actions taken by nurse in high pressure alarm (61.1%)The nurses in study have poor practical(59% or less) regardingActions taken by nurse in low pressure alarm (53.3%), Actions taken by nurse in apnea alarm (48.9%),When alarm occur first step should occur(53.3%). And Low pressure alarm caused by (48.9%),

The nurses have variable and poor practical Because in mechanical ventilator training course depend on demonstrating and main application of trouble shooting alarms , aloft number of staff not training of mechanical ventilator , most of them have recent experience and fresh practical from university. according to study the analysis conducted by the Globe and the ECRI institute ,a nonprofit patient safety organization ,found that 119peopel died between 2005 and may 2011 in incident ventilator alarms result an actual malfunction of ventilator was cause two of those deaths, all other were the result of care cavers' ignoring alerts, failing to hear them or setting the alarms incorrectly.No association between practical with years of experience and qualification P value ,844 The nurses in study have positive attitude regardingWhen the pt need to help by the nurse the nurse should be.....?(92.2%) ,Pt in mechanical ventilator need to.....?(100.0%), What is nurse should be documented?(93,3%).

Conclusion

The study conclude the nurses knowledgeable about mechanical ventilator and alarm of mechanical ventilator because nurses have information from university.

-Regarding behavior and response nurses has positive behavior.

-Regarding practical nurses has poor practical because nurses less yearsof experience and 51% not involve in training course about mechanical ventilator.

Recommendation

This research recommend that;

- Improve practice and knowledge the nurses regarding troubleshooting alarms management in mechanical ventilated patient by more training for nurses.
- Workshops should be performed to the nurses in the all hospital of the state.
- Use of poster and gaid line in the work area to help in training program
- in the hospital policy should be put years of experience to staff in ICU or CCU (above three years) to safe patient

Appendix

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Shendi University

Graduate College

Faculty OF Nursing Science

Questioner about

Intensive care Nurse's competence regarding trouble shooting alarms in mechanical ventilated patient in Omdurman stat in march 2017

Nurse should be put cycle around selected answer

Section one; Demographic characteristic of nurses

1-Gender;

a-Male b- Female

2- Age years

3-Qualification;

a-Diploma b-MSc C-BSc d-PHD

4- Years of experience..... Years?

5- Training Course in trouble shooting alarms in mechanical ventilator;

a-Yes b- No

6-Do you work with pt in mechanical ventilator?-

a-Yes b-No

Suction two; assessment knowledge of nurse

7- What the mechanical ventilator?

a –It is device to assisting inhalation of oxygen into the lung and the exhalation of carbon dioxion according to the pt condition

b-It is device use only to deliver oxygen

c- a and b

8- What is indications of mechanical ventilator?

a –Sever hypoxia b-bronchitis c- Angina

9-What is types of mechanical ventilator?

a-Invasive b- Invasive and noninvasive

10-What is mode of mechanical ventilator?

a-AC B-PEEP C- Tidal volume

11-What the ventilator setting?

Tidal volume b- PEEP C-AC

d- a and b.

12-Positive ventilator requires?

a-Endotracheal tube b- tracheotomy c-A and B?

13-Life threading alarm include.....? a-No gas deliver to pt

b- Loss of electrical power

c- a and b

14- types of noninvasive mechanical ventilator include ?

a-CPAP b- PIPAP C-Pressure cycled ventilator.

d- a and b

15- invasive mechanical ventilator need to ?

a-ET tube b-Tracheotomy c- Face mask

16-Noninvasive mechanical ventilator require?

a-CPAP mask b-Oxygen c-a and b

17-Low pressure alarm cause by?

A-Disconnected or leak of tube b-Accumulation of secretion tube

18-What is the alarm?

a-Normal sound in mechanical ventilator

b-Abnormal sound require intervention.

Suction three; assessment of nurses practical.

19-When the alarm occur the first step should be done.....?

a-Evaluate the Pt b- mechanical ventilator

c-ignore

20-What is types of alarms?

a-Apnea alarm b- Oxygen loss alarm c-Apnea alarm only

d- a and b

21- Actions taken by nurse In low pressure alarm?

a- Check if Leak of circuit b-Loose of connection c- A and B d- suction

22-Actions taken by the nurse in high pressure alarm?

a-Suction b- Suction and sedation c-Emotional support only

d- Loss of sedation

23-Actions taken by the nurse in apnea alarm?

a-Encourage patient to breath b- Suction

c-Check pt circuit

Suction four; assessment behavior and response of nurses

24- when the pt need to help by the nurse the nurse should be.....?

a-rapid response to pt b- ignore

c-manipulation with staff

25- What is nurse should be documented

a-vital signs b- pt condition and medication

c-A and B.

26- nurse role of pt depress about health problem?

a-discuss about health problem.

b- support patient and family

c-A and b

27- When the alarm occur the nurse should be.....? - a

- a- rapid response and intervention
- b- ignore
- c- silent the sound of alarm