



**KNOWLEDGE, ATTITUDES AND PRACTICE
AMONG NURSES TOWARD OXYGEN
ADMINISTRATION TO THE CRITICALLY
ILL PATIENTS AT UTHK**

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Supervisor: Mrs. Christine UFASHINGABIRE

June 12th 2017

DECLARATION

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DECLARATION AND AUTHORITY TO SUBMIT THE DISSERTATION

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**KNOWLEDGE, ATTITUDES AND PRACTICE OF NURSES TOWARD OXYGEN
ADMINISTRATION TO THE CRITICALLY ILL PATIENTS AT UTHK**

a. Declaration by the Student

I do hereby declare that this *dissertation* submitted in partial fulfillment of the requirements for the degree of **MASTERS OF SCIENCE** in **NURSING**, at the University of Rwanda/College of Medicine and Health Sciences, is my original work and has not previously been submitted elsewhere. Also, I do declare that a complete list of references is provided indicating all the sources of information quoted or cited.

Date and Signature of the Student

JUNE 12th 2017

b. Authority to Submit the dissertation

Surname and First Name of the Supervisor: **Mrs. Christine UFASHINGABIRE** in my capacity as a supervisor, I do hereby authorize the student to submit his/her dissertation.

Date and Signature of the Supervisor/Co-Supervisor

JUNE 12th 2017

DEDICATION

I dedicate this work to my husband NIYONSENGA Valere who has encouraged me along the way from the starting to the end. To my children GATONI Laura Thania, GATAKO Happy Amelia and GABIRO Gabriel Marie, who have been in different way affected by this work.

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ABSTRACT

Objective: To assess knowledge, attitudes and practice of nurses toward oxygen administration to the critically ill patients at University Teaching Hospital of Kigali

Methods: The study was carried out at University Teaching Hospital of Kigali (UTHK known as CHUK) in ICU and Emergency units. UTHK is Rwandan Referral Hospital located in Kigali City, Nyarugenge District. The target population was professional nurses working at the Emergency and ICU units at UTHK. The researcher used questionnaire which is adapted from previous similar study. The questionnaire was developed from research conducted at Addisababa by LEMMA (2015).A questionnaire was distributed to consenting nurses for completion. Dependent variables were knowledge attitude and practice. Independent variables were Sex, age, level of education, marital status and working experience. The data was analyzed using SPSS 20. Level of knowledge was grouped according to Bloom's original cut-off points into good (80-100%), moderate (60-79%) and poor (< 60%). A quantitative descriptive method was chosen because it was enabled the researcher to collect numerical data and perform quantitative analysis.

Aims: This study aims to identify the knowledge, attitude, practical skills and related gap among nurses on oxygen therapy at Emergency and ICU units at UTHK.

Results: Out of the 65 Nurses who responded, 73.8 % had a level of knowledge classifiable as poor, 21.1% moderate and 3.1% good. The mean score of level of knowledge, participants in this study was 87.7%. Standard deviation was 19.3 and there is significant relation between the education level and nursing practices during administration of oxygen (p value= 0.033). The participants showed lower levels of knowledge in different subject matters. Only 26.2 % give the right answer about oxygen indications, 50.8 % gave the correct answer about normal range of oxygen saturation and 27.7 % responded correctly questions related to the physiology of respiratory system. The attitudes of participants in the various subject areas raised were moderate on 63.1%, and practice also was moderate on 46.2%.

Conclusion: The participants had poor level of knowledge of oxygen administration. However their attitude and practice was generally moderate. Their knowledge could be boosted with regular continuous nursing education on oxygen administration.

Key words: Knowledge, attitude, practice, oxygen administration, critical ill patients.

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LIST OF ACRONYMS AND ABBREVIATIONS

ABG:	Arterial Blood Gas
ANOVA	Analyze of Variance
BP:	Blood Pressure
COPD:	Chronic Obstructive Pulmonary Disease
COT:	Conservative oxygen therapy
ED	Emergency Department
HDU:	High Dependent Unit
IASP:	International Association for the Study of Pain
ICU:	Intensive Care Unit
KAP:	Knowledge, Attitude, Practice
O ₂ :	Oxygen
OT:	Oxygen Therapy
PaCO ₂ :	The partial pressure of CO ₂ in the blood.
PR:	Pulse Rate
PaO ₂ :	The partial pressure of oxygen in the blood.
ROS:	Reactive oxygen
SaO ₂ :	Arterial oxygen saturation measured from blood specimen.
SpO ₂ :	Arterial oxygen saturation measured via pulse ox meter.
SPSS:	Statistical Package for Social Science
SD	Standard Deviation
UTHK:	University Teaching Hospital of Kigali
WHO	World Health Organization

CHAPTER1. INTRODUCTION

1.1. INTRODUCTION

Oxygen (O₂) is an essential for almost all of earth's organisms. In the clinical location, O₂ is used as a treatment for various pathophysiological conditions such as pneumonia, heart failure and hemorrhagic shock (HS). While O₂ administration is helpful, too much can be harmful. Antioxidants appear naturally in the body and are used to prevent damage caused by free radicals O₂ toxicity(Knight, Fry, Clancy, & Pierce, 2011:1)

Supplemental oxygen help to prevent hypoxemia problems; once improperly administered, the patient can come across the risk of hypoxemia, respiratory dysfunction even death. (Eastwood, Reade, Considine, & Bellomo, 2012:2)

Oxygen therapy is a one of treatment used to manage tissue hypoxia. This increases the amount of oxygen and enables continued breathing. Nurses do a lot work as far as this concerned , the failure of nurses to give oxygen to the critical ill patient may result in patient complication such as cardiac arrest even death. If the oxygen is given out in a proper and professional way, it saves lives and equally dangerous if not administered professionally to the extent that it can even cause death.

Oxygen administration of critically ill patients is one of the most important aspects of patient care and will be effective on basis to the core responsibility of the nurse to take care of patient comfort. In such way, required knowledge, good practice and positive attitudes about oxygen administration are key elements towards that aspect of care. This enables them to assess patients' condition and deliver individualized care to each patient in order to improve quality of life of the patient, prevent hypoxemia and acute lung injury (Baker, 2009, p. 145).

In emergency situation patient must not refuse oxygen therapy and special care for the patients in critical situation such as cardiac and/or respiratory arrest guidelines for Basic & Advanced Life Support is to be applied. According to Annika, the supplemental oxygen is a key point in clinical

conditions management(Annika , N. Scriven, 2011:3); and for any suspected hypoxia patient, oxygen therapy should immediately be initiated without waiting for medical prescription due to the emergency faced to.(The American National Red Cross, 2011, p. 3), however, a medical prescription report, and adequate monitoring from the nurses are necessary, because oxygen is a drug among others, and the monitoring system well administered make a point in the healthcare professional's activity.

BABU, in his study done in pediatric department suggest selecting mode of delivery must be based on the concentration needed, and give an example of two various methods; Mask and Nasal cannula, were mask delivers higher oxygen concentration than cannula(BABU, 2008:2).

During oxygen administration nurse must ensure that if supplemental oxygen is timely and appropriately given. Careful administration of O₂, coupled with an awareness of the positive and negative effects assists nurses to perform well without damaging patient cellular.(Constantin, Tonnelier, Pierrot, & Mathonnet, 2015:3).

In the study conducted by Lemma, contribution to the oxygen monitoring and administration comes to highlight the role of well trained staff and the good delivery system which implies delivery device flow rates, drug chart etc. in order to keep the target level.(Lemma, 2015:12)

In many critical circumstances, such as critical illness, long-lasting pathology, oxygen delivery should be optimized to prevent harmful effects of hypoxemia.

This study aims to identify the knowledge, attitudes, practical skills and related gap among nurses on oxygen therapy at Emergency and ICU units at UTHK.

1.2. Background to the Study

Supplemental oxygen is a life saving treatment in emergency conditions and is commonly used as a therapeutic agent in emergency and ICU departments at UTHK. Without additional oxygen treatment, many patients cannot survive (Alberta Health Services, 2016:4)

Patients whose blood exchange is severely impaired may require high inspiratory oxygen concentration. In these situations, a non-rebreathe mask is generally used and requires oxygen flows up to up to 12-15 l / min , whereas other patients suffering from hypoxia, oxygen flow rate is between 2 and 10 l / min by nasal prongs.(Lemma, 2015:11)

Maintenance of adequate oxygen supply to vital organs often requires the additional administration of oxygen, occasionally at high levels. Even if oxygen therapy is lifesaving, it can together be associated with adverse special effects when given for long periods at high concentration. According to Browne & Crocker; Oxygen should be administered to achieve a target saturation of 94-98% for most critically ill patients or 88-92% for those at risk of respiratory insufficiency of hypercapnia. (Browne & Crocker, 2013:4)

The rationale to prescribe Oxygen therapy is to improve the oxygen supply and reduce respiratory work. Theories regarding unfavorable effects of hypoxemia and the positive impact of oxygen treatment have been developed and it has been argued that many years ago, (Lemma, 2015:1).

Oxygen has an effect on the lung tissue. A high concentration of oxygen could make changes in the lung that causes oxygen toxicity. Production of surfactant is affected by high concentration of oxygen which in turn collapses alveoli. Therefore, these alveoli decrease gas exchange. The critical care nurse must monitor the oxygen treatment and reducing supplemental oxygen as soon as possible to avoid such risks. (Lemma, 2015:2).

The target saturation must be tagged in drug chart. Oxygen should be administered by a professionally trained nurse (Williams et al, 2013: 6).

Nurses Staff must use appropriate devices and flows to reach the target of saturation, and record on patient monitoring chart, Oxygen saturation and the delivery system. Oxygen supply delivery and flow rates must be adjusted to maintain oxygen saturation in the target range.

Oxygen therapy is common in intensive care and emergency treatment, but some gaps are identified; According to Lemma , the supply of oxygen and flow rates are particularly poor, with a negative potential impact on patient care where we can see too little oxygen in an emergencies with high flow systems , those lead to CO2 retention.(Lemma, 2015:2).

Given the fact that the decisions of nurses in oxygen administration is very important and may impact patient outcomes, critical care nurses must be equipped by knowledge, good attitude in the oxygen administration practices of critical ill patient, Eastwood et al gives an example of Australian nurse's knowledge of the oxygen therapy practices were intensive care is sometimes missing.(Eastwood, O'Connell and Considine, 2011)

Many researchers argue that in developing countries, the staff is not well trained in caring for critically ill patients, leading to a lack of knowledge of critical care principles and that cause a barrier to quality care.(Baker, 2009:146)A need to update the knowledge of staff nurses, training as needed is essential and should be integrated into their work schedule regularly (Kavitha and Patil, 2015:4)

Emergency medicine care in Rwanda include nursing, is among challenges for the continued growth of facility specific and Mbanjumucyo (2015) state that Still Emergency Medicine is being an emerging field in country. First trainees in Emergency Medicine in Rwanda, play a vital role in the system of Emergency care implementation. Emergency medicine and development of appropriate training and emergency response systems of first medical resources (Mbanjumucyo *et al.*, 2015:2-4).

Also the main causes of mortality in Rwanda include complications of HIV / AIDS and related opportunistic infections, severe malaria, lung infections and injuries, and these are managed in most of time with emergency department and if there is complications which put the patient in critical condition it will be transferred in intensive care department. However, according to

Bahati et al, personal health care resources are significantly rare, and there are no labor force trained in emergency medicine. (Bahati *et al.*, 2013:103).

Rwanda is making progress toward attaining of sustainable development Goal (SDG). But there are serious deficiencies in term of education. Access to education has expanded rapidly. Nurses have different levels of education; some are trained at secondary school, others have an advanced certificate in nursing obtained after 3 years of nursing school and there are other nurses who have a bachelor's degree in nursing. Currently, trained nurses at the level of secondary school represent the small number according to others. Actually, there is no precise plan to develop nursing specialists in emergency care, but there are efforts to provide additional training for general practice nurses working in emergency department, mainly in referral hospitals .In the study conducted, by Bahati and Binagwaho, (Bahati *et al.*, 2013:108)explain the challenge in Rwanda health sector, according to her, while nursing career has developed by shifting activity for many clinical decisions and activities to nurses an insistent absence of adequately qualified health professionals, poses a major obstacle to increasing the availability and quality of specialized care. (Binagwaho et al. 2013:2054)

1.3. Problem Statement

Based on theoretical gaps and on the fact that there is, on my knowledge, no research related to oxygen therapy or related knowledge, attitude and practice of nurses for oxygen administration in critical ill patients in our country, the idea comes out to conduct the research related to the interest to this topic coupled with my experience in critical care field and own observation.

I have 8 years' experience working as nurse in “Service d’Aide Medical d’Urgence” (SAMU)where the pre-hospital care service ,with a paramedical system consisting in giving first aid on scene and monitored transportation with ambulance equipped with materiel for Basic Life Support and Advanced Life Support, towards an appropriate health facility is our main activity. According to our pres-hospital emergency protocol, every critical ill patient whose saturation of oxygen is under 95% measured using oxymeter; must receive oxygen, typically with a goal of reversing hypoxemia.

Most of time, those critical ill patients are transported to UTHK emergency services on our portable oxygen's cylinders, patients are no longer on oxygen treatment until medical prescription is done due to triage and internal management system. It is a good practice to provide the critical ill patient in emergency condition with oxygen regardless the medical written prescription (Browne & Crocker, 2013:3).

Harding et al. (2015) suggests that highly qualified clinicians should evaluate all critically ill patients by measuring pulse, blood pressure, respiratory rate, and assessing circulating blood volume, ABG and anemia (Harding et al., 2015:3) but in emergency department the use of ABG is not their practice and remembers that using Pulse oximetry has practical limitation like peripheral vasoconstriction (in case of hypothermia, cardiac failure, and fluid loss), intense ambient light, patient motion, and fitting etc.

Regarding oxygen dispensing method, in the research done by Elmak Nimir university hospital, the result showed (58%) based on doctor order selection of appropriate oxygen delivery device (20%) of nurses know based on pO_2 , 10% based on guideline, and 12% patient condition (Mahmoud *et al.*, 2016) at UTHK, nurses only use face mask as high flow systems and I am wondering whether nurses know how important it is to choose different deliveries specific and constant percent of oxygen depending of patient's breathing. The reliable proof suggested that choice of the oxygen supply device, patient, nurse and contextual characteristics impact individually and in combination on the actual nurses manage oxygen therapy (Eastwood, 2012, pp. 40–44).

The last not least practical concern is the procedure were all humidification bottles for O_2 the critical ill patients that receive oxygen using high flow system in UTHK emergency unit and ICU are empty while insurance of humidification attached on device and add water vapor to inspired air is required because O_2 is a dry gas that dehydrates respiratory mucous membrane. Apart from this practice, in both units of the study, there were no protocols to guide oxygen therapy. Therefore, nurses have used prior knowledge to administer oxygen.

1.4. The aim of the study

This study aims to assess the knowledge, attitude, skills among nurses on oxygen therapy at Emergency and ICU units at UTHK.

1.5. Research objectives (General objectives and specific objectives)

a) General objectives

The core objective of the project study is to ascertain and assess knowledge, attitude and practice of nurses about oxygen therapy in intensive care and emergency departments for critically ill patients at UTHK.

b) Specific objectives

- 1) To assess nurses' knowledge on oxygen therapy
- 2) To identify and evaluate nurses' attitude and practices about oxygen therapy
- 3) To identify factors associated with KAP of nurses on oxygen therapy.

1.6. Research Questions

As per the scope of this study, the research questionnaire will focus on the following main points taking CHUK Hospital in ICU and Emergency Unit:

1. What is the level of knowledge related to oxygen administration in caring for critically ill patients?
2. What are the nurses' attitude and practice on oxygen administration to the critically ill patients?
3. What are factors associated with KAP of nurses on oxygen therapy?

1.7. Significance of the study

Achievement of positive outcome of condition for critically ill patients in terms of quality of healthcare, there is a need to consider the level of education and practical skills of the nurses. The barriers which can lead to poor practice related to oxygen administration should also be considered. Hence, the strategies to improve the level of education and practice of oxygen

administration by nurses will be developed and evaluated eventually. This will prevent patients' tissues damage that can occur from inappropriate oxygen administration through improved nursing practice. Approaches to strengthen good practice and to mitigate identified barriers will be a concern to this study.

This research was helped the student to assess also the major gap among nurses on oxygen therapy at emergency and ICU departments of UTHK best practice that could, possibly, be related to the inconsistency in use of globally accepted oxygen therapy standards coupled with lack of sustainable training on oxygen administration. This assessment will be based on discussions and possible solutions will also be identified.

1.8. Definition of Concepts

Attitude: Attitude is positive or negative reaction of health professionals towards patient's intheir beliefs, feelings, or intended behaviour. Individuals' behaviours are influenced by their feelings (affective) and beliefs (cognitive).(Rutto, 2011)

Critically ill patient: Patients in acute and critical care nursing practice include those whoneed for care is acute in nature and whose current condition could be classified as critical, but also those with complex, chronic diagnoses (and their families) across the continuum of care.(Bell, 2015)

Knowledge: Is facts, information and skills acquired through experience or education; the theoretical or practical understanding of a subject.

Oxygen: Oxygen is an unscented, monochrome and tasteless gas that constitutes one fifth of the earth's atmosphere and is essential to living organisms. Oxygen is also a medical intervention in the prevention and treatment of hypoxia.(Alberta Health Services, 2016:2)

Practice: Is actual application or use of an idea, belief, or method, as opposed to theories relating to it.

NURSES: Licensed health-care professional skilled in promoting and maintaining health, who can practice independently or is supervised by a physician, and are able to initiate oxygen if patients breach expected normal parameters of oxygen saturation.

CHAPTER2. LITERATURE REVIEW

2.1. Introduction

In health care services, the nurses play a very remarkable role. Ajani suggests that a nurse has to be updated with current knowledge and practice to make powerful nursing practice still beyond basic knowledge and fundamental ability (Ajani and Moez, 2011:5). Implication connection between knowledge attitude and practice on oxygen administration are showed by some studies, for example, there is insignificant relationship of $P (0.70)$ nurses knowledge about the indication at oxygen, and half of nurses (50%) know hypoxemia as an indication of oxygen therapy, which may due to poor knowledge of the other indication of oxygen therapy. (Mahmoud *et al.*, 2016:34)

2.2. Oxygen dimension overview

Oxygen is an indispensable element of life; its 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. Also oxygen therapy is highly specialized and its prescription must be tailored on an individual basis. Health care professionals, especially nurses most often use oxygen therapy empirically without sufficient knowledge of its indications, dosage, side effects and toxicity. Oxygen therapy is a nursing procedure where specific medical orders should be given in order to minimize side effects to patients.

The Oxygen is not something new in our life, the presence of “air” is vital for human being survival. It has been documented in the ancient Greek as well as in Vedic Hindu literature more than 2000 years ago, known as an atmospheric gas necessary for survival of all living things; denoted by letter O₂. (Mahmoud *et al.*, 2016a) It was only in the 18th century that gas was

isolated by Joseph Priestley and its significance in respiratory physiology was described by Antoine Lavoisier (Fath and Ahmed, 2016).

The problems of oxygen deficiency as well as the need and indications for oxygen therapy were subsequently recognized. Soon, oxygen came to be known as a 'cure all' medicine used for conditions varying from cholera, arthritis, anemia and syphilis to glaucoma, epilepsy, diabetes and cancers. It was around second decade of the twentieth century and later that the oxygen therapy was adopted for indications based on firm scientific foundations.(Jindal, 2008)

Oxygen therapy is the term used for the clinical supplemental oxygen. It is indicated to patients with acute hypoxemia. It is one of the most common drugs used in secondary care in hospital. It is also, an essential component of resuscitation, acute medical care, basic life support, anesthesia and postoperative care (Goharani *et al.*, 2017) and it is considered as an important drug required for the management of hypoxaemia; (PaO₂ less than 60 mm Hg or SaO₂ less than 90%) and for those with symptoms of chronic hypoxemia or increased cardiopulmonary workload, the reason why, it is given to any patient with suspected or known tissue hypoxia and several other diseases characterized by hypoxic conditions; such as large number of pulmonary and non-pulmonary diseases for its definitive, supplementary or palliative role.(Goharani *et al.*, 2017)

Hypoxia is a major determinant of morbidity and mortality in critically ill patients. Adequate oxygenation and tissue perfusion are vital to survival. Many disease processes can produce hypoxemia. In the acute care setting, the most common mechanism for hypoxemia is ventilation-perfusion mismatch. Failure to correct significant hypoxaemia may result in cardiac arrest, the need for mechanical ventilation mechanisms of hypoventilation, right to left shunt, and diffusion abnormality or death. Preventing hypoxaemia and maintaining optimal blood oxygen concentrations (oxygen saturation \geq 95%) reduces the likelihood a patient suffering a respiratory-related adverse event. Eastwood insist on fundamental aspect of patient care based on, administering supplemental oxygen in a timely and appropriate manner (Eastwood *et al.*, 2009).

Administration of oxygen is a medical intervention which can be used for a variety of medical conditions to achieve adequate tissue oxygenation, and there are no absolute contraindications to oxygen therapy. If indications are judged to be present, assessment of need for oxygen in most

instances, is for nursing responsibility (Annika and Scriven, 2011). But it is required to use guidelines and protocols for appropriate oxygen therapy because it has been shown that use of protocols for oxygen therapy in hospital wards can be very helpful in reducing errors during this process because some studies reveal that doctors and nurses frequently prescribe oxygen improperly and without adequate supervision (Goharani *et al.*, 2017)

2.3. THEORETICAL LITERATURE

INTRODUCTION

Knowledge, attitudes and practices are key theoretical concepts used in this study as depicted in the conceptual framework which provides an abstract for the assessment of knowledge, attitudes and practices of nurses towards oxygen administration for critical patients.

According to Bell(Bell, 2015), nurses need high-quality training to develop and maintain the knowledge and skills needed to provide the level of care that those critical ill patients need, which can be difficult to integrate into the nurse's daily activities coupled with material resources management, time, responsibility and patient care while maintaining the patients' health care complications of monitoring.

The scope of this study focused on the knowledge and practices related to the administration of oxygen for critically ill patients care. Arguments are developed to confirm that Knowledge of oxygen promotes good health practices, improve the well-being and required care. On the other hand, lack of proper knowledge of oxygen can affect health practices and may damage the patient health.

2.3.1 Theory of knowledge of nurses on oxygen administration

Personal knowledge refers to the culture, attitude, awareness and personnel behavior of nurses themselves as well as patients. Personal knowledge is subjective and promotes the personal integrity and commitment rather than laissez-faire, is an essential element of professionalism. Personal knowledge integrates experience and knowhow and encourages self-determination in

practice. Personal maturity and freedom are the straightforward elements of individual knowledge; this may include spiritual and metaphysical forms. Knowledge as the part of clinical learning, a nurse can learn a common behavior and qualitative characteristics throughout the environment she/he works in. In this way, evaluations differ according to specific historical knowledge (Mantzorou and Mastrogiannis, 2011:259).

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. It can also be considered as the theoretical or practical understanding of a subject matter (e.g trauma and emergency). However, there is no consensus on the definition of knowledge, and there are many theories about it (Chinenye, 2015:4-5).

The concept of knowledge explains oxygen administration to the critical ill patients and related myths. Kavitha and Patil throughout their study, conclude that there is a need to update the knowledge of staff nurses, and regular trainings should be integrated into their work schedule (Kavitha and Patil, 2015, p. 4).

Earlier studies had evaluated the use of oxygen at hospitals in other countries. In the study conducted in 2006 by Ganeshan et al., knowledge of 53 nurses and 40 doctors that worked in intensive care unit of the General Hospital in UK and were active in oxygen prescription, was evaluated. 25% of the physicians and 50% of the nurses could not prescribe the right dose and method of oxygen therapy in cardio respiratory arrest cases. They concluded that doctors and nurses did not have sufficient knowledge and understanding of oxygen therapy. In a similar study, Brokalaki et al. assessed the knowledge of oxygen therapy in seven hospitals in a major city of Greece, in 2004 (Goharani *et al.*, 2017) the findings showed that the familiarity level of participants with some aspects of O₂ therapy such as its indications, necessary measurements and monitoring during therapy, and identifying delivery devices was on moderate level (<80%). Rounding together the findings above, the need to update the knowledge of staff nurses through trainings and workshops, the need to improve training and other practical abilities up to be incorporated in the regular working schedules is very important. According to Kavitha et al, the refreshment of knowledge with systematical organized programs is helpful to exercising the profession as a nurse (Kavitha and Patil, 2015).

I. 2.3.2 Attitude of nurses toward oxygen administration

The term attitude can be referred as the act or manner of doing something, performance or action to balance theory and practice, (Ajani and Moez, 2011:3927).

The term is generally used to refer to general feelings of a person on a subject, object or person. In this study attitudes are closely related to knowledge, beliefs, emotions and human values, and they could be positive in other words described as causal attitudes or incorrect attitudes.

A previous study directly described intensive care clinician's attitudes to the introduction of COT for mechanically ventilated adult patients. In 2013, Eastwood et al., in their survey questionnaire of 90 intensive care clinicians in an Australian ICU, identified considerable consistency in the attitudes and stated practices in relation to COT. The key findings of this Australian study were that clinicians were strongly concerned about oxygen related lung injury, and reported that COT was easy to perform, and that further research should be conducted to show no harm was being caused as a result of COT (Fathi *et al.*, 2015).

Attitudes will be illustrated to the extent of accord and outcome expectancies nurses have towards oxygen administration to the critical ill patients, their level of motivation and perceived self-efficacy. Attitudes fall into the second part of a standard evaluation of KAP where most studies try to divert that field, maybe, being afraid of related harming risks to generalize the opinions and attitudes to a particular group people. Even if the tends to embarrass that subject matter, some respondents try to be fair by giving modest answers, answers that they believe are acceptable or generally appreciated, not to say that they are practically on top of their answers.

II. 2.3.3 Practice of nurses toward oxygen administration

Practices are the third and integral part of the KAP study. Concepts usually involve the use of different techniques and options. Practices are often used to plan activities to behavior change

based on the false hypothesis that there is a relationship between knowledge and attitude. In oxygen administration, ensuring the correct patient, correct rate, good device, and the correct connection to a source of oxygen is very important. It also includes factors related to the health system, individuals and other resources such as human resources trained in intensive an emergency care, the presence of protocols and guidelines, assessment and management priorities hypoxia by the ICU, emergencies team and required material. Practices included actual actions used towards oxygen administration to the critical ill patients as well as the feasibility of caring the adult critical ill patients with hypoxia.

Blake in his research (Blake, 2011), explained that nurses should have to be skilled on the best practices in order to avoid many practical gaps that lead to poor outcomes for patients like pulse oximetry, humidification attachment, use of different oxygen devices to save the life of many emergency patients. Cousins, Wark and McDonald using suggestion of Pilcher and Beasley state that there is a rooted and routine administration of blind to the high-oxygen administration for acute patients, patients in hospitals received either oxygen or no additional oxygen at broadband (Cousins, Wark and McDonald, 2016, pp. 6–7).

The administration of oxygen must start by assessing patients for oxygen therapy. The initial needs assessment for oxygen therapy is made clinically, considering what we can see when we evaluate the patient, lab findings, and what we can observe about the underlying disease process. Annika show the Nurses' responsibility on oxygen administration where must pay particular attention to three systems when addressing the potential need for oxygen therapy. Typically, we jump to the respiratory system and look for respiratory signs and symptoms, which may include alteration in rate (tachypnea, bradypnea, or apnea) or depth of respiration (hypopnea), difficulty breathing (dyspnea), and changes in color (pallor or cyanosis). (Annika and Scriven, 2011) add explain more, neurologic signs and symptoms, as well as cardiac response, can provide important clues that will help direct nurses search for hypoxemia.

Examples for changes in neurologic status associated with hypoxemia can range from irritability and changes in level of alertness in acute settings to complaints of chronic headaches in patients with long-standing hypoxemia.

Oxygen should be prescribed on the drug chart designed to assist prescription and administration to achieve the appropriate target saturation of 94-98% for most acutely unwell patients or 88-92% for those at risk of hypercapnic respiratory failure. More information on how acute oxygen therapy is administered are needed; nurses must be understand the action and the related rational towards good practice.

Table 1: Administering the oxygen therapy(Annika and Scriven, 2011)

ACTION	RATIONALE
1. Ensure patency of airway	To promote effective oxygenation
2. The type of delivery system used will depend on the needs and comfort of the patient. It is the nurse's role to assess the patient and use the prescribed system.	To provide accurate oxygen delivery to the patient. Most stable patients prefer nasal cannulae to masks
3. Ensure oxygen is prescribed on prescription chart. In some situation protocol may be in place to allow designated nurses to administer oxygen. In these cases the doctor must review the patient's condition within the stated time and prescribe oxygen accordingly.	To ensure a complete record is maintained and expedite patient treatment. The exception to this action would be during an emergency situation where the resuscitation guideline should be followed.
4. Ensure that the oxygen dose is clearly indicated. If nasal cannula or reservoir masks are being used	In accordance with the administration of medicines policy.

check that the flow rate is clearly indicated.	
5. Inform patient and or relative/ carer of the combustibility of oxygen	Oxygen supports combustion therefore there is always a danger of fire when oxygen is being used.
6. Show and explain the oxygen delivery system to the patient. Give the patient the information sheet about oxygen.	To obtain consent and cooperation
7. Assemble the oxygen delivery system carefully as shown in Appendix (h).	To ensure oxygen is given as prescribed
8. Attach oxygen delivery system to oxygen source.	To ensure oxygen supply is ready
9. Attach oxygen delivery system to patient according to manufacturer's instructions.	For oxygen to be administered to patient
10. Turn on oxygen flow in accordance with prescription and manufacturers instruction.	To administer correct % of oxygen.
11. Ensure patient has either a drink or a mouthwash within reach.	To prevent drying of the oral mucosa.
12. Clean oxygen mask as required with general purpose detergent and dry thoroughly needed. Discard system after use.	To minimize risk of infection (Single patient device)

Once the target saturation has been identified and prescribed, guidance regarding the most appropriate delivery system to reach and maintain the prescribed saturation is provided for those

administering oxygen. Low-flow oxygen therapy devices are commonly used to provide supplemental oxygen to patients. Those who receive oxygen via a low-flow device typically have minimal respiratory distress and can maintain adequate ventilatory patterns. Although there is little recent published work, researchers have evaluated the effectiveness of low-flow oxygen therapy devices in terms of satisfactory blood oxygen concentrations, usually measured by pulse oximetry (SpO₂), or arterial blood gas analysis (ABG). Some earlier researchers have described patterns of supplemental oxygen use or the impact of device factors, such as size, shape and fit on oxygen delivery and patient oxygenation; for instance, poor face mask fit can decrease the fraction of inspired oxygen (FiO₂). The studies that have been conducted on oxygen delivery devices have generally assessed device comfort or device preference. Device comfort has a direct impact on patient acceptance of oxygen therapy. An uncomfortable device may lead to increased interruptions to the therapy and increased episodes of hypoxaemia and this places the patient at risk of dyspnoea, altered or deteriorating mental state and respiratory arrest. (Eastwood *et al.*, 2009)

For better management of patient who need oxygen therapy, nurses must be well familiar with good practice and should be familiar with the performance characteristics of all of the patient care equipment choosing the right delivery system using the three P approach (Purpose, Patient, and Performance). From a practical point of view, there are two types of delivery systems: patients who are breathing on their own and can protect their airways and unconsciousness patients who need respiratory support.

The commonly used devices are nasal cannula, simple face mask, partial rebreathing, non-rebreathing mask and air entrainment mask.

The nasal cannula is a comfortable delivery system for patients. It doesn't interfere with talking or eating and comes in sizes appropriate for all age groups. It can deliver FiO₂ levels of 0.24 to 0.40 with flow rates up to 8 L/minute in adults. We have to remember that the amount of oxygen delivery may vary according to inspiratory time and rate and depth of respiration. The rule of thumb is that for each liter of oxygen provided, the FiO₂ should increase by approximately 4%.

The simple face mask is more cumbersome. Some patients complain of feeling claustrophobic with masks, and they must be removed before meals. For these reasons, it is used for short-term oxygen delivery. Simple face masks can provide FiO₂ levels between 0.35 and 0.50. Attention is needed for patients with chronic obstructive pulmonary disease (COPD) and carbon dioxide (CO₂) retention. Low flow rates can cause rebreathing and increased levels of CO₂.

The partial rebreathing mask can provide oxygen supplementation between 40% and 70%, with variable stability. This bag requires a minimum flow of 10 L/minute to prevent bag collapse on inspiration and make sure that the bag is inflated in order to prevent suffocation hazard.

The no rebreathing mask can be used over the full range of FiO₂. As with the partial rebreather, it poses a suffocation risk if not used properly.

The air entrainment mask is used with high flow oxygen to provide fixed FiO₂ levels between 0.24 and 0.50. It's recommended for use in unstable patients who need stable, low levels of oxygen. (Beasley *et al.*, 2015) and (Saskatoon Health Region, 2015).

The patient's oxygen saturation and oxygen delivery system should be recorded on the bedside. Patients should thus be monitored as specified by the standardized guideline for that reason all patients on oxygen therapy should have regular pulse oximetry measurements.

The frequency of oximetry measurements will depend on the condition being treated and the stability of the patient. Critically ill patients should have their oxygen saturations monitored continuously and recorded every few minutes whereas patients with mild breathlessness due to a stable condition will need less frequent monitoring. (Annika and Scriven, 2011)

2.4. Critical Review and Research gap identification

Oxygen administration's knowledge of and the tools used to provide oxygen can also be a challenge to greatest oxygen delivery. It has been demonstrated with the oxygen prescription data, many practical shortcomings exist that lead to poor outcome of patient. Cousins Wark and McDonald propose change of culture and a clear need to examine obstacles, facilitators, and attitudes toward oxygen and prescription in acute care if we improve practices and minimize damage to groups of susceptible patients. They agree that these interventions can help translate

expert guidelines into clinical practice. To facilitate the adoption of best practices and eventually improve clinical outcomes for COPD and other vulnerable groups of patients who are primarily affected by poor oxygen delivery practices (Cousins, Wark and McDonald, 2016, p. 1072).

The assessment methods used to measure oxygenation, is noted in the some literature that there are limits and normally the combination of monitoring and physical assessment provides clinicians with the tools to detect respiratory abnormality. Pulse oximetry has important limitations that must be taken into account when identifying the type of respiratory dysfunction encountered by the patient and determining whether the oxygen treatment is appropriate.

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).

The establishment of a up to date practice profile practical in intensive care nurses is a necessary prelude to improve oxygen therapy for critically ill patient (Eastwood *et al.*, 2012, p. 29)

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2.6. Conceptual frame work

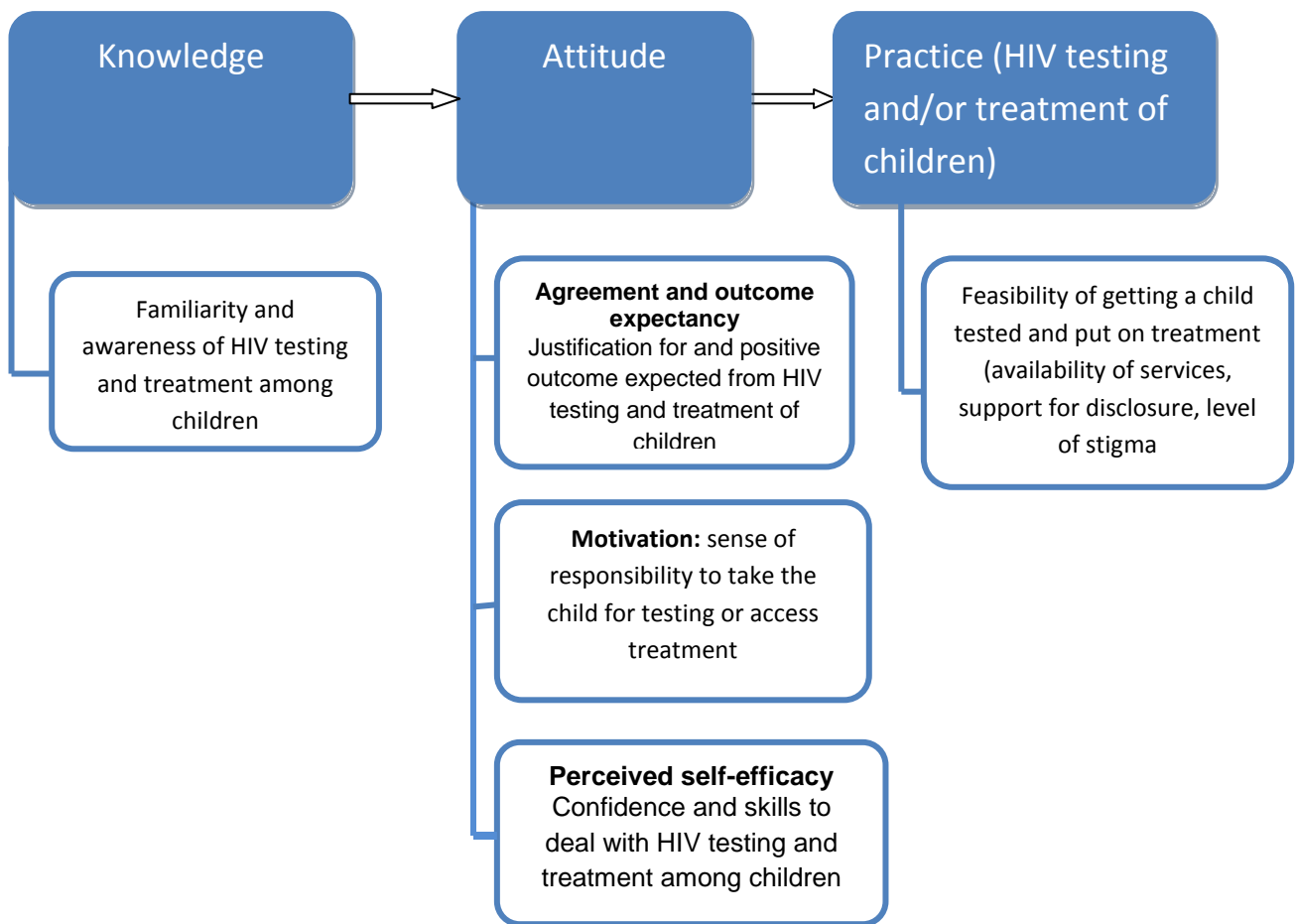
The researcher chosen to adapt the conceptual framework from Cabana et al (Cabana *et al.*, 1999, p. 1458) and In the first instance, Cabana et al, use a similar framework to review barriers to physician devotion to clinical guidelines if are available and explain the series of behavior change from knowledge, to attitudes and then behavior

Roelens et al (Roelens *et al.*, 2006)put up warning Cabanas' behavior Framework to come up with a predictive model to assess current barriers to screening for intimate partner violence in settings where neither clinical guidelines nor specific recommendation with regards to abuse have been

instigated. Additional affirm that barriers fit into one of the three major categories depending on whether they affect physician’ knowledge, behavior or practice

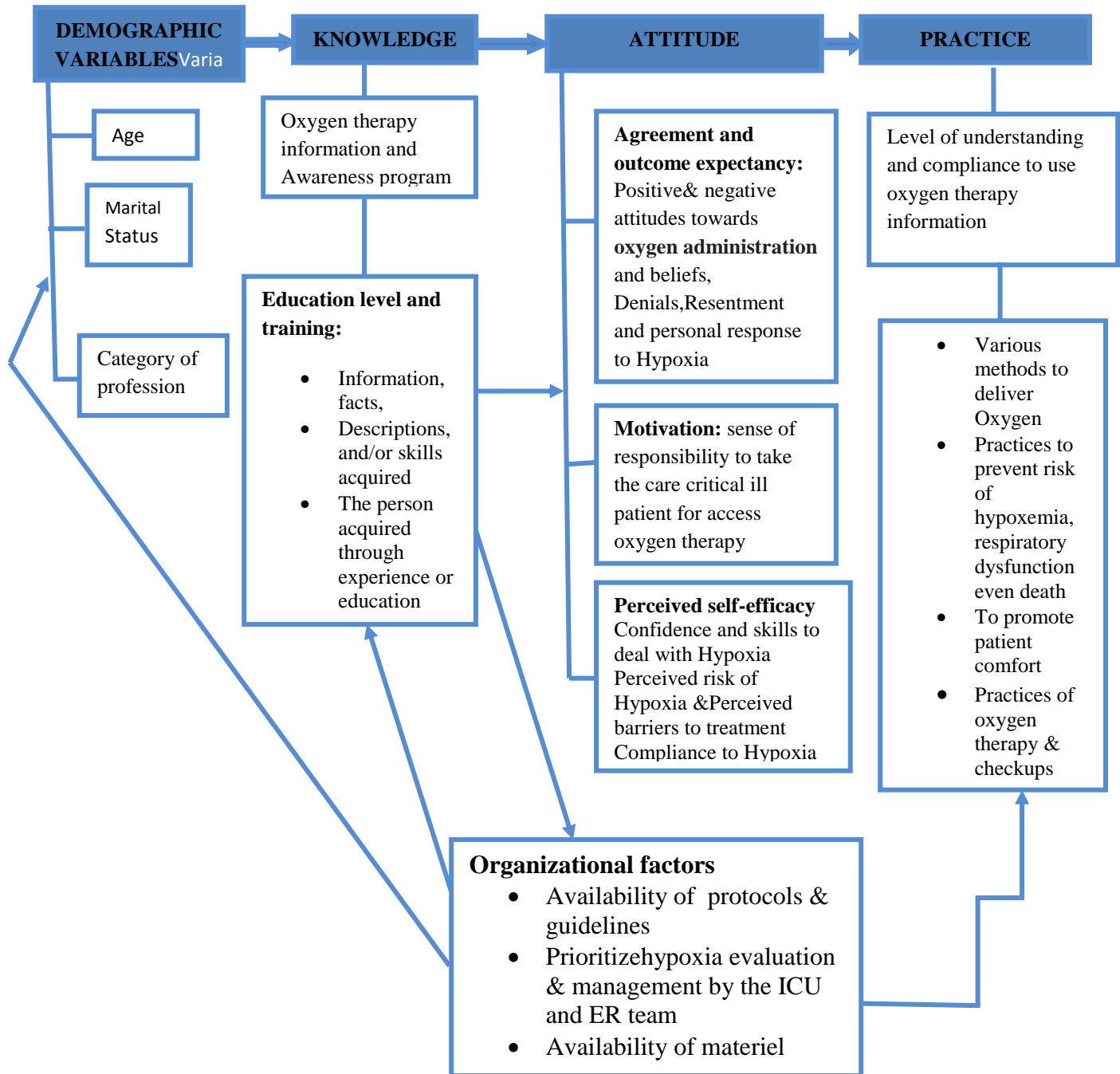
Therefore, the researcher applied similar reasoning to review barriers to oxygen administration to the critical ill patients, explained the series of behavior change from knowledge, to attitude and then practice in a setting where existence of policies and guidelines are yet to give unpredictable results. The conceptual framework explained how nurses, whose attitudes typify their feelings of inadequacy, did not initiate oxygen administration to the critical ill patients.

Figure 1: Knowledge, attitude and practices towards HIV testing and treatment for children: A conceptual framework



Source: Adapted from Cabana, Rand, Powe, Wu, Wilson, Abboud and Rubin (1999:1459) and Roelens, Verstaelen, Egmond and Temmerman (2006:4)(Matinhure, 2013)

Figure 2: Conceptual framework knowledge, attitudes and practice of nurses toward oxygen administration to the critically ill patients at University Teaching Hospital of Kigali



Source: Adapted from Cabana, Rand, Powe, Wu, Wilson, Abboud and Rubin (Cabana et al., 1999, p. 1458) Roelens, Verstaelen, Egmond and Temmerman (Roelens et al., 2006:4), and Nelia Matinhure (Matinhure, 2013, p. 19)

CHAPTER 3: RESEARCH METHODOLOGY

3.1. Study design

To achieve our research objectives, a quantitative descriptive study were conducted with the aim of describing the knowledge, attitude, practical skills and related gap among nurses on oxygen therapy at Emergency and ICU units at UTHK.

3.2. Study setting

The study was carried out at University Teaching Hospital of Kigali (UTHK known as CHUK) in ICU and Emergency units. UTHK is Rwandan Referral Hospital located in Kigali City, Nyarugenge District. The hospital bedding capacity is 550 beds. UTHK is the first Rwandan Teaching Hospital and the largest hospitals in the country (Rwanda) with staff turning around 792, among these, nurses are 500 (63%).

UTHK receives critically ill patients transferred from all hospitals in the country in addition to none referred critically ill patients from Kigali. Patients who are admitted to Emergency and ICU are among the various types of critical illnesses, both medical and surgical.

UTHK has been chosen as the largest public hospital in the country. Also, being a public hospital it would be assumed to have a good number of nurses involved in the management of critically ill patients including those in need of oxygen with various conditions such as medical, surgical, traumatic, and neurological and burns.

3.3. Study Population

The target population was professional nurses working at the Emergency and ICU units at UTHK. Nurse's qualifications range from: Associated nurses, Diploma Nurses, Bachelor of Nurses. The inclusion criterion has comprised of registered nurses working in the above units for a minimum period of 1 year; and, Nurses agreed to participate in the study. Exclusion criteria has been to have less than one year working experience at the unit, being not registered nurse, being in annual leave during the time of data collection. Nurses not directly involved in the bedside patient care such as nurse managers are also excluded. The total of 72 Nurses ICU and Emergency units has been comprised the target population as they care critically ill patient day to

day. According to the records at the office of the head nurse at UTHK, we count 72 nurses, 33 in ICU and 39 in Emergency Unit.

3.4. Sampling strategy

Purposive sampling technique has been used to recruit nurses who met the inclusion criterion and consented to participate in the study. The researcher used a purposive sampling because it is a simple strategy in which the researcher select people who are considered to be typical of the the population. The knowledge of the researcher populations and its element is used to hand pick cases to be included in sample. Due to the small size of population all nurses meeting the inclusion criteria has been participated in this study. A quantitative descriptive method was chosen because it enabled the researcher to collect numerical data and perform quantitative analysis.

The researcher approached each of them available during data collection period in the selected units requesting for their participation after sufficient explanation of the purpose of the study. Then nurses who were accept to participate signed consent form

3.5. Sample size

All nurses that were working in Emergency and ICU of the study area has been included as a sample size total is 72 nurses 33 in ICU and 39 in Emergency units.

3.6. Data Collection tool

The researcher used questionnaire which is adapted from previous similar study. The questionnaire was developed from research conducted at Addis Ababa By Lemma (Lemma, 2015), Known as “Assessment of nurses knowledge, attitude and practice about oxygen therapy”. The researcher has requested the permission to use the tool and waiting for feedback. The original questionnaire was developed for Nurses and Midwives working in emergency department (Adult and Pediatrics). To adapt the questionnaire to the study context the following items were adapted by researcher. The items 5 and 6 were removed because they requested

experience hospital by hospital while our case study focused on only one hospital, UTHK. The term “pediatric” in item 9 were replaced by the term “adult”

Testing multiple choice questions has been distributed to the staff during day shifts by the researcher; the activity took two month period. Each question had one answer and nurses were free to respond. For multiples choice questions have been required to circle the letter corresponding to the right answer among 5 alternatives and other to fill in, in the relevant box. For more awareness of the form and the content of the questionnaire, a pre-test has been organized on the sample of five respondents from each unit not included in the final sample.

The questionnaire was divided into four sections:

Section one – Socio-demographic characteristics of the participants

There were 5 questions on this part that included: Sex, age, level of education, marital status and working experience. For age and sex, participants were asked to fill in their age and male or female respective their sex. For level of education; participant fall into four categories namely: Associated nurses, Diploma Nurse; Bachelor of Nurse and Master’s Degree. The first refers to nurses who underwent six years of secondary school of education mattering with nursing, the second one concerns nurse who completes a three year university program, 3th categories concerns nurses who complete the four year university program in the nursing field and 4th relates to nurses who have master’s degree in nursing.

Section two – Knowledge of nurses on oxygen administration

This section consists of 7 items grouped in two categories, First category of 4 questions relates to anatomy and physiology of respiratory system and the second category of 3 questions relates to oxygen administration. Multiple choice questionnaires were used with one correct answer. Maximum score was 35 while minimum score was 0.

The overall knowledge of the study participants was assessed using the sum of scores of each outcome based on Bloom's cut-off point. The scores were classified into 3 levels as follows: Bloom's cut off point, Good knowledge or High level knowledge were 28-35 points (80%-100 %): Knowledge score that fell between 21-28 points (60%-79%) was Moderate knowledge and knowledge score below 21 points (60%) was Poor knowledge

Section three is related to nurses' attitude used a psychometric response scale in questionnaires to obtain participant's degree of agreement with a statement. The question on Likert's scale had positive and negative response that ranged from "strongly agree", "agree", "neutral", "disagree", "strongly disagree". The scoring system used with respects to respondents' response was as follows. (Bertram, 2007)

The responses were summed up and a total score was obtained for each respondent. The mean score was calculated and those scored above the mean and the mean score had positive attitude and scores below the mean meant negative attitude towards oxygen administration. The highest score was expected to be 35 and the lowest score to be 7.

The questionnaire on practice was categorized into 4 phases of giving oxygen therapy: good practice of nursing care in assessment before oxygen administration and special monitoring patient; the best practice on pulse oximetry and limitation; the good practice of nurses to avoid of risks related to oxygen administration and the manipulation of delivery devices for oxygen therapy. First phase consists of 3 items; second 2 and third phase consist of 3 and the fourth consist of 4, in total are 12 items. Five alternatives or options are given to each question with only one correct answer. Maximum score was 60, minimum score was 0. The scores were classified into 3 levels as per the Bloom's cut off point: poor practice if the score is less than 35.4 points (59%), moderate if the score is comprises between 36-47.4 point (60%- to 79%) and good practice if the score is more than 48 (80%-100 %).

For Associated factors questions on oxygen therapy: Associated factors on oxygen therapy were evaluated whether these points were affecting nurse's knowledge, attitude and practice on oxygen therapy.

3.4.1. Validity and reliability

To make sure that the tool is measuring what it is supposed to measure, the questionnaire was adapted to the current study. The questionnaire was finalized after the pilot used to test the instrument. A pilot study was conducted with 5 nurses in emergency and ICU unit at UTHK hospital to determine the clarity of questions, effectiveness of instructions, completeness of response sets, time required to complete the questionnaire and success of data collection technique. Pilot subjects were asked to comment on the applicability and appropriateness (validity) of the questionnaire.

The questionnaire was revised and validated by panel of 5 nurses in emergency and ICU, and they agreed on them. Internal consistency among the questionnaire items was 0.90 Cronbach's alpha (α) and it was considered within the acceptable range. The researchers determined that it would take forty (40) minutes to complete the questionnaire.

Table 2: Summary of content Validity: objectives and measurement

Research objectives	Items for Measurement
To evaluate nurses' knowledge on oxygen therapy	The second section of knowledge regarding oxygen administration 1-6
To identify and evaluate nurses' attitude and practices about oxygen therapy	The second section of attitude regarding oxygen administration 7-25
To identify factors associated with KAP of nurses on oxygen therapy	The third section of associated factors questions on oxygen therapy 26-32

3.4.2. Data collection procedure

After getting ethical clearance, from Institution Review Board of the University and Ethics committees of the hospital, the researcher went to the heads of concerned units to access the research population. The small meeting with unit managers has been organized to clarify the idea and procedures of the study and obtain their consent to carry out the research. A brief preamble to the participants has individually been organized to obtain the consent forms provided by the researcher to eligible participants at work. The researcher allowed nurses with sufficient time to read the consent form and ask questions if any. Signed consent forms have been collected from nurses willing to participate and a copy of the questionnaire has been provided. Each participant has had time to complete the questionnaire in front of researcher.

Data Analysis and Management

Data was recorded and analyzed using the SPSS program version 16. Univariate and bivariate analysis were utilized, univariate analysis for frequency computations and bivariate analysis in computing associations between variables. To analyze variance (ANOVA) inferential statistics has been used in order to test the relationship between knowledge of the principles and level of qualification of nurses, nursing experience at the work place. ANOVA has been chosen as it allows to test the average score differences more than two groups. For the third objective, frequencies and percentages has been used to analyze barrier data. The Chi-square test was used to measure the strength of associations between variables, a “p” value of <0.05 was considered to be statistically significant.

3.5. Ethical considerations

The permission to carry out this research has been sought from the permission to collect data from UTHK in intensive care and emergency units have been obtained from the IRB the and UTHK’s ethics committee. Formal acceptance and written document is a prerequisite for all participants outlining all ways of protecting their rights. Participants has again been made to

understand that their participation in this exercise is at their own discretion and whatever were given out as requested has been treated with utmost good faith and confidentiality .The information has not whatsoever been exposed to any un authorized person as a matter of confidentiality. When all is done access to data has been through a given password that will not be given to anybody other than that one authorized.

3.6 Data Dissemination

The study process and results are ready disseminated to relevant organizations namely University Teaching Hospital of Kigali (UTHK), University of Rwanda (UR) and Ministry of Health (MOH). The final research will be presented in nursing conference and published in articles in peer reviewed journals

CHAPTER 4: RESULTS

4.1. Introduction

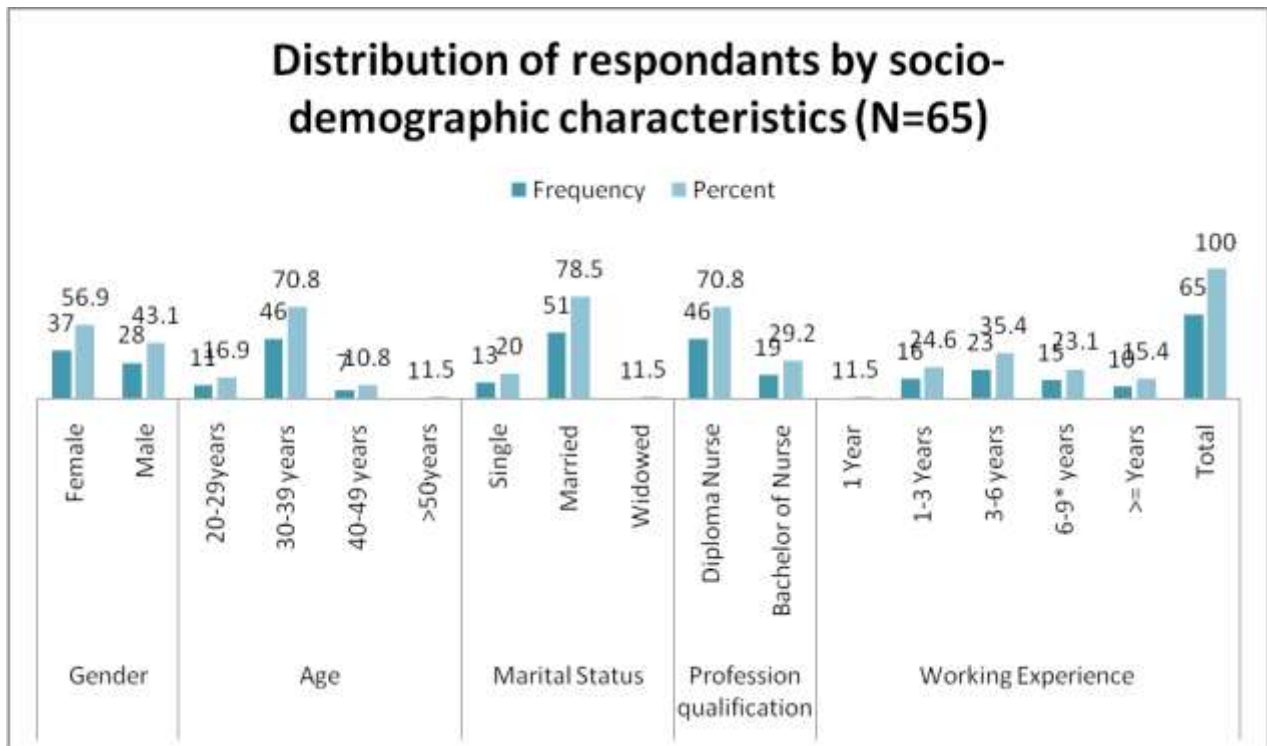
In this chapter, we analyze the data with the purpose of answering the key questions defined in Chapter 1 section 1.6 Research objectives. The analysis is done in several steps, not necessarily starting with the most important question. Descriptive statistics values, such as mean, median and standard deviations (SD) have been used for continuous variables while distribution of frequencies and percentages contribute to categorical variables.

For testing the relationship between knowledge, attitude and practice of the principles and level of qualification of nurses, nursing experiences and at the workplace or unit the variance (ANOVA) has been analyzed through inferential statistics.

SOCIALDEMOGRAPHIC CHARACTERISTICS

Figure 3: Distribution of respondents by socio-demographic characteristics (N=65)

As per the table below, 70.8% of participants were 30-39 years old, 29.2 % are Bachelor Degree holder in nursing and 38.5 % had more than 5 years of experience.



KNOWLWDGE OF NURSES ON OXYGEN ADMINISTRATION

Table 3: Distribution of response on level of knowledge (N=65)

As indicated in the below (3) table only 26.2 % give the write answer about oxygen indications, 50.8 % gave the write answer about normal range of oxygen saturation and 27.7 % give the write answer about physiology respiratory system.

Variable		Frequency	Percent
Oxygen indications	Treat hypoxia	7	10,8
	Prevent hypoxia	10	15,4
	Acute myocardial infarction	31	47,7
	All of the above	17	26,2
The normal oxygen saturation at rest adult < 70 years is	88-92%	4	6,2
	96-98%	33	50,8
	86-88	2	3,1
	<90	18	27,7
	None	8	12,3
Oxygen therapy is contraindicated in	Acute hypoxemia in pneumonia, shock, asthma, heart failure a	1	1,5
	Pneumothorax	3	4,6
	Carbon monoxide poisoning	6	9,2
	None	55	84,6
Movement of air into and out of the lungs is	Ventilation	57	87,7
	Exhalation	1	1,5
	Inspiration	2	3,1
	Expiration	5	7,7
The passive process in respiratory physiology is	Inhalation	6	9,2
	Inspiration	5	7,7
	Expiration	27	41,5
	Ventilation	9	13,8
	All of the above	18	27,7
The normal breathing rates in adult ranges between	12 - 20 breath/ min	65	100,0

ATTITUDE OF NURSES ON OXYGEN ADMINISTRATION

Table 4: Distribution of responses on attitude of nurses on oxygen administration (N=65)

As per the table below (4), the question requesting whether the oxygen is a kind of drug and should be prescribed by a medical officer only 53.8 gave the write answer, the one related to the oxygen administration, only 24.6 gave the write answer, only 58.5% managed to provide the good answer about how persons with severe lung disease, only 36.9% managed to provide a good answer the in comparing continuous oxygen administration and intermittent oxygen therapy, only 30.8% managed to provide a good answer about oxygen therapy signposts and only 38.5 managed to provide a good answer on whether oral and nasal hygiene and normal saline drops as necessary should be done when giving oxygen therapy in adult critical care ill patient.

Variable		Frequency	Percent
Oxygen is a drug that should be given only when ordered by a medical officer, or a registered nurse initiated order in an emergency situation	Strongly Agree	35	53,8
	Agree	17	26,2
	Disagree	7	10,8
	Strongly Disagree	6	9,2
Continuous oxygen administration is more beneficial than intermittent oxygen therapy	Strongly Agree	16	24,6
	Agree	17	26,2
	Neutral	13	20,0
	Disagree	12	18,5
	Strongly Disagree	7	10,8
Humidification is the best practice to prevent dryness of mucus membrane of upper respiratory tract causing soreness	Strongly Agree	60	92,3
	Agree	5	7,7
Persons with severe lung disease need to be maintained at the prescribed oxygen saturation range	Strongly Agree	38	58,5
	Agree	22	33,8
	Neutral	3	4,6
	Disagree	2	3,1

The oxygen is a medicine its administration to the patient is safe and also it is very dangerous	Strongly Agree	24	36,9
	Agree	18	27,7
	Neutral	11	16,9
	Disagree	8	12,3
	Strongly Disagree	4	6,2
A patient on oxygen therapy signposts that the patient could be at the end stage of life	Strongly Agree	3	4,6
	Agree	2	3,1
	Neutral	13	20,0
	Disagree	27	41,5
	Strongly Disagree	20	30,8
Oral and nasal hygiene and normal saline drops as necessary should be done when giving oxygen therapy in adult critical care ill patient.	Strongly Agree	25	38,5
	Agree	22	33,8
	Neutral	3	4,6
	Disagree	4	6,2
	Strongly Disagree	11	16,9

PRACTICE OF NURSES ON OXYGEN ADMINISTRATION

Table 5: Distribution of responses on practice of oxygen administration

Table 5.1 Good practice of nursing care (N=65)

Findings depicted in the below table (5.1) represent number of respondents who managed to respond correctly to the raised questions. Remarkable findings related to the questions about assessment before oxygen administrations were only 29.2% and for special monitoring patient response which is to follow protocol of oxygen administration only 12.3% were managed to provide good response.

Variable		Frequency	Percent
Before oxygen administration nurse	Assessed patients by using the signs and symptoms and the vital sign	15	23,1
	Check the O ₂ saturation of patient using pulse oximeter	27	41,5
	Observe and think that he is in distress and needs O ₂	4	6,2
	All of the above	19	29,2
Special monitoring of the patient on oxygen nurse	Do routine hourly monitoring of the vital signs	5	7,7
	Follow protocol of oxygen administration	8	12,3
	Follow doctor's prescription	4	6,2
	Check the O ₂ saturation of patient using pulse oximeter	31	47,7
	All of the above	17	26,2
Which nursing care is appropriate during oxygen therapy	Mouth care	38	58,5
	Encourage adequate fluid intake	3	4,6
	Apply water based cream if lips or nose become dry	4	6,2
	Apply petroleum jelly to minimize inflammation of lips and n	6	9,2
	None	14	21,5
Total		65	100,0

Table5.2 The best practice on pulse oximetry and limitation of its use (N=65)

The table below (5.2) depicts findings towards the question related to the best practice on pulse oximetry and limitation. For the two questions stated in the table, figures show respectively that only 27.7% and 40% have best practice on pulse oximetry.

		Frequency	Percent
Pulse oximetry monitoring is affected by	Patient motion or fitting	10	15,4
	Carbon-monoxide poisoning	3	4,6
	False nails, nail varnish	34	52,3
	All of the above	18	27,7
The best practice on pulse oximetry	The wave form and/or signal strength must be optimal before	4	6,2
	A blood pressure cuff on the arm of probe will lead to a false	17	26,2
	A blood pressure cuff on the arm of probe will lead to a correct SPO ₂	7	10,8
	A and B	26	40,0
	A and C	11	16,9
Total		65	100,0

Table 5.3 Good practice of nurses to avoid of risks related to oxygen administration (N=65)

Referring to the figures as per the table below (5.3), to reduce the risk of side effects associated with dry O₂ administration and to promote patient comfort, 80% of respondents demonstrate a good practice while about the best practice which helps oxygen to travel easily only 24.6% managed to prove their aptitude about good practice thereto.

Variable		Frequency	Percent
To reduce the risk of side effects associated with dry gas administration and to promote patient comfort	Use face mask	1	1,5
	Use nasal cannula	1	1,5
	Attach humidification device	52	80,0
	Attach pulse oximeter probe	3	4,6
	All of the above	8	12,3
Collection of water in the tubing during oxygen administration	Can partially or completely occlude the flow of oxygen	15	23,1
	Empty the collected water in the tubing as needed	3	4,6
	Facilitates flow of oxygen and promote patient comfort	17	26,2
	Can partially or completely occlude the flow of oxygen and Empty the collected water in the tubing as needed	16	24,6
	Empty the collected water in the tubing as needed and Facilitates flow of oxygen and promote patient comfort	14	21,5
Oxygen cannot travel easily through wet secretions, so optimize their removal by	Sitting the patient up, or out in a chair	8	12,3
	Ensuring mouth is kept moist	4	6,2

	Providing tissues and/or a sputum cup	6	9,2
	Regularly assessing if a patient can take a deep breath and	23	35,4
	All of the above	24	36,9

Table 5.4 Manipulation of delivery devices for oxygen therapy (N=65)

As per the distribution below (5.4), the respondents who are aware of providing appropriate oxygen concentration using nasal cannulae turn around 43.1%, and to the question related to provide appropriate oxygen concentration using facial mask, only 32.3% have information on difficulty of tolerating and constantly struggling to remove the oxygen when use face mask for oxygen therapy. The question about -rebreather mask which had high percentage of oxygen 95-100 % (FiO2) and used for short term treatment in trauma, only 32.3%select non-rebreather mask as appropriate oxygen delivery device. On the question related to the availability of oxygen equipments, only 49.2 of nurses are aware of the face mask, nasal prongs, Re- breather mask, T- Piece, ventilator

Variance		Frequency	Percent
Nasal cannulae	Are suitable for patients with nasal polyps and nasal edema	4	6,2
	May cause headaches or dry mucous membranes if flow exceeds	10	15,4
	Should not be used for those needing over 40% (> 4L/min)	17	26,2
	Are suitable for patients with nasal polyps and nasal edema and May cause headaches or dry mucous membranes if flow exceeds 4L/min	6	9,2

	May cause headaches or dry mucous membranes if flow exceeds 4L/min and it should not be used for those needing over 40% (> 4L/min)	28	43,1
Your patient may have difficulty of tolerating and constantly struggling to remove the oxygen delivery device. Most probably this device is	Nasal cannulae	8	12,3
	Oxygen mask	21	32,3
	Nasal prongs	11	16,9
	All of the above	25	38,5

ASSOCIATED FACTORS ON OXYGEN THERAPY

Table 6: Distribution of responses on factors on oxygen administration (N=65)

Regarding attendance of training courses, around 69.2% of the respondents have never attended any short or long-course training about oxygen administration, and 56.9% of participant agrees on effect of work load on oxygen therapy. Regarding the guideline of oxygen therapy in the working unit 53.8% of nurses agree while 40.0% disagree

Variable		Frequency	Percent
Have you trained on oxygen therapy/administration?	Yes	20	30,8
	No	45	69,2
	Total	65	100,0
Is there a guideline of oxygen therapy in the currently working unit?	Yes	26	40,0
	No	35	53,8
	I do not Know	4	6,2
	Total	65	100,0

Do you know that using too little oxygen in area may contribute to carbon dioxide retention?	Yes	30	46,2
	NO	16	24,6
	I do not know	19	29,2
	Total	65	100,0
Is there adequate supply of oxygen and delivery systems in your unit?	Yes	54	83,1
	NO	8	12,3
	I do not Know	3	4,6
	Total	65	100,0
Do you know if your patients administered oxygen, paid/charged for the procedure?	Yes	48	73,8
	No	8	12,3
	I do not Know	9	13,8
	Total	65	100,0
Do you get the amount of oxygen cylinders equivalent to the label written?	Yes	42	64,6
	No	14	21,5
	I do not Know	9	13,8
	Total	65	100,0
Do you think work load/ burden affects oxygen therapy in your unit?	Yes	37	56,9
	No	16	24,6
	I do not Know	12	18,5

Pearson Chi-Square Tests

		Working Experience
Have you trained on oxygen therapy/administration?	Chi-square	6.377
	df	4
	Sig.	0.173
Do you know that using too little oxygen in area may contribute to carbon dioxide retention?	Chi-square	7.100
	df	8
	Sig.	0.526

BLOOM'S CUT OFF POINTS

Table 7: Categorization of participants' knowledge, attitude and practice, toward oxygen administration to the critically ill patient at UTHK according to bloom's cut off points (N=65)

The result on table below of this study shows that the majority of nurses had poor knowledge about oxygen administration and the level of knowledge of the participants scored low levels of knowledge turns around 73,8%, only 2 respondents, representing 3.1 % of the population documented the high level of knowledge while standard deviation (SD) stands for 19.3.

Level of Knowledge	Frequency	Percent	Mean	Median	SD
Good knowledge (80-100%)	2	3.1	87.7	88.8	19.3
Moderate knowledge (60-79%)	15	23.1			
Poor knowledge (≤ 59 %)	48	73.8			
Good attitude (80-100%)	2	3.1	80.7	78.9	8.4
Moderate attitude (60-79%)	41	63.1			
Poor attitude (≤ 60 %)	22	33.8			
Adequate practice (80-100%)	21	32.3	69.7	73.3	14.1
Moderate practice (60-79%)	30	46.2			
Poor practice (≤ 60 %)	14	21.5			
Total	65	100.0			

Table 8: Association between socio demographic characteristics and levels of practices

The table below (8) shows that there is significant relationship between the education level and nursing practices during administration of oxygen p value= 0.033.

		Practice level				P value
		Poor Practice	Moderate practice	Good practice	Total	
Demographic or Social characteristics	Total	21	30	14	65	0.791531
	Female	12	16	9	37	
	Male	9	14	5	28	
Age	Total	21	30	14	65	0.787
	20-29years	4	6	1	11	
	30-39 years	14	20	12	46	
	40-49 years	3	3	1	7	
	>50years	0	1	0	1	
Marital Status	Total	21	30	14	65	0.084
	Single	1	10	2	13	
	Married	20	19	12	51	
	Widowed	0	1	0	1	
Professional qualification	Total	21	30	14	65	0.033
	Diploma Nurse	12	26	8	46	
	Bachelor of Nurse ⁴	9	4	6	19	

CHAPTER5. DISCUSSION

INTRODUCTION

In any case of the situation in which oxygen is delivered, it has to be always considered as a drug. Its effectiveness in treating hypoxemia is often underestimated and, if given inappropriately, it becomes very dangerous. Patients must receive this therapy in an appropriate, safety and comfortable manner and this depends on an understanding of why oxygen is being delivered, the methods of delivering the oxygen and the nursing needs of the patients receiving it. (Mahmoud *et al.*, 2016a)

In this regard, the aim of this study was to assess knowledge, attitude and practice of nurses regarding oxygen therapy and the perspectives of participants on clinical oxygen therapy, the initiation of oxygen therapy the patient assessment before starting the oxygen therapy and patient monitoring. It aims also to look for perspectives on challenges of oxygen therapy such as knowledge and related gaps, availability of protocols, availability of delivery device, work- load, and other oxygen supply challenges. The perspectives of nurses on clinical oxygen therapy towards initiation of therapy, patient assessment and oxygen monitoring were the key factors surrounding this study.

The participants were made up of sixty five (65) nurses whose 30 nurses are allocated in ICU and 35 in Emergency. The socio demographic trends show that the majority of the respondents about 78.5% are females and married, the factor behind is probably due to the dominance of women in the profession of nursing from long ago as cited in Hus et al, 2010 that through the efforts of Florence Nightingale in the mid-nineteenth century, nursing was established as a women's profession. And the majority of the participants is in the middle age where 70.8% are in the range from 30 to 39 years old with the following statistics values: Mean of 34.2, and Median of 34.5, a small number of them (29.2%) are Bachelor Degree holders in Nursing and all of all participants, are working at their present unit (emergency or ICU), for a period ranging from 1 years to 10 years and those with the working experience less than five years turn around 35.4% with Mean = 5.6 and Median 4.5 as statistical values.

KNOWLWDGE OF NURSES ON OXYGEN ADMINISTRATION

Assessment of nurses' knowledge on oxygen therapy was mainly focused 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. This study a relationship with the previous study where researcher find that in general knowledge related to administration of oxygen by staff nurses were lower than the expected standards and consequently the improvement is needed to reach up to the expected standards (Naihar P., 2016).

To the knowledge of researcher, this kind of study was the first to be conducted in the country. As documented through the different analysis performed, the majority of nurses had poor knowledge about oxygen administration. These facts that can contribute more to the observed weakness it is probably the level of education and lack of basic practical knowledge; that could be gained from different trainings, workshops, and exposures to scientific journals, etc.. The percentage of participants scoring on the low level of knowledge turns around 73.8% and only 2 participants, standing for 3.1% with standard deviation of 19.3 score the high level of knowledge. Coming to the background related to training and education, only 29.2% hold Bachelor degree in nursing and only 30.8% managed to be trained on the oxygen administration during their period at work. These go hand in hand with the results from other study done by Lemma at Addis Ababa, Ethiopia showed that training on oxygen therapy was the most frequently nominated professional need among nurses (Lemma, 2015) ,this study have also documented the serious shortage in undergraduate nursing education which can lead to poor nursing knowledge toward oxygen administration.

According to the table the table 3study reported lack of knowledge on oxygen therapy such as the indication of oxygen therapy. The results showed that 26.2% of respondents know hypoxemia and acute myocardial infarction are indication of oxygen therapy, and about the knowledge of normal oxygen saturation at rest approximately only a half of

respondents 50.8% provided the correct answer and this might be due to poor knowledge about other indications of oxygen therapy. The reported low levels may be linked with the lack of training; as shown in table 6 that majority standing for 69.2% of the respondents (nursing staff) had not taken a training course. This implies the responsibility of hospital management for not providing the staff skills development program while updating the knowledge of the staff nurses is a paramount factor in professional performance as depicted out by Kavitha and Patil. In their study, they concluded that there is a need to update the knowledge of staff nurses, the training is essential and should be integrated into their work schedule regularly (Kavitha and Patil, 2015, p. 4). In addition, Mahmoud insisted on that all nursing staff who record oxygen saturation must have had appropriate training on how to use the saturation monitor and where to record results. (Mahmoud *et al.*, 2016a)

ATTITUDE OF NURSES ON OXYGEN ADMINISTRATION

According to table 7, poor attitude or negative attitude score for oxygen therapy was found to be 63.1% with a mean score of 42.25 and SD of 9 as statistical values. Even if some of the nurses have a positive attitude for oxygen therapy, much more awareness and related updates constitute a paramount factor to professional performance success. This finding contributes to the guideline for oxygen therapy where nurses should have an encouraging attitude to the needs of mouth hygiene in adults and use of humidification devices when administering oxygen therapy (Blake, 2011).

In regard to the attitude of nurses about oxygen to be a medication and prescribed by physician requirements, 53.8% of respondents agree that oxygen is a drug and should be first of all be prescribed by the physician as per stated by Naihar in his study saying that oxygen should be prescribed, administered and monitored by trained staff, if not, it can cause detrimental effects. (Naihar P., 2016). The same is also shown that the exception should be in life-threatening situations, where high-flow oxygen via a reservoir (non-rebreather) bag should be given immediately, without a prescription, but subsequent documentation should take place (Kane *et al.*, 2013). This has been confirmed by Browne and Crocke who argue that in emergency situations i.e. cardiorespiratory arrest, plus peri-arrest situations and critical illness such as sepsis,

oxygen at high percentage (i.e. non rebreath mask) may be commenced before a written prescription has been made..(Browne and Crocker, 2013).

In regard to the knowledge of nurses about caution in oxygen therapy, 24 out of 65 respondents, standing for 36.9% had knowledge about importance of oxygen therapy and its effect, this frequency is lower compared to the literature review where it is stated that oxygen therapy should be administered continuously unless the need has been shown to be associated with specific situations requiring intermittent use only (e.g. exercise or sleep)(Saskatoon Health Region, 2015).

PRACTICE OF NURSES ON OXYGEN ADMINISTRATION

Assessment of good practice on oxygen therapy, the results show that 21 out of 65 respondents, standing for 32.3% with mean scoring 69.6 and SD of 14.1 and 14 out of 65 respondents, standing for 21.5 % present poor practice. The standard guidelines for oxygen administration and monitoring, Blake(Blake, 2011)explained that nurses should have to be skilled on the best practices on pulse oximetry, humidification attachment, use of different oxygen devices to save the life of many emergency patients.

It is the nurses' responsibility to ensure that the required dose of oxygen is correctly delivered to the patient and how to regularly monitor the patient's condition. According to Browne, (Browne and Crocker, 2013) a nurse must allow 5 minutes after any change to oxygen percentage or device before assessing response device; also percentage or liters per minute and respiratory rate must be documented on the patient's observation chart and then document oxygen delivery in percentage terms.

All the nurses did some form of assessment before they administered oxygen to patients, like assessed patients by using the signs and symptoms and the vital sign, check the O₂ saturation of patient using pulse oximeter, Took blood sample for blood gas analysis or observe and think that he is in distress and needs O₂, but the best practice is to combine all form before oxygen administration, but the findings shown in table 5.2; reveal that only 29.2% nurses had this

information. Some of the participants representing 47.7% used gadgets such as the pulse oximeter and don't took blood sample for blood gas analysis to assess the condition of the patient. In regard to the attitude of nurses measuring blood oxygen saturation by pulse oximetry and if they are aware of limitation factors that cause increases and decreases in the individual patient's SpO₂ using pulse oximetry, the response of nurses show that 27.7% of the respondents had best practice on pulse oximetry and 40% had the best practice which helps the waveform and/or signal strength must be optimal before a reading can be accepted. A blood pressure cuff on the arm of probe will lead to a false SpO₂ reading. According to Browne, (Browne and Crocker, 2013)it is important to assess signs, symptoms and the vital sign and put patients on the pulse oximeter and check their O₂ saturation; but also not forgot to check arterial blood gases to see whether it tallies with the SPO₂ (oxygen saturation) and afterwards, decide on what to do. These results are in agreements with the documented literature where Williams finds gaps in using puls oxymeter and concluded that pulse it should be recorded in all patients as the 'fifth vital sign' and further assessment with arterial blood gases (ABGs) performed and nurses must fully understand the appropriate applications and limitations of this technology-Guidelines (Williams *et al.*, 2013), and Kacmarek explain that Pulse Oximetry provides estimates of arterial blood ox-hemoglobin saturation levels, but as not actual SaO₂ measures. (Kacmarek et al, 2013.)

Special monitoring is needed if the patient is on oxygen, this study showed that only around half of the studied 58.5% have appropriate nursing care which is good practice of nurses about assessment; and special monitoring patient response during oxygen therapy, the previous study show that critical ill patient (including arrest and peri-arrest situations), acute breathlessness, severe sepsis and any other critical illness should be given high concentration supplemental oxygen in the initial stages of the resuscitation process. Once the patient is stable, formal assessment of the need for oxygen should be made, guided by pulse oximetry plus ABGs if required.(Kane *et al.*, 2013);

The findings of the study show that only 12.3% of respondents were to follow the protocol of oxygen administration. The table 8 of this study showed that there was significant relationship between the education level and nursing practices during administration of oxygen where p value is significant at 0.033; this relationship can be due to educational programs of nursing in Rwanda and nurses perceived challenges of clinical oxygen therapy like lack of protocol, instruments to

assess the oxygen level, for this reason, they assessed patients using the signs and symptoms and the vital signs only.

Significant relation between nurses knowledge about the indication at oxygen and the problem associated with face mask was reported at 32.3% of the respondents had information on difficulty of tolerating and constantly struggling to remove the oxygen when they use face mask for oxygen therapy; about providing appropriate oxygen concentration, 43.1% of the respondents had knowledge about using nasal cannulae, this might due to hospital management policy for not accommodating staff capacity building program. And the study showed that most of nurses' staff 78% had keep nose pieces clean in nursing care about providing appropriate oxygen concentration,

Some participants from the Emergency and ICU provide information saying that they took the initiative when they thought the patient was in distress among the 53, 8% of them take a decision based on doctor order, 12.3 % of them take decision based on oxygen saturation and only 20% of them are able to select an appropriate oxygen delivery device. Naihar insist on responsibility and accountability for all nursing care delivered. Responsibility refers to execution of duties associated with a nurse's particular role. When administering a medication, nurse is responsible for assessing the client's needs for drug, giving it safely and correctly and evaluating the response to it. Accountability is being answerable for one's own action. A nurse is accountable to self, the client, the profession, the employing institution and society. (Naihar P., 2016) A nurse as a professional assumes principals of drug administration: right medicine is given, with the right dose, to the right patient, at the right time, through right route. Following the protocol of oxygen administration, 47.7% are able to implement protocol through checking the O₂ saturation of patient using pulse oximeter this might due to hospital protocol management policy. This will be the default method of initiating and adjusting the direction of oxygen therapy. Clinical staff need to be aware of the limitations of this monitoring (Browne and Crocker, 2013)

For distribution of the participants according to the practice about providing appropriate oxygen concentration, 43.1% of the nurses had good practice about using nasal cannulae. About problem associated with face mask was represented by 32.3% of the nurses who had information on difficulty of tolerating and constantly struggling to remove the oxygen when we use face

mask for oxygen therapy. 32.3% of the participants can select non-rebreather mask as appropriate oxygen delivery device which had High percentage of oxygen 95-100 % (FiO₂) and used it for short term treatment in trauma.

In regard to the availability of oxygen equipment, a small number turning around 32/65 representing 49,2% of respondents are aware of the how to use the face mask, nasal prongs, Re-breather mask, T-Piece, ventilator and trachy-mask for patient with tracheotomy. It is therefore important for persons who are responsible for oxygen administration to be familiar with its indications for use, potential hazards and equipment(Williams *et al.*, 2013)

ASSOCIATED FACTORS ON OXYGEN ADMINISTRATION

Associated factors on oxygen therapy were evaluated whether these points was affecting nurses knowledge, attitude and practice on oxygen therapy. In this study among respondents 45 out of 65 representing 69.2% had never attends any continuing education courses about oxygen administration and only 20 out of 65 representing 30.8% of respondents managed to get related training and it is commonly known that a lack of training on oxygen therapy affected nurses' knowledge, attitude and practice.

Participants were also asked about the availability of oxygen therapy guideline and 40.0% of the agreed and 53, 8% disagree about availability of guidelines. In this study as the majority of nurses evidenced the lack of oxygen therapy guideline this can be the startup of is gaps noted on knowledge and practice on oxygen therapy. The guidelines cover the use of oxygen in critically ill and hypoxaemic adults and those who are at risk of hypoxemia. (Kane *et al.*, 2013)

Regarding to information on availability of adequate supply oxygen: 54/65 representing 53.8% had the same opinion, but 42/65 standing for 64.6% of respondents illustrated that there is a gap between amount of oxygen cylinders and equivalent to the label written on, distribution of nurses according effect of work load on oxygen therapy and illustrated that there is a gap between amount of oxygen cylinders and equivalent to the label noted at 64.6%.

The conceptual framework explained how nurses, whose attitudes typify their feelings of inadequacy, did not initiate oxygen administration to the critical ill patients. And the finding

showed that majority of nurses had poor knowledge about oxygen administration., level of knowledge of the participants scored low levels of knowledge 48 representing 73,8%) while only 2 respondents representing 3.1 % documented the high level of knowledge with SD of 19.3 and this SD showing how much observation deviate from the mean., and the knowledge affects attitude and practice.

CHAPTER 6: CONCLUSIONS AND RECOMMENDATIONS

Oxygen is a physiologic requirement for normal cellular function (energy production through aerobic metabolism), and is vital to sustaining human life. To failure to maintain adequate blood oxygen levels can result in the progressive deterioration of the patient, beginning with cell death, and if prolonged, organ failure and ultimately body system failure and death.

Nurses often contribute to the administration of O₂ for airway management. Knowledge of current practices can help and facilitate evidence-based practices to optimize care of patients receiving oxygen therapy. The oxygen is required for every critically ill patient with respiratory distress, patient with acute and chronic hypoxia, and for most patients the major risk is giving too little oxygen, insufficient oxygen therapy can lead to cardiac arrhythmias, tissue damage, renal damage and ultimately cerebral damage. Oxygen therapy was indicated for Oxygen was prescribed by the doctors but administered by nurses. However, in emergency situations, nurses administered oxygen without doctor's prescription. Nurses initiated O₂ therapy based on knowledge gained during training and experience.

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. The findings from the present study reported that a good number of respondents demonstrate the low level of knowledge towards oxygen administration and the other activities thereto in addition the lack of relevant trainings.

Implications and recommendations

The results of this study have some implications for nursing practice, nursing education, and research.

Nursing practice

The findings from this study 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. The organization of different exposure events for undergraduate courses would likely contribute more to increase required knowledge in domain.

Nursing education

The findings can inform curriculum review to address the identified gaps in knowledge and skills towards oxygen therapy. Thus, hospital could include the nursing role and responsibility in oxygen administration in the training program, especially Units with critical patients where in the study took place, and would establish regular training courses, workshops and continuous educational programs to ensure standards in nursing care on oxygen administration of nurses to their working places.

Professional bodies

Professional bodies like UTHK and nursing associations could promote development and transfer of knowledge, improve nursing practices and enhance professional capacities through reviewing some of their objectives and perform professional standards, capacity building, knowledge sharing and knowledge services and becoming a model organization. Organizing periodic in-house and outside short and long courses, organizing study visits, conference debates, articles in newspaper, etc mattering with different nursing care fields, where different relevant sections, such as the subject matter and related fields could take place would be helpful to improve the profession and the system in general.

Research

The study was conducted on one site, UTHK; the findings in this research 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.

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Appendix

Self-Administered Questionnaire for Nurses

This is a self-administered questionnaire designed for nurses who are working in Emergency and Intensive Care Unit (ICU) at CHUK.

This research aims to measure the knowledge, skill and competence of nurses on oxygen therapy in the emergency department and intensive care at CHUK. I kindly request your active participation in this study while stressing your significant importance in order to have worthy information about knowledge, attitudes and practice regarding oxygentherapy and the gaps thereto and this will help to develop possible solutions and recommendations.

Instruction:

Each question has one answer and you can respond on your choice. For multiples choice questions set in way of choice multiple, you are required to circle the letter corresponding to the more correct answer, and for those to fill in, fill the relevant box.

Do not be afraid it will, on average, take about 20 minutes to complete this questionnaire.

Do not write your name.

You have a right to discontinue responding at any point.

Thank you

I. DEMOGRAPHIC OR SOCIO-ECONOMIC CHARACTERISTICS

Please tick the best answer

1. Sex

Female Male

2. Age

- A. < 20 years
- B. 20 – 29 years
- C. 30 – 39 years
- D. 40 – 49 years
- E. > 50 years

3. Marital Status

- A. Single
- B. Married
- C. Divorced
- D. Widowed

4. Your category of profession is

- A. Associated nurses
- B. Diploma Nurse
- C. Bachelor of Nurse
- D. Masters degree

5. Working experience in the respective unit

- A. 1 year
- B. 1 – 3 years
- C. 3 – 6 years
- D. 6 – 9 years
- E. \geq 10 years

II. KNOWLEDGE ON OXYGEN THERAPY

Please tick the best answer

1. Oxygen is administered to

- A. Treat hypoxia
- B. Prevent hypoxia
- C. Acute myocardial infarction
- D. Treat hypoxia and Prevent hypoxia
- E. All of the above

2. The normal oxygen saturation at rest for adults < 70 years is

- A. 88 – 92%
- B. 96 – 98%
- C. 86 – 88%
- D. < 90%
- E. None

3. Oxygen therapy is contraindicated in:

- A. Acute hypoxemia in pneumonia, shock, asthma, heart failure and pulmonary embolus
- B. Pneumothorax
- C. Carbon monoxide poisoning
- D. Post thoracic and abdominal surgery
- E. None

4. Movement of air into and out of the lungs is

- A. Inhalation
- B. Ventilation
- C. Exhalation
- D. Inspiration
- E. Expiration

5. The passive process in respiratory physiology is

- A. Inhalation
- B. Inspiration
- C. Expiration
- D. Ventilation
- E. All of the above

6. The normal breathing rates in adult ranges between

- A. 12 – 20 breath/ min**
- B. 15 - 30 breath**
- C. 25 – 50 breath/ min**
- D. 40 – 70 breath/m**
- E. All of the above**

III. ATTITUDES OF NURSES TOWARD OXYGEN THERAPY

Answer questions from 7 to 13 by writing “ ”according to your response.

N^o	Description	Strongl y Agree	Agre e	Neutr al	Disagr ee	Strongl y Disagre e
7.	Oxygen is a drug that should be given only when ordered by a medical officer, or a registered nurse initiated order in an emergency situation.					
8.	Oral and nasal hygiene and normal saline drops as necessary should be done when giving oxygen therapy in adult critical care ill patient.					
9.	Continuous oxygen administration is more beneficial than intermittent oxygen therapy.					
10.	Humidification is the best practice to prevent dryness of mucus membrane of upper respiratory tract causing soreness.					
11.	Persons with severe lung disease need to be maintained at the prescribed oxygen saturation range.					
12.	The oxygen is a medicine its administration to the patient is safe and also it is very dangerous					
13.	A patient on oxygen therapy signposts that the patient could be at the end stage of life.					

IV. PRACTICE OF NURSES DURING OXYGEN THERAPY

Please tick the best answer

14. Before oxygen administration nurse :

- A. Assessed patients by using the signs and symptoms and the vital sign
- B. Check the O₂ saturation of patient using pulse oximeter
- C. Took blood sample for blood gas analysis
- D. Observe and think that he is in distress and needs O₂
- E. All of the above**

15. Special monitoring of the patient on oxygen nurse:

- A. Do routine hourly monitoring of the vital signs.
- B. Follow protocol of oxygen administration**
- C. Follow doctor's prescription
- D. Check the O₂ saturation of patient using pulse oximeter
- E. All of the above

16. Pulse oximetry monitoring is affected by

- A. Patient motion or fitting
- B. Carbon-monoxide poisoning
- C. Jaundice and anemia
- D. False nails, nail varnish
- E. All of the above**

17. The best practice on pulse oximetry

- A. The wave form and/or signal strength must be optimal before a reading can be accepted
- B. A blood pressure cuff on the arm of probe will lead to a false SPO₂ reading
- C. A blood pressure cuff on the arm of probe will lead to a correct oxygen saturation reading
- D. A and B**
- E. A and C

18. To reduce the risk of side effects associated with dry gas administration and to promote patient comfort

- A. Use face mask
- B. Use nasal cannula
- C. Attach humidification device**
- D. Attach pulse oximeter probe
- E. All of the above

19. Collection of water in the tubing during oxygen administration

- A. Can partially or completely occlude the flow of oxygen
- B. Empty the collected water in the tubing as needed
- C. Facilitates flow of oxygen and promote patient comfort
- D. A and B**
- E. B and C

20. Oxygen cannot travel easily through wet secretions, so optimize their removal by

- A. Sitting the patient up, or out in a chair
- B. Ensuring mouth is kept moist
- C. Providing tissues and/or a sputum cup
- D. Regularly assessing if a patient can take a deep breath and cough**
- E. All

21. Nasal cannulae

- A. Are suitable for patients with nasal polyps and nasal edema
- B. May cause headaches or dry mucous membranes if flow exceeds 4L/min
- C. Should not be used for those needing over 40% (> 4L/min)
- D. A and B**
- E. B and C

22. Your patient may have difficulty of tolerating and constantly struggling to remove the oxygen delivery device. Most probably this device is

- A. Nasal cannulae
- B. Oxygen mask**
- C. Nasal catheter
- D. Nasal prongs
- E. All of the above

23. High percentage of oxygen 95-100 % (FiO₂) used for short term treatment in trauma achieved by using a device

- A. Nasal catheter
- B. Venturi masks and adapters
- C. Non- rebreathing oxygen mask**
- D. Tracheostomy masks
- E. All of the above

24. Oxygen therapy requires the use of appropriate delivery devices, in our unit we have:

- A. The face mask, nasal prongs, Re- breather mask, T-Piece, ventilator and trachy-mask for patient with tracheotomy
- B. The face mask, nasal prongs, Re- breather mask, T-Piece,
- C. The face mask, nasal prongs, Re- breather mask, , ventilator and trachy-mask for patient with tracheotomy
- D. , The face mask, nasal prongs, and trachy-mask for patient with tracheotomy
- E. , The face mask, nasal prongs, Re- breather mask, ventilator

25. Which nursing care is appropriate during oxygen therapy

- A. Mouth care**
- B. Encourage adequate fluid intake
- C. Apply water based cream if lips or nose become dry
- D. Apply petroleum jelly to minimize inflammation of lips and nose
- E. None

V. ASSOCIATED FACTORS QUESTIONS ON OXYGEN THERAPY

26. Have you trained on oxygen therapy/administration?

- A. Yes
- A. No
- B. I do not know

27. Is there a guideline of oxygen therapy in the currently working unit?

- A. Yes
- B. No
- C. I do not know

28. Do you know that using too little oxygen in area may contribute to carbon dioxide retention?

- A. Yes
- B. No.
- C. I do not know

29. Is there adequate supply of oxygen and delivery systems in your unit?

- A. Yes
- B. No
- C. I do not know

30. Do you think work load/ burden affects oxygen therapy your unit?

- A. Yes
- B. No
- C. I do not know

31. Do you know if your patients administered oxygen, paid/charged for the procedure?

- A. Yes
- B. No
- C. I do not know

32. Do you get the amount of oxygen cylinders equivalent to the label written?

- A. Yes
- B. No
- C. I do not know

**THANK YOU VERY MUCH FOR YOUR TIME AND YOUR UNWAVERING
SUPPORT TO RESPOND COMPLETELY.**