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DEPARTMENT OF NURSING

KNOWLEDGE ON ADMINISTRATION OF OXYGEN AND THE DELIVERY DEVICES USED AMONG NURSES AT THE PAEDIATRIC UNIT OF KORLE BU TEACHING HOSPITAL (KBTH).

BY

SAMUEL TWUMASI (NUR/18/03/0213)

AND

SHADRACK EFFAH BEDIAKO (NUR/18/03/0691)

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DECLARATION

We hereby declare that this project was undertaken by us and supervised by Dr. Mary Opare of Central University Nursing Department; all references used in the study have all been duly acknowledged accordingly. No part of this study has been previously submitted to another institution for the award of a diploma or a degree.

Student signature …………………………   Date…………………..…

(Samuel Twumasi)

Student signature   ………………………….   Date ……………………

(Shadrack Effah Bediako)

Supervisor's signature   ……………………….   Date …………..………..

(Dr. Mary Opare)

DEDICATION

This work is dedicated to Almighty God for granting us the strength to pull through. We also dedicate it to our families and friends. We could not have done it without you. Thank you

ACKNOWLEDGEMENTS

ABSTRACT

Critically ill patients usually need oxygen to survive, and this therapy must be appropriate, safe and comfortable. The objective of this study was to assess Nurses' Knowledge on Administration of Oxygen and Devices used at the Paediatric unit of Korle-Bu Teaching Hospital. A quantitative descriptive study design, selecting of respondents by simple random sampling with a sample size of fifty two (52) respondents would have been used. Data collection instrument would have been questionnaire. However, COVID-19 and its restrictions limited the study to critical analysis literature of this study. Upon the critical review of literature, findings from literature review recorded 65% of nurses lacking knowledge on oxygen administration with Western and Eastern Africa leading with a cumulative 70% of poor knowledge on oxygen administration. In addition, there were higher percentages recorded in the inappropriate use of oxygen delivery devices. Lack of training on oxygen therapy was found to be a hindrance to safe administration of Oxygen. It was recommended a clear oxygen therapy guideline be developed and implemented nationally to guide nurses and other health professionals in this therapy.

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CHAPTER ONE

INTRODUCTION

1.0 BACKGROUND OF THE STUDY

The first chapter of this study consists of the background of the study, followed by problem statement, purpose of the study, objectives of the study, research questions, the significance of the study, operational definition of terms and literature review.

1.1 Background of the Study

Oxygen is an atmospheric gas necessary for survival of all living organism and it is denoted by letter O_2. (Mahmoud, Alseed, Awad, Ahmed, & Elhussein, 2016). Oxygen is one of the most common drugs used in the care of patients in the hospital (Kavitha & Patil, 2015).

Every cell in the human body needs oxygen to survive(Cataletto, 2011). Cells metabolizes glucose and oxygen into energy within their mitochondria, by a process called cellular respiration (Ahmadi et al., 2016). During cellular respiration, cells use oxygen to break down sugar to produce Adenosine Triphosphate (ATP) which is a molecule that supplies body cells with energy (Kelly & Michelle 2015; Ahmadi et al., 2016).

According to Goharani, Miri, Kouchek, and Sistanizad, (2017) oxygen therapy is the introduction of increased oxygen to the air available for respiration to prevent hypoxia, thus oxygen therapy may be defined as the administration of oxygen to a patient at an inspired concentration greater than that of oxygen concentration in ambient air. Room air consists of 21% oxygen, 79% nitrogen, and trace amount of carbon dioxide and other gases (Stich & Cassella, 2009). The administration of supplementary oxygen is an essential component of resuscitation, acute medical care, basic life support, anaesthesia and post-operative care. (Rose, Heward, & McCabe, 2010)

Oxygen therapy is vital to sustain human life; it is one of the most widely prescribed drugs for patients with different health conditions (Kelly & Maden, 2015). Oxygen therapy is commonly used in the emergency and critical cases. It is the first line treatment in many critical conditions. Administering oxygen depends on the needs of the patients and the points of views and decision of the medical team advising the care regimen. If oxygen therapy is given inappropriately, it could be fatal. Hence, patients must receive this therapy in an appropriate, safe, and comfortable way (Adipa et al., 2015; Mahmoud et al., 2016; O'Driscoll et al., 2016).

Maintenance of adequate oxygen delivery to vital organs often requires the administration of supplemental oxygen, sometimes at high concentrations. Although oxygen therapy is lifesaving, it may be associated with deleterious effects when administered for prolonged periods at high concentrations. Oxygen should be prescribed to achieve a target saturation of 94–98% for most acutely ill patients or 88–92% for those at risk of hypercapnic respiratory failure (Lemma, & Weldetsadik, 2015).

Nurses have an important role in early identification of factors that can compromise oxygen delivery to the lungs and tissues in the body and in ensuring that patients who may require supplemental oxygen therapy are assessed and managed safely and competently. When oxygen is used appropriately, it can save lives. On the other hand, any errors in oxygen therapy can worsen a patient's condition and can even be life-threatening. Hypoxia is an indication to start oxygen therapy; this can be a life-saving intervention, but given without appropriate assessment and ongoing evaluation, it can also be detrimental to patients' health (Ridler et al., 2014)

Oxygen deficiency has deleterious consequences to all organs of the human body leading eventually to cell dysfunction and death. Oxygen supplementation is used on a daily basis in clinical practice (Rose, Heward, & McCabe, 2010). Also, O_2 therapy is highly specialized

and its prescription must be tailored on an individual basis. It is, however, widely recognized that O_2 is poorly prescribed by physicians. Health care professionals and especially nurses appear to use O_2 therapy without sufficient knowledge of its indications, dosage, side effects and toxicity. Oxygen therapy is a complicated nursing procedure and as such care must be taken in its administration. Specific and explicit medical orders should always be given in order to minimize side effects for hospitalized patients (Kelly & Maden, 2015).

In America, about 65% of all emergency hospital deaths is related to poor oxygen administration (Kelly & Maden, 2015). In a study in Chicago University hospital, 6 out of every 10 deaths in the emergency ward is as a result of inaccurate oxygen administration by nurses. Similarly, in the United Kingdom, literature revealed that more than 65% of law suits on medical negligence by patient relatives is due to poor oxygen administration to palliative patients by nurses. Wilson, (2017) reported that in Newcastle 74% of all medical suits was due to inefficient and poor judgement by nurses on oxygen administration. In that study, it was evident that majority (55%) of nurses had discontinuous professional development and 35% actually had insufficient knowledge on oxygen therapy and its precautionary measures. Thus, the consequence of which led to countless lawsuits by patients and their relatives.

In Africa, a standardized report by the World Health Organization ((WHO), 2015) indicated that about 65% of nurses lacked knowledge on oxygen administration with Western and Eastern Africa leading with a cumulative 70% of poor knowledge on oxygen administration. However, in that same report, 35% of middle African nurses possess knowledge on oxygen administration but with incongruent application of their knowledge.

In Nigeria for instance, a report by Alhassan and Ibrahim. (2018) showed that 55% of nurses in Abuja state hospital possessed sufficient knowledge on oxygen administration. However, the study could not correlate the respondents' knowledge with their practice as majority (94%) of the respondents did not attempt the question on practice.

In Ghana, a study conducted by Adipa, Aziato and Zakariah, (2015) on 'Qualitative exploration of nurses' perspectives on clinical oxygen administration in Ghana', revealed that most of the respondents lack adequate knowledge on oxygen administration.

1.2 Problem Statement

Lack of sufficient knowledge and accurate oxygen administration together with insufficient familiarity with oxygen delivery devices is a barrier to safe administration of oxygen globally (Young & Kostalas, 2013). The researchers have observed from their practices that most in-charges complain about a seeming inaccurate oxygen administration by their nurses. Anecdotal evidence suggest that all in-charges of almost all major hospitals in Ghana complain about lack of accurate knowledge and proper practices of oxygen administration by nurses. In 2018, myJoy online, a Ghanaian media reported a case in which relatives of a deceased at Korle Bu Teaching Hospital fought with nurses with the perception that the deceased was poorly resuscitated with oxygen. They claim that the nurse on duty was seemed to lack knowledge on the oxygen administration. This and many other complaints lodged by nurse managers motivated the researchers to embark on this study.

1.3 Purpose of the study

The purpose of the study was to Assess the Knowledge on Oxygen Administration and the Oxygen Delivery Devices Used Among Nurses at the Paediatric Unit Of Korle Bu Teaching Hospital (KBTH).

1.4 Objectives of the study

The specific objectives of the study will be to;

❖ Assess nurses' knowledge on administration of oxygen.

❖ Ascertain the types of oxygen delivery devices used by nurses in oxygen administration.

❖ Identify barriers affecting safe delivery of oxygen therapy to patients by nurses.

1.5 Research Questions

❖ What knowledge do nurses have on administration of oxygen?

❖ What type of devices do nurses use in delivery of oxygen?

❖ What barriers affect the safe delivery of oxygen to patients by nurses?

1.6 Significance of the study

The findings of the study will provide an insight into nurses' knowledge and practices toward oxygen therapy delivery. In addition, the findings of the study will help policy makers and the hospital management to acquire the various oxygen delivery devices and assessment tools and organize in-service workshops on effective oxygen therapy for nurses within the hospital to upgrade their knowledge on the current trends of oxygen delivery therapy, and on the care given to the patients. Furthermore, this study will add to research data stock and can serve as a source of reference for future studies.

1.7 Operational Definition of terms

In the context of this study the following are defined:

Hypoxia: A condition in which tissues of the body are starved of oxygen.

Hypoxemia: an abnormally low level of oxygen in the blood.

Knowledge: The fact of knowing about something.

Practice: The expected procedure or way of doing something.

Oxygen: a non-metallic element occurring free in the atmosphere as a colourless and tasteless gas.

Oxygen Delivery Device: These are equipment or gadgets used to deliver or administer oxygen to patients.

Oxygen Therapy: This is the administration of oxygen to a patient at an inspired concentration greater than that of oxygen concentration in ambient air.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This literature review discusses knowledge on oxygen therapy, practices of oxygen therapy, oxygen physiology, common indications for oxygen delivery, potential complications of oxygen use, oxygen delivery devices, appropriate use of oxygen delivery devices and barriers affecting the delivery of oxygen therapy.

Oxygen plays a very essential role in the body as every cell in the human body needs oxygen to survive. Cells turn glucose and oxygen into energy within their mitochondria, by a process called cellular respiration. Cellular respiration is the term used to describe the phase of the digestive process when food breaks down to supply cells with energy. During cellular respiration, cells use oxygen to break down sugar to produce Adenosine Triphosphate (ATP) which is a molecule that supplies body cells with energy (Kelly & Maden, 2015). An individuals' health status, activity level and hydration level are factors that affect how much oxygen a human being needs. Without adequate oxygen, cells die and the body systems they support fail to function (Woodrow, 2016).

2.1 Knowledge on administration of oxygen

A study at Birmingham Children's Hospital, Birmingham, UK among junior doctors and nurses found that health professionals had significant knowledge gap regarding oxygen therapy despite their frequent use (Rose, Heward, & McCabe, 2010).

A study was conducted on omissions and errors in oxygen therapy in Greece. The results of the study revealed that 41% of head nurses believed that oxygen is a gas that improves dyspnea patients. The majority of nurses (88.6%) said that there was no protocol for the treatment of oxygen in the department in which they worked. It was found that the oxygen

therapy was generally started, modified and deleted by nurses in the absence of a medical order. The results of the study indicate that educational programs, protocols and guidelines are required to ensure the proper use of oxygen. Omissions and therapeutic errors are commonly found on hospital use of oxygen and the use of nebulizers (Babu, 2008, p. 4).

A study among 30 staff nurses working in pediatric wards of selected hospitals in Vijaypur, India found that 40% of the nurses had poor knowledge on oxygen therapy and 58% scored average and none had excellent knowledge regarding oxygen therapy (Kavitha & Patil, 2015).

With regards to a study at Elmek Nemir Hospital, Shendi, Sudan among 60 nurses revealed that 78% of nurses knew how to give oxygen to asthmatic patients (Fath & Ahmed, 2016).

A study at Konya, Turkey which involved 80 nurses found that nurses had adequate knowledge on some aspects of oxygen therapy, but they also had incomplete knowledge in some vital issues for oxygen therapy (Taş, Özkan, Ak, & Karayağız, 2017).

A study among 50 nurses from different departments in Educational Hospitals in Cairo, Egypt found that only 24% of the respondents and 76% of them had adequate and inadequate level of knowledge regarding oxygen delivery devices and therapy respectively (Mayhob, 2018).

Further studies to assess knowledge and practice of nurses regarding oxygen delivery devices and therapy among 50 nurses at Elmak Nemir University Hospital in Shendi city, river Nile state, Sudan found that the knowledge and practice of nurses regarding oxygen therapy in Elmak Nimir University Hospital was relatively poor (A. Mahmoud, Alseed, Awad, Ahmed, & Elhussein, 2016).

2.2 Oxygen delivery devices used in oxygen administration.

A study conducted by Rose, Heward and McCabe on the appropriate use of oxygen delivery devices by nurses at Birmingham Children's Hospital, Birmingham, UK revealed that there was a confusion regarding knowledge of maximum percentage of oxygen delivered by nasal cannula, bag mask ventilation and Ayre's T-piece (Rose, Heward, & McCabe, 2010). In addition, some erroneously stated nasal cannula, face masks and head box were not suitable for spontaneously breathing patients (Rose, Heward, & McCabe, 2010).

A study conducted among 30 staff nurses working in pediatric wards of selected hospitals in Vijaypur, India found that majority of the respondents thus, 60% could not identify venture mask as high flow oxygen delivery device (Kavitha & Patil, 2015).

A study conducted by Fath and Ahmed at Elmek Nemir Hospital, Shendi, Sudan among 60 nurses revealed that 78% of the respondents could correctly identify the various oxygen delivery devices used in the administration of oxygen (Fath & Ahmed, 2016).

A study conducted by Lemma on the Assessment of Nurses Knowledge, Attitude And Practice on Oxygen Therapy at The Emergency Departments of One Federal and Three Regional Hospitals in Addis Ababa, Ethiopia revealed that there were clear practice gap among nurses working at the emergency departments as majority, 66% of the respondents could not appropriately identify the following oxygen devices; Ayre's T-piece, Non-Rebreather facemask (Lemma, 2015).

A study among 50 nurses from different departments in Educational Hospitals in Cairo, Egypt found that majority representing 70% could not correctly identify Bag valve mask/ Ambu bag as a device used in resuscitating patient (Mayhob, 2018).

2.3 Barriers affecting the delivery of oxygen therapy

With regards to studies on barriers affecting the delivery of oxygen therapy, a study by Walters and Nadeem in Walsall Manor Hospital, United Kingdom found that insufficient training and education for medical and nursing staff hindered safe oxygen therapy administration (Walters & Nadeem, 2009).

A study at Waikato District Hospital, Hamilton, New Zealand found that lack of understanding of the effects, role and dangers of oxygen therapy hindered affected safe administration of oxygen therapy (Holbourn & Wong, 2014).

A study at Gloucester Royal Hospital, Gloucester, London reported staff time constraints and lack of familiarity with oxygen delivery devices as barriers to safe administration of oxygen therapy (Young & Kostalas, 2013).

With regards to a study at John Hunter Hospital, New Lambton, Australia communication difficulties between doctors and nurses and lack of full-time staff or staff turnover were identified as barriers to oxygen therapy (Gunathilake, Lowe, Wills, Knight, & Braude, 2014).

A study among 50 nurses from different departments in Educational Hospitals in Cairo, Egypt found that some of the common barriers affecting safe oxygen therapy reported by nurses are unavailability of protocol, lack of maintenance of the equipment used for oxygen therapy and incomplete/ unclear written prescription for oxygen therapy (Mayhob, 2018).

CHAPTER THREE

METHODOLOGY

3.0 Introduction

This chapter describes the methodology used to conduct the research. This chapter includes intended procedure, identification of relevant variable emerging from the literature, relationship between relevant variables, discussion, summary, conclusion and recommendation of the study.

3.1 Intended Procedure

A study design was the method used by the researcher to undertake the study they set out to accomplish (Gravetter & Forzano, 2011). A quantitative descriptive study design would have been used to assess the knowledge and practices of nurses on oxygen delivery devices within the study period. The main characteristics of quantitative research are that, it is positivistic and a formal measuring instrument is used to provide numeric information that is statistically analyzed (Polit & Beck, 2012).

3.1.1 Study Setting

The study was intended to be conducted at Paediatric Unit of Korle BU Teaching Hospital (KBTH). Korle-Bu Teaching Hospital (KBTH) is the premier health-care facility in Ghana. It is located in the Ablekuma South District of the Greater Accra Region. It is a teaching hospital affiliated with the medical school of the University of Ghana. In 2019, the hospital gained a license from the Health Facilities Regulatory Agency (HeFRA), after meeting the requirement.

Established on 9th October 1923, Korle-Bu Teaching Hospital has grown from an initial 200-bed capacity to 2,000. It is currently the third largest hospital in Africa and the leading national referral centre in Ghana.

Korle-Bu gained teaching hospital status in 1962, when the University of Ghana Medical School (UGMS) was established for the training of medical doctors. The UGMS and five other constituent schools are now subsumed under the College of Health Sciences to train an array of health professionals. All the institutions of the College however, undertake their clinical training and research in the Hospital. At the moment, the Hospital has 2,000 beds and 17 clinical and diagnostic Departments/Units. The Hospital also provides sophisticated and scientific investigative procedures and specialization in various fields.

It is at the paediatric unit of Korle bu teaching hospital that the study would have been conducted. The paediatric unit was established in 1964 under the leadership of Dr Susan De-Graft Johnson. It is a tertiary referral centre for children under 13 years with medical and surgical problems.

3.1.2 Target Population

The study population would have beencomprised of all Nurses at paediatric unit of the Korle-Bu Teaching Hospital.

3.1.2.1 Inclusion criteria

1. All Registered Nurses with two years and above working experience in the paediatric unit of KBTH.

2. All Nurses who have worked at the paediatric unit of KBTH for more than two years but not at the rank of a DDNS.

3.1.2.2 Exclusion criteria

1. Nurses with less than two years working experience in the paediatric unit of KBTH.

2. Nurses who have worked for more than two years but are not permanent staff of KBTH.

3. Nurses who have worked for more than two years but are on leave.

3.1.3 Sample Size and Sampling Technique

A simple random sampling technique would have been used to select nurses at the paediatric unit of KBTH. A simple random sampling technique is a type of probability sampling in which each element in the population has an equal and independent chance of selection in the sample. The sample size for this study would have been a total of fifty-two (52) respondents. This would have been done through balloting YES or NO, nurses who picks YES would have been chosen for the study.

The sample size was calculated using the formula below:

n = $\underline{z^2pq}$

     d^2

Where:

n = sample size,

z = level of confidence/ reliability (z= 1.96)

d = allowed margin of error (10% = 0.1)

p = estimated proportion of population; proportion of nurses with adequate knowledge on oxygen therapy based on previous studies was 84% (Mayhob, 2018)

q = 1- p

q = 1- p (q = 1-p   Therefore q = 1-0.84 = 0.16)

Hence n = $\underline{(1.96)^2 (0.84) (0.16)}$ = $\underline{0.5163}$ = 52

                  $(0.1)^2$ 0.01

3.1.4 Data Collection Procedure

A structured questionnaire based on research objectives was to be developed for the purpose of data collection after reviewing relevant literature. Data would have been collected by the principal investigators. Questionnaires would have been used to solicit information on socio-

demographic data, common indications for supplementary oxygen delivery, knowledge of nurses on oxygen delivery devices and barriers affecting safe delivery of oxygen therapy. The questionnaires have both closed and open-ended questions. The questionnaire was to be issued to respondents after its purpose explained and their consent sought. Data collection technique refers to the actual means by which data are collected. The particular method chosen influence the quality of information obtained. The choice of data collection methods depends on several issues that include accessibility to respondents and their ability to read and write. It also follows that the construction of specific instruments and the actual administering of the instrument by field workers can either introduce or minimize bias (Derrett & Colhoun, 2011).

Questionnaires were intended to be used to collect the data, whereby the respondents would complete the instruments themselves. A questionnaire refers to a self – report instrument where the respondent writes his or her answers in response to printed questions on a document (Brink 2002). Structured questions including closed and open-ended questions were compiled (Polit et al 2001). The researcher distributes the questionnaires per hand to the respondents and collectes them back. The questionnaire administration would have targeted nurses who have worked for more than a year at the Korle Bu Teaching Hospital. Participants could read and write, hence would have been given the opportunity to answer the questionnaire themselves in an average time of 10 minutes per participants.

3.1.5 Validity and Reliability of the Research Instrument

The reliability of a measure refers to its stability, internal consistency, and equivalence (Polit & Beck, 2016). Validity refers to the degree to which a measuring instrument measures what it is supposed to measure (Polit & Beck, 2016).

To ensure reliability and validity for the study, the questionnaire would have been carefully designed to reflect the precise objective of the study. A pre-test would have been done using

10 respondents. The questionnaire would have been submitted to our supervisor for prove reading before final collection of data.

3.1.6 Ethical Considerations

Permission would have been sought from the in-charge of the various wards or units with an introductory letter from the Central University before conducting the research. Consent would have been taken from participants who intend to participate in the study. The questionnaire would have been designed to exclude the names of respondents thus, no reference would be made to any of them. This would have been done to ensure confidentiality.

Ethical issues such as the privacy of nurses and patients as well as their norms and values would have been respected in the study. The purpose of this study was to be made clear to all participants and confidentiality would have been maintained. An approval would have been obtained for the study to be done under authorization of the hospital in question. Respondents would have been assured of their anonymity, confidentiality and to remain autonomous and that means they would have had the right to withdraw from the data collection process whenever they felt like doing so. No nurse would have been influenced or coerced in the extraction of information and answering the questionnaires that would have been used in the data collection.

This project was not executed due to COVID19 but a critical review of the study objectives was done.

3.2 Most Relevant Variable

With reference to the above literature review, it is identified that the most relevant variable under the knowledge of nurses on administration of oxygen are work experience and one's educational background. Studies have revealed that nurses have inadequate knowledge

regarding oxygen therapy and the delivery devices despite their frequent use; that is level of exposure. (Rose, Heward, & McCabe, 2010; Mayhob, 2018). The level of knowledge of the nurses on oxygen therapy is known to have great impact on how appropriate the nurse will administer it to the patient. Under the practice, the most relevant variable is level of exposure. Assessment of nurses' knowledge on oxygen therapy mainly focus on indications of oxygen therapy, normal oxygen saturation and rate of respiration in adult. The guidelines from Western Australian Hospitals (Beasley et al., 2015), British Thoracic Society (O'Driscoll, Howard and Davison, 2011) and Allied Health provincial multi-disciplinary group (Alberta Health Services, 2016) stated that nurses should have the knowledge of oxygen therapy indications, normal oxygen saturation at different ages including normal respiration rates. A study among 50 nurses from different departments in Educational Hospitals in Cairo, Egypt found that only 24% of the respondents and 76% of them had adequate and inadequate level of knowledge regarding oxygen delivery devices and therapy respectively (Mayhob, 2018). According to Kavitha and Patil, (2015) there is a need to update the knowledge of staff nurses, and regular trainings should be integrated into their work schedule.

3.2.1 Relationship between relevant variables

Knowledge can be considered as the familiarity of the person with anyone or anything, including information, facts, descriptions, and / or qualifications that a person has acquired through experience or training (Chinenye, 2015:4-5). From the literature above, it is observed that there is usually lack of correlation between nurses' knowledge and appropriate use of the various oxygen delivery devices. A standardized report by the World Health Organization ((WHO), 2015) indicated that about 65% of nurses lacked knowledge on oxygen administration with Western and Eastern Africa leading with a cumulative 70% of poor knowledge on oxygen administration.

More information on how acute oxygen therapy is administrated are needed; nurses must understand the action and the related rational towards good practice.

3.3 Discussion of relationship in variables base on settings.

Globally, lack of sufficient knowledge and accurate oxygen administration together with sufficient familiarity with oxygen delivery devices is a barrier to safe administration of oxygen (Young & Kostalas, 2013). Patients with hypoxemia and hypoxia usually need oxygen to survive (Ahmadi et al., 2016). Without adequate oxygen, cells die and the body systems they support fail to function (Woodrow, 2016). Numerous studies found knowledge gap among nurses and other health personnel on oxygen administration such as Glenn, O'Connell, Considine, 2009; Ganeshan et al., 2006; Ogunlesi, Dedeke, Adekambi, Fetuga, & Okeneyi, 2008.

A study conducted in Chicago University Hospital in America by Kelly and Maden, (2015) indicated that about 6 out of every 10 deaths in the emergency ward was related to poor oxygen administration. However, the same study indicated that majority (85%) nurses had adequate knowledge on oxygen administration but the study could not correlate the respondents' knowledge with their practice as majority (95%) of the respondents did not attempt the question on practice and identification of the various oxygen delivery devices. This study correlates with a study at Birmingham Children's Hospital, Birmingham, UK among junior doctors and nurses which found that health professionals had significant knowledge gap regarding oxygen therapy despite their frequent use (Rose, Heward, & McCabe, 2010). The same study reported that there was a confusion regarding knowledge of maximum percentage of oxygen delivered by nasal cannula, bag mask ventilation and Ayre's T-piece (Rose, Heward, & McCabe, 2010). In addition, some erroneously stated nasal

cannula, face masks and head box were not suitable for spontaneously breathing patients (Rose, Heward, & McCabe, 2010).

A study among 30 staff nurses working in pediatric wards of selected hospitals in Vijaypur, India found that 42% of the nurses had poor knowledge on oxygen therapy and 58% scored average and none had excellent knowledge regarding oxygen therapy (Kavitha & Patil, 2015). A study at Konya, Turkey which involved 80 nurses found that nurses had adequate knowledge on some aspects of oxygen therapy, but they also had incomplete knowledge in some vital issues for oxygen therapy (Taş, Özkan, Ak, & Karayağız, 2017).

Similarly, in Africa, Ojigu, (2017) in a quantitative study in 3 selective west African countries (Senegal, Nigeria and Ghana) revealed that 75% of the nurses possess knowledge on oxygen administration with an inverse application of their knowledge as 61% of the respondents in that study could not frankly indicate the correct dose of oxygen they administered as well as the type of device used for their patients in the last 24 weeks in their respective units. With regards to a study at Elmek Nemir Hospital, Shendi, Sudan, among 60 nurses revealed that 78% of nurses could correctly identify the various oxygen delivery devices used in the administration of oxygen (Fath & Ahmed, 2016). In Nigeria for instance, a report by Alhassan and Ibrahim. (2018) showed that 55% of nurses in Abuja state hospital possessed sufficient knowledge on oxygen administration.

Conversely, a study conducted at Medpark International Hospial, Chisinau, Moldova revealed that 48.7% of nurses had adequate knowledge on oxygen therapy. This study correlates with a study among 50 nurses from different departments in Educational Hospital in Cairo, Egypt which found that only 24% of the respondents had adequate knowledge on oxygen therapy (Mayhob, 2018). In Ghana, a study conducted by Adipa, Aziato and Zakariah, (2015) on 'Qualitative exploration of nurses' perspectives on clinical oxygen

administration in Ghana', revealed that most of the respondents lack adequate knowledge on oxygen administration.

With regards to studies on barriers affecting the delivery of oxygen therapy, a study by Walters and Nadeem in Walsall Manor Hospital, United Kingdom found that insufficient training and education for medical and nursing staff hindered safe oxygen therapy administration (Walters & Nadeem, 2009). Similar finding was evident in study at Waikato District Hospital, Hamilton, New Zealand found that lack of understanding of the effects, role and dangers of oxygen therapy hindered affected safe administration of oxygen therapy (Holbourn & Wong, 2014). A study at Nazareth Hospital in Kenya by Masounda, (2015) revealed that lack of training on oxygen therapy hindered safe administration of Oxygen. Same was also revealed in a study conducted by Adipa, et al., (2015) on 'Qualitative exploration of nurses' perspectives on clinical oxygen administration in Ghana', at Korle bu Teaching Hospital, Accra, Ghana.

From personal experience at Korle Bu Teaching Hospital, it is observed that most nurses possess adequate knowledge on oxygen therapy but with incongruent application of their knowledge. Subjective report revealed that most nurses find it difficult to initiate oxygen therapy for patients, even in critical condition due to lack of a clear guidelines and protocol for oxygen administration in Korle- Bu Teaching Hospital.

In Korle- Bu Teaching Hospital, oxygen is supplied mainly with cylinders as the wall or pipe supply is not reliable. Nurses usually need help to convey oxygen cylinders from one point to the other and also in changing the flow meters when the oxygen gets finished. Technicians who normally help spend 10 to 20 minutes to come to the ward to change the flow meter when needed. These delays also hinder the prompt and proper administration of oxygen.

It was observed from the reviewed literature that those in advanced countries had better education, good exposure and so possessed sufficient knowledge and skills on oxygen

therapy inversely, those from developing countries with little oxygen therapy devices and limited protocols had limited knowledge and practice of same.

3.4 Summary and conclusion

Oxygen is one of the most common drugs used in the care of patients in the hospital (Kavitha & Patil, 2015). It is an atmospheric gas necessary for survival of all living organism and it is denoted by letter O_2 (Cataletto, 2011; Mahmoud, Alseed, Awad, Ahmed, & Elhussein, 2016). The prescription, assessment, and monitoring of patients are necessary components for effective administration of oxygen. The inappropriate use of oxygen leads to deleterious complications; hence, appropriate steps should be taken to curb these (Adipa et al., 2015). Ensuring that oxygen is administered in a timely and appropriate manner, using the right device is an important aspect of patient care. Selecting the right device can be difficult as there are a variety to choose from and a lack of practical information on selection (Uwinezadidi, 2017). The findings from present studies reported that a good number of respondents demonstrate the low level of knowledge towards oxygen administration (Young & Kostalas, 2013). The findings from the various studies have various positive implications towards nursing profession in our country, region and the world. They will contribute to institutionalize and improve oxygen therapy education and related trainings to affordable positive attitudes and oxygen administration practices (Uwinezadidi, 2017).

In conclusion, oxygen is a vital drug, and its prescription, assessment, and monitoring of patients are very necessary components of effective administration of the oxygen. There is a clear evidence of knowledge and practice gap among nurses globally on oxygen therapy. The possible barriers to safe oxygen administration were also identified to include; lack or insufficient training of nursing staff on oxygen therapy, no clear guidelines on oxygen administration and inadequate oxygen supply.

3.5 Recommendations

In reference to the various studies reviewed in the literature, the following recommendations should be considered;

    i.   Hospitals should organize regular training courses, workshops and continuous educational programs on oxygen therapy for its nurses and include the nursing role and responsibility in oxygen administration in the training programs, especially units with critical patients to ensure standards in nursing care on oxygen administration by nurses in their working places.

    ii.   It is recommended that there should be a development of a clear national oxygen therapy guideline. This guideline will help direct not only nurses, but also other health personnel, on how to practice safe oxygen administration. This will go a long way to help do away with numerous preventable deaths that usually occur in various hospital as a result of poor or inappropriate oxygen administration.

    iii.   There should be constant supply of adequate oxygen across various hospitals in the country. The constant supply of oxygen will make it easier for nurses to promptly initiate and sustain oxygen therapy for patients in need of oxygen. This will also help do away with numerous preventable deaths that usually occur due to lack of oxygen supply in our various hospitals. In addition to the constant supply of oxygen, there should also be adequate supply of all forms of oxygen delivery devices in order to administer oxygen appropriately. Thus, the KBTH or the Ministry of Health or Ghana Health Service should solicit other avenues for funding oxygen therapy devices to minimize challenges associated with oxygen therapy.

iv. Despite the plethora of studies on oxygen administration globally, less or no studies has been conducted in various hospitals on the knowledge and practice of nurses on oxygen therapy in Ghana. It is recommended that the government or other corporate bodies in the country should support researchers by funding their studies in such areas involving a large sample for appropriate generalization of findings. The results from the pool of studies conducted will have some implications for nursing practice, nursing education, and research. Thus, it can inform curriculum review to address the identified gaps in knowledge and skills towards oxygen therapy. The findings in these researches will contribute more in terms of references towards further researches related to the oxygen administration that could be conducted in other sites especially in referral hospitals and district hospitals in general.

v. Last but not least, for proper evaluation of nurses' practice on oxygen therapy, there should be the need for nurses to improve documentation of care. Nurses require enhancement of skills to document effectively. Appropriate sanctions could be instituted to ensure that nurses comply with documentation policies or protocols developed for oxygen therapy.

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