بسم الله الرحمن الرحيم

University of Shendi

Faculty of graduate studies andscientific research

Assessment of knowledge and practice of nurses regarding oxygen therapy in Elmak Nimir University Hospital

A Thesis Submitted in requirements of partial fulfill of M.Sc.Medical Surgical Nursing.

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الآيـــة

﴿وَأَقِيمُوا الصَّلاةَ وَآتُوا الزَّكَاةَ وَمَا تُقَدِّمُوا لأَنفُسِكُم مِّنْ خَيْرٍ تَجِدُوهُ عِندَ اللَّهِ إِنَّ اللَّهَ بِمَا تَعْمَلُونَ بصير﴾

البقرة (110)

Dedication

My since gratitude shall be submitted first to “Allah” who always helps and care for me.

I feel always indebted to “Allah” the most kind and merciful.

To person who gives me force and support me forever, and feeling me secure.

My father

To the person who give me constant source of inspiration, who light my life and always say to me (it’s possible)

My mother

To my brothers for support me and engorgement

To my sister

To my colleges

Researcher

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I would like to thank nursing staff in Elmak Nimer university hospital.

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I would like to thank my teachers in nursing Science College, Shendi University.

ملخص الدراسة

المقدمة :

الاكسجين يعطى للمريض كعلاج تصحيحى فى حالات التى ينتج منها ضيق التنفس الذى يودى الى انخفاض مستوى الاكسجين فى الدم .

دور الممرض او الممرضه فى العلاج بالاكسجين يتضمن الاتى مراقبه المعدل ومستوى التدفق والتاكد من توصيل انبوبه التنفس للمريض ومراقبه مستوى الاكسجين وقياس مدى استجابه المريض للعلاج.

الدراسة:نوع

اجريت هذه الدراسة الوصفية في مستشفي الملك نمر الجامعي في الفترة من يوليو الي نوفمبر 2014.لتقيم معرفه واداء الممرضين و شملت الدراسة 50 من الممرضيين بالمستشفى. تم جمع البيانات باستخدام استبيان قياسي مغلق الاسئلة مكونة من 16 سؤال وايضا قايمه التدقيق الملاحظه.

بعد جمع البيانات تم تحليلها يدويا ومن ثم باستخدام برنامج التحليل الحزمي للبيانات بالحاسوب اصدارة (16.5).

الاهداف:

اجريت الدراسة بغرض تقييم اداء ومعاومات وسلوك الممرضات والمرضين فى عمليه العلاج بالاكسجين وفي مستشفى الملك نمر الجامعي ومدى معرفه الممرضات والممرضين بالاجهزه والادوات المستخدمه فى العلاج بالاكسجين وطريقه التعامل .

ومعرفه اداء الممرضين والمرضات عند القيام بعمليه العلاج بالاكسجين وكيفيه الاعطاء.

النتائج:

توصلت الدراسة الي ان المعرفه متوسطه لدى الممرضين والممرضات ان ضيق التنفس وهو من دواعى العلاج بالاكسجين اتى بنسبه (50%) .

واظهرت الدراسه ان (58%)من الممرضين يختارون الاداة المناسبه لاعطاء الاكسجين على اساس امر الطبيب و(20%)على اساس معدل تركيز الاكسجين فى الدم و(10%)على الاساس المعيارى للاعطاء و(12%)على حسب حاله المريض .

اغلبيه الممرضين والممرضات التى تمثل (88%) كان لديهم اداء صحيح بخصوص اعطاء الاكسجبن عن طريق فراشه الانف بالاضافه الى ذالك الدراسه اظهرت (82%)من الممرضين والممرضات كان لديهم اداء صحيح بخصوص اعطاء الاكسجين عن طريق قناع الوجه .

التوصيات:

توصلت الدراسة الي عدة توصيات تمثلت في تقديم دورات للمرضين والممرضات عن العلاج بالاكسجين واقامه ورش عمل والاهتمام باجراءات السلامه بالنبسه للعلاج بالاكسجين. واقامه برنامج تعليمى مستمر لضمان اداء وفقا للمعاير القياسيه للرعايه التمرضيه وعمل بوسترات توضح خطوات اعطاء الاكسجين وفقا لى للمعاير القياسيه

Abstract

Introduction:

Oxygen (O2) is administered as a corrective treatment for conditions resulting in hypoxia (low level of oxygen in the blood).The role of the nurse in oxygen therapy include monitoring the flow rate, ensuring that the cannula and tubing or other device remain properly placed, and monitoring the patient's response to treatment.

Study design:

Descriptive, hospital-based study, was conducted in Shendi city in Emek Nimir University hospital in2014,study covered 50 nurse in hospital, standard closed ended questioner was been used to data collection and observational check list . The collected data was analyzed manually and then by using Computer software SPSS program version (16.5)

Objectives:

To assess knowledge and practise of nurses regarding oxygen therapy.

Result:

The result showed only half (50%) of nurse know hypoxemia as indication of oxygen therapy**.**

The result showed(58%) based on doctor order selection of appropriate oxygen delivery device (20%) of nurses know based on pao2 ,10% based on guideline , and 12% patient condition. Majority of the nurses which represents(88%) had Proper performances regarding administrating oxygen by nasal cannula. In addition that the study showed that most of the nursing 82% had Proper performances regarding administrating oxygen by face mask.

Recommendations:

The study recommended to Provide staff development about oxygen therapy, safety measure Establish training courses and work shop ,continues educational program to ensure standard quality of nursing care. Provide poster clarify steps of oxygen administration according to standerguideline .

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CHAPTER ONE

- Introduction
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1.1Introduction

Oxygen therapy is the introduction of increased oxygen to the air available for respiration to prevent hypoxia, a condition in which insufficient oxygen is available for the cells of the body, especially those in the brain and vital organs.

Hypoxia may occur in the following circumstances.

Respiratory disease in which the area available for respiration is reduced by, for example: infection ,chronic conditions such as chronic obstructive airways disease and postoperatively when analgesic drugs, e.g. narcotics, may have an effect on respiratory function , in emergency situations, e.g. cardiac or respiratory arrest and cardiogenic , bacteraemic or haemorrhagic shock, as the cardiac output will fall, reducing the amount of oxygenated blood available to the vital organs ,head or spinal injuries.Oxygen must only be administered at the rate and percentage prescribed, as over oxygenation can be dangerous for some individuals, particularly those with chronic lung disease who are retaining carbon dioxide , and infants, where there is also a risk of retinopathy. **(Penelope_2004)**

Oxygen therapy is ordered by the physician when the patient is unable to maintain oxygenation. Many patients are placed on supplemental oxygen when their oxygen saturation is
less than 90 percent on room air. The physician's order should include the method of administration and the flow rate.

A variety of delivery methods are described in the following sections. The role of the nurse in oxygen therapy includes monitoring the flow rate, ensuring that the cannula and tubing or other device remain properly placed, and monitoring the patient's response to treatment. If the patient becomes short of breath while on oxygen therapy, an RT or a

physician should be notified. Instruct the patient to avoid smoking, using electrical equipment, and performing other activities that can cause fire in the presence of oxygen. The RT is knowledgeable about oxygen therapy and is an excellent resource when questions arise. **(Penelope_2004)**

Oxygen administration, like the administration of any drug, is not without hazards. Clients who have chronic pulmonary disease associated with carbon dioxide retention (hypercapnia) may become insensitive to carbon dioxide levels to drive their respiratory rate. Instead, these clients may depend upon a chronic low oxygen level in the blood (hypoxemia) to stimulate their respiratory drive. While low-flow oxygen may be beneficial to these clients, excessive oxygen administration may obliterate that hypoxic drive, resulting in apnea. **.(Suzanne C. Smeltzer etal,2010)**

1.2. Rational

Oxygen therapy is very important procedure because of it is equipment need reprocessing and sterilization and put patient at risk for infection and complication because of that, conducts this study which aim to assess quality of nurses in Knowledge and practise.

1.3 Objectives

General objective:

To assess knowledge and practise of nurses regarding oxygen therapy.

Specific objectives:

- ❖To identify nurses knowledge about indication of oxygen therapy.
- ❖To identify nurses knowledge about oxygen therapy devises selection.
- ❖To assess nurses performance on oxygen administration.

CHAPTER

TWO

- Literature Review

2. Literature review

Oxygen (O2) is administered as a corrective treatment for conditions resulting in hypoxia (low level of oxygen in the blood). Oxygen is classed as a medication and must be prescribed by a doctor and administered correctly to prevent over- or under-oxygenation.

Remember oxygen is NOT flammable, but it does aid combustion.

Patients and visitors should therefore be educated about the increased risk of fire and the precautions necessary to reduce this risk when supplementary oxygen is in use.

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2.1. Administer Oxygen

Oxygen uptake in the pulmonary capillary beds can be improved by increasing the concentration of oxygen in the alveolar air; this increase in the partial pressure of oxygen in the alveoli (PaO2) increases the driving pressure for gas diffusion across the alveolar-capillary membrane. The percentage of oxygen in the inspired air is referred to as the fraction of inspired oxygen, expressed as a percentage; normal atmospheric air has an FiO2 of 21%. Supplemental oxygen delivery systems are capable of increasing the FiO 2to anywhere from 24% to nearly 100% oxygen **.(Suzanne C. Smeltzer etal,2003)**

Oxygen administration, like the administration of any drug, is not without hazards. Clients who have chronic pulmonary disease associated with carbon dioxide retention (hypercapnia) may become insensitive to carbon dioxide levels to drive their respiratory rate. Instead, these clients may depend upon a chronic low oxygen level in the blood (hypoxemia) to stimulate their respiratory drive. While low-flow oxygen may be beneficial to these clients, excessive oxygen administration may obliterate that hypoxic drive, resulting in apnea. **.(Suzanne C. Smeltzer etal,2003)** Another possible hazard of oxygen administration is oxygen toxicity. Prolonged administration of high FiO2 (greater than 50% for more than 24 hours) may actually damage lung tissue and produce severe respiratory difficulties. The mechanisms by which oxygen toxicity occurs are twofold. First, it should be understood that 78% of the inspired air consists of the gas nitrogen. **. .(Suzanne C. Smeltzer etal,2003)**

Although nitrogen is (under normal conditions) physiologically inert, it does serve an important function in the lung: it keeps the alveoli open simply by occupying space. High concentrations of oxygen displace nitrogen from the alveoli; as this oxygen is absorbed by the alveolar

capillary blood, the volume of gas in the alveolar space is reduced and the alveoli collapse. **.(Suzanne C. Smeltzer etal,2003)**

Once the alveoli have collapsed (atelectasis), no airflow occurs and the work of breathing increases dramatically. Second, oxygen in high concentrations is toxic to the type II alveolar cells, which are responsible for the production of surfactant. Surfactant is a substance that assists in keeping the alveoli open by reducing the alveolar surface tension (the tendency of the alveolar walls to collapse upon themselves). Atelectasis results when surfactant is insufficient. **.(Suzanne C. Smeltzer etal,2003)**

Widespread atelectasis due to oxygen toxicity may result in a syndrome known as the adult respiratory distress syndrome (ARDS), which is characterized by diffuse pulmonary edema, severe stiffness of the lung tissue, and profound hypoxemia. **.(Suzanne C. Smeltzer etal,2010)**

Oxygen therapy can be administered as long-term continuous therapy, during exercise, or to prevent acute dyspnea during an exacerbation. The goal of supplemental oxygen therapy is to increase the baseline resting partial arterial pressure of oxygen (PaO2) to at least 60 mm Hg at sea level and an arterial oxygen saturation (SaO 2) at least 90%. Long-term oxygen therapy (more than 15 hours per day) has also been shown to improve quality of life, reduce pulmonary arterial pressure and dyspnea, and improve survival. Long-term oxygen therapy is usually introduced in very severe COPD, and indications generally include a PaO2 of 55 mm Hg or less or evidence of tissue hypoxia and organ damage such as cor pulmonale, secondary polycythemia, edema from right-sided heart failure, or impaired mental status For patients with exercise-induced hypoxemia, oxygen supplementation during exercise may improve performance. There is no evidence to support the idea that short bursts of oxygen before or after exercise provide any symptomatic relief Patients who are hypoxemic while awake are likely to be so during

sleep. Therefore, nighttime oxygen therapy is recommended as well, and the prescription for oxygen therapy is for continuous, 24-hour use. Intermittent oxygen therapy is indicated for patients who desaturate only during exercise or sleep. **.(Suzanne C. Smeltzer etal,2003)**

The main objective in treating patients with hypoxemia and hypercapnia is to give sufficient oxygen to improve oxygenation. Patients with COPD who require oxygen may have respiratory failure that is caused primarily by a ventilation–perfusion mismatch. These patients respond to oxygen therapy and should be treated to keep the resting oxygen saturation above 90%. However, a small subset of patients with COPD and chronic hypercapnia (elevated partial pressure of arterial carbon dioxide levels) may be more oxygen sensitive; their respiratory failure is caused more by alveolar hypoventilation. Administering too much oxygen can result in the retention of carbon dioxide. Patients with alveolar hypoventilation cannot increase ventilation to adjust for this increased load, and increasing hypercapnia occurs. **.(Suzanne C. Smeltzer etal,2003)**Monitoring and assessment are key in the care of patients with COPD on supplemental oxygen. Pulse oximetry is helpful in assessing response to therapy but does not assess PaCO2levels. Optimal oxygenation of patients is important while monitoring for any possible complications of oxygen supplementation.**(Suzanne C. Smeltzer etal,2003)**

2.2. Methods of Oxygen Administration

Oxygen is dispensed from a cylinder or a piped-in system. A reduction gauge is necessary to reduce the pressure to a working level, and a flow meter regulates the flow of oxygen in liters per minute. When oxygen is used at high flow rates, it should be moistened by passing it through a humidification system to prevent it from drying the mucous membranes of the respiratory tract. **(linda.paula2007)**

The use of oxygen concentrators is another means of providing varying amounts of oxygen, especially in the home setting. These devices are relatively portable, easy to operate, and costeffective. However, they require more maintenance than tank or liquid systems and probably cannot deliver oxygen flows in excess of 4 L, which provides an FiO2 of about 36%.**(linda.paula2007)**

Many different oxygen devices are used, and all deliver oxygen if they are used as prescribed and maintained correctly.

The amount of oxygen delivered is expressed as a percentage concentration (eg, 70%). The appropriate form of oxygen therapy is best determined by arterial blood gas levels, which indicate the patient's oxygenation status. **(linda.paula2007)**

Oxygen delivery systems are classified as low-flow or high-flow delivery systems. Low-flow systems contribute partially to the inspired gas the patient breathes. This means the patient breathes some room air along with the oxygen. These systems do not provide a constant or known concentration of inspired oxygen. The amount of inspired oxygen changes as the patient's breathing changes. Examples of low-flow systems include nasal cannula, oropharyngeal catheter, simple mask, and partial-rebreather and non-rebreather masks. High-flow systems provide the total amount of inspired air. A specific percentage of oxygen is delivered independent of the patient's breathing. High-flow systems are indicated for patients who require a constant and precise amount of oxygen. Examples of such systems include transtracheal catheters, Venturi masks, aerosol masks, tracheostomy collars, T-piece, and face tents.

A nasal cannula is used when the patient requires a low to medium concentration of oxygen for which precise accuracy is not essential. This method is relatively simple and allows the patient to move about in bed,

talk, cough, and eat without interrupting oxygen flow. Flow rates in excess of 6 to 8 L/min may lead to swallowing of air; this may cause irritation and drying of the nasal and pharyngeal mucosa. **(linda.paula2007)**

2.2.1. Low-Flow Devices

2.2.1.1Nasal cannula.

The nasal cannula is the most common method of oxygen administration. Oxygen is delivered through a flexible catheter that has two short nasal prongs .

For the nasal cannula to be most effective, the patient must breathe through his or her nose. The cannula allows the patient to eat and talk, and it is generally more comfortable than other methods of administration. If the nasal mucous membranes become dry, an RT can place a water source on the system to humidify the oxygen. Oxygen can be delivered at 1 to 6 L/minute via a nasal cannula, according to the physician's order. **(linda.paula2007)**

2.2.1.2 Masks**.**

Masks are used when a higher oxygen concentration is needed .

A disadvantage to masks is that they make some patients feel claustrophobic. Also, a mask must be replaced by a cannula for eating.

2.2.1.3 Simple face mask.

A rate of 5 to 10 L/minute can deliver oxygen concentrations from 40 to 60 percent with a simple face mask. **(linda.paula2007)**

2.2.1. A partial rebreather mask.

A partial rebreather mask uses a reservoir to capture some exhaled gas for rebreathing. Vents on the sides of the mask allow room air to mix with oxygen. It can deliver oxygen concentrations of 50 percent or greater. **(linda.paula2007)**

2.2.1.5 Nonrebreather mask.

A nonrebreather mask has one or both side vents closed to limit the mixing of room air with oxygen. The vents open to allow expiration but remain closed on inspiration.

The reservoir bag has a valve to store oxygen for inspiration but does not allow entry of exhaled air. It is used to deliver oxygen concentrations of 70 to 100 percent. **(linda.paula2007)**

When a patient is using a partial rebreather or nonrebreather mask, ensure that the reservoir is never allowed to collapse to less than half full. The oropharyngeal catheter is rarely used but may be prescribed for short-term therapy to administer low to moderate concentrations of oxygen. The catheter should be changed every 8 hours, alternating nostrils to prevent infection and nasal irritation. When oxygen is administered via cannula or catheter, the percentage of oxygen reaching the lungs varies with the depth and rate of respirations, particularly if the nasal mucosa is swollen or if the patient is a mouth breather.

Oxygen masks come in several forms. Each is used for different purposes Simple masks are used for low to moderate concentrations of oxygen. The body of the mask itself gathers and stores oxygen between breaths. The patient exhales directly through openings or ports in the body of the mask. If oxygen flow ceases, the patient can draw air in through these openings around the mask edges .Although widely used, these masks cannot be used for controlled oxygen concentrations and must be adjusted for proper fit. They should not press too tightly against the skin, because this may cause a sense of claustrophobia and skin breakdown; adjustable elastic bands are provided to ensure comfort and security. **(linda.paula2007)**

Partial-rebreathing masks have a reservoir bag that must remain inflated during both inspiration and expiration. The nurse should adjust the liter

flow to ensure that the bag does not collapse during inhalation. A higher concentration of oxygen can be delivered because both the mask and bag serve as reservoirs for oxygen. Oxygen enters the mask through small-bore tubing that connects at the junction of the mask and bag. As the patient inhales, gas is drawn from the mask, the bag, and potentially from room air through the exhalation ports. As the patient exhales, the first third of the exhalation fills the reservoir bag. This is mainly dead space and does not participate in gas exchange in the lungs. Therefore, it has a high oxygen concentration. The remainder of the exhaled gas is vented through the exhalation ports. The actual percentage of oxygen delivered is influenced by the patient's ventilatory pattern . **(linda.paula2007)**

Non-rebreathing masksare similar in design to partialre breathing masks except that they have two valves. The first valve is a one-way valve located between the reservoir bag and the base of the mask. The valve allows gas from the reservoir bag to enter the mask on inhalation and prevents gas in the mask from flowing back into the reservoir bag during exhalation. The second valve is a set of valves located at the exhalation ports. These one-way valves prevent room air from entering the mask during inhalation. They also allow the patient's exhaled gases to exit the mask on exhalation. **(linda.paula2007)**

As with the partial-rebreathing mask, it is important to adjust the liter flow so that the reservoir bag does not completely collapse on inspiration. In theory, if the nonrebreather mask fits the patient snugly and both side exhalation ports have one-way valves, it is possible for the patient to receive 100% oxygen, making the non-rebreather a high-flow oxygen system. However, because it is difficult to get an exact fit from the mask on every patient, and some non-rebreather masks have only one one-way exhalation valve, it is nearly impossible to ensure 100% oxygen delivery, making it a low-flow oxygen system. **(linda.paula2007)**

TheVenturi mask is the most reliable and accurate method for delivering precise concentrations of oxygen through noninvasive means. The mask is constructed in a way that allows a constant flow of room air blended with a fixed flow of oxygen. It is used primarily for patients with COPD because it can provide low levels of supplemental oxygen, thus avoiding the risk of suppressing the hypoxic drive. The Venturi mask employs the Bernoulli principle of air entrainment (trapping the air like a vacuum), which provides a high air flow with controlled oxygen enrichment. For each liter of oxygen that passes through a jet orifice, a fixed proportion of room air will be entrained. A precise volume of oxygen can be delivered by varying the size of the jet orifice and adjusting the flow of oxygen. Excess gas leaves the mask through the two exhalation ports, carrying with it the exhaled carbon dioxide. This method allows a constant oxygen concentration to be inhaled regardless of the depth or rate of respiration.

The mask should fit snugly enough to prevent oxygen from flowing into the patient's eyes. The nurse should check the patient's skin for irritation. It is necessary to remove the mask so that the patient can eat, drink, and take medications. **(linda.paula2007)**

The transtracheal oxygen catheter is inserted directly into the trachea and is indicated for patients with chronic oxygen therapy needs. These catheters are more comfortable, less dependent on breathing patterns, and less obvious than other oxygen delivery methods. Because no oxygen is lost into the surrounding environment, the patient achieves adequate oxygenation at lower rates, making this method less expensive and more efficient. TheT-piececonnects to the endotracheal tube and is useful in weaning patients from mechanical ventilation . Other oxygen devices include aerosol masks, tracheostomy collars, andface tents,all of which are used with aerosol devices (nebulizers) that can be adjusted for oxygen

concentrations from 27% to 100% (0.27 to 1.00). If the gas mixture flow falls below patient demand, room air is pulled in, diluting the concentration. **(linda.paula2007)**

The aerosol mist must be available for the patient during the entire inspiratory phase. Although most oxygen therapy is administered as continuous flow oxygen, new methods of oxygen conservation are coming into use. Demand oxygen delivery systems DODS) interrupt the flow of oxygen during exhalation, when the oxygen flow is otherwise mostly wasted. Several versions of DODS are being researched for their effectiveness. Studies show that DODS models conserve oxygen and maintain oxygen saturations better than continuous-flow oxygen when the respiratory rate increases. **(linda.paula2007)**

Hyperbaric oxygen therapy is the administration of oxygen at pressures greater than one atmosphere. As a result, the amount of oxygen dissolved in plasma is increased, which raises oxygen levels in the tissues. It is administered through a small (single patient use) or large (multiple patient use) cylinder chamber. During therapy, the patient is placed in the chamber. Hyperbaric oxygen therapy is used to treat conditions such as air embolism, carbon monoxide poisoning, gangrene, tissue necrosis, and hemorrhage. Other uses for this therapy include treatment for multiple sclerosis, diabetic foot ulcers, closed head trauma, and acute myocardial infarction. Research continues in the area of hyperbaric oxygen use because of potential side effects, including ear trauma, central nervous system disorders, and oxygen toxicity **(linda.paula2007)**

2.2.2High-Flow Devices

2.2.2.1. VENTURI MASK.

A Venturi mask is used for the patient who requires precise percentages of oxygen, such as the patient with chronic lung disease with CO2 retention.

A combination of valves and specified flow rates determines oxygen concentration.

2.2.2.2. Transtracheal Catheter

A transtracheal catheter is a small tube that is surgically placed through the base of the neck directly into the trachea to deliver oxygen.

This is an attractive alternative for some patients who are on long-term oxygen therapy at home because it does not obstruct the nose or mouth and can be easily covered with a loose scarf or collar.

The patient is taught to remove and clean the catheter two or three times a day to prevent mucus obstruction. Check institution policy and procedure and the respiratory care department for specific care instructions. **(linda.paula2007)**

2.3.Risks of Oxygen Therapy

Patients with chronic obstructive pulmonary disease (COPD) have chronically high PaCO2 levels. Therefore, they depend on low PaO2 levels to stimulate breathing, and high supplemental oxygen flow rates can depress respirations. Patients with COPD should be maintained on no more than 1 to 2 L of oxygen per minute. Occasionally, hospitalized patients receive higher flow rates, but they must be carefully monitored.In addition, any patient can suffer lung damage from high oxygen concentrations delivered for more than 24 hours. If a patient exhibits symptoms of dry cough, chest pain, numbness in the extremities,

lethargy, or nausea, the physician should be contacted. A PaO2 greater than 100 mm Hg should also be reported**. (linda.paula2007)**

2.4.Indications

A change in the patient's respiratory rate or pattern may be one of the earliest indicators of the need for oxygen therapy. The change in respiratory rate or pattern may result from hypoxemia or hypoxia. **Hypoxemia** (a decrease in the arterial oxygen tension in the blood) is manifested by changes in mental status (progressing through impaired judgment, agitation, disorientation, confusion, lethargy, and coma), dyspnea, increase in blood pressure, changes in heart rate, dysrhythmias, central cyanosis (late sign), diaphoresis, and cool extremities. Hypoxemia usually leads to **hypoxia**, which is a decrease in oxygen supply to the tissues. Hypoxia, if severe enough, can be life-threatening. The signs and symptoms signaling the need for oxygen may depend on how suddenly this need develops. With rapidly developing hypoxia, changes occur in the central nervous system because the higher neurologic centers are very sensitive to oxygen deprivation. The clinical picture may resemble that of alcohol intoxication, with the patient exhibiting lack of coordination and impaired judgment. Longstanding hypoxia (as seen in chronic obstructive pulmonary disease [COPD] and chronic heart failure) may produce fatigue, drowsiness, apathy, inattentiveness, and delayed reaction time. The need for oxygen is assessed by arterial blood gas analysis and pulse oximetry as well as by clinical evaluation. For more information about hypoxia, **(*Suzanne* -2003)**

2.5.Cautions in Oxygen Therapy

As with other medications, the nurse administers oxygen with caution and carefully assesses its effects on each patient. Oxygen is a medication and except in emergency situations is administered only when prescribed by a physician. In general, patients with respiratory conditions are given

oxygen therapy only to raise the arterial oxygen pressure back to the patient's normal baseline, which may vary from 60 to 95 mm Hg. In terms of the ox hemoglobin dissociation curve the blood at these levels is 80% to 98% saturated with oxygen; higher inspired oxygen flow values add no further significant amounts of oxygen to the red blood cells or plasma. Instead of helping, increased amounts of oxygen may produce toxic effects on the lungs and central nervous system or may depress ventilation It is important to observe for subtle indicators of inadequate oxygenation when oxygen is administered by any method. Therefore, the nurse assesses the patient frequently for confusion, restlessness progressing to lethargy, diaphoresis, pallor, tachycardia, tachypnea, and hypertension. Intermittent or continuous pulse oximetry is used to monitor oxygen levels. **(*Suzanne* -2003)**

2.6.Oxygen Toxicity.

Oxygen toxicity may occur when too high a concentration of oxygen(greater than 50%) is administered for an extended period (longer than 48 hours). It is caused by overproduction of oxygen free radicals, which are byproducts of cell metabolism. If oxygen toxicity is untreated, these radicals can severely damage or kill cells. Antioxidants such as vitamin E, vitamin C, and beta-carotene may help defend against oxygen free radicals. The dietitian can adjust the patient's diet so that it is rich in antioxidants; supplements are also available for patients who have a decreased appetite or who are unable to eat. Signs and symptoms of oxygen toxicity include substernal discomfort, paresthesias, dyspnea, restlessness, fatigue, malaise, progressive respiratory difficulty, and alveolar infiltrates evident on chest x-rays. **(*Suzanne* -2003)**

Prevention of oxygen toxicity is achieved by using oxygen only as prescribed. If high concentrations of oxygen are necessary, it is important to minimize the duration of administration and reduce its concentration as

soon as possible. Often, positive end expiratory pressure or continuous positive airway pressure is used with oxygen therapy to reverse or prevent microatelectasis, thus allowing a lower percentage of oxygen to be used. The level of PEEP that allows the best oxygenation without hemodynamic compromise is known as "best PEEP." **(*Suzanne* -2003)**

2.7. Nursing Assessment and Interventions

Assess need for oxygen by observing for symptoms of hypoxia:Tachypnea.Sao_2 < 88%.Tachycardia or dysrhythmias (premature ventricular contractions).A change in level of consciousness (symptoms of decreased cerebral oxygenation are irritability, confusion, lethargy, and coma, if untreated). **(Nettina, Sandra2006)**

Cyanosis occurs as a late sign (PaO_2 % 45 mm Hg). Labored respirations indicate severe respiratory distress.Myocardial stress increase in heart rate and stroke volume (cardiac output) is the primary mechanism for compensation for hypoxemia or hypoxia; pupils dilate with hypoxia.

Obtain ABG values and assess the patient's current oxygenation, ventilation, and acid-base status. Administer oxygen in the appropriate concentration. Low concentration (24% to 28%) may be appropriate for patients prone to retain CO_2 ,who are dependent on hypoxemia (hypoxic drive) to maintain respiration. If hypoxemia is suddenly reversed, hypoxic drive may be lost and respiratory depression and, possibly, respiratory arrest may occur. Monitor $PaCO_2$ levels. High concentration (30%) if hypoxemia is suddenly reversed, hypoxic drive may be inhibited and respiratory depression and, possibly, respiratory arrest may occur. High concentrations are appropriate in patients not predisposed to CO_2 retention. Monitor response by oximetry and/or ABG sampling. Increase or decrease the inspired oxygen concentration (FIO_2), as appropriate. **(Nettina, Sandra2006)**

CHAPTER

THREE

- **Methodology**

Methodology

3.1. Study design:-

This was descriptive, cross-sectional hospital-based study. conducted to assess nurse`s knowledge regarding oxygen therapy in Elmak Nemir university hospital in Shendi city.

3.2. Study duration:-

This was conducted during the period which extends from May 2014 to November 2014.

3.3. Study area:-

This was conducted in Shendi city, river Nile state, Sudan, which located in the north of Khartoum about 176 Km, it`s population about 80000 persons (WHO 2003) most of them are farmers.

Shendi city now is one of the rich cities in health care facilities; it contains three main hospitals, Elmak Nemir University hospital. , Shendi teaching hospital and military hospital, and also there is hush bannaga hospital and elmiseiktab hospital

3.4. Setting:-

Elmak Nemir University hospital was established since 2002. And it's the second university hospital in Sudan. The hospital provides most types of medical services (medicine, surgery, Obs&Gyne, and paediatric). Beside these there are cardiac, renal, and oncology centres). In the hospital there is a big theatre complex in which most types of general operations can be done (caesarean, GIT surgery and orthopaedic surgery …etc.). There was two diabetic outpatient clinics in the hospital established science 2009 ,one for adult and other for children , which composed of three rooms ,laboratory ,doctor and nursing follow-up care

room which provide care , follow up and teaching for the diabetic patients. Inthis clinic there are nurses rotate the duty among them, doctors and physician, the clinic work every Thursday from eight o'clock to midday.

The hospital system for work , for nursing staff , morning shift for 8 hours in duration, and afternoon , evening shift for 16 hours, and is the distribution of nursing staff according to need of hospital departments ,nurses they will rotated frequently without fixed intervals according to the need.

3.5. Study population:-

Include all nurse`s staff members during the time of the study.

3.6. Sampling &Sample size:-

The study included 50 nurses of staff members. They was selected by simple random sample

3.7. Data collection tools:

Tow tools were used firstly standard closed ended filled questioner was be developed by researcher according to the available Literature, and composed of (16) questions:-

Part one: - contain question about demographic data (level of education, experience years, area of work, training courses).

Part two: - question about nurses knowledge about indication, contraindication, caution, equipment, level of administration …etc)

Observational check list have been modified by the researcher rated by:-

- Proper for standard nursing practice and scored by 2 mark
- Improper for non standard nursing practice scored by 1 mark
- Not done scored by zero mark

3.8. Data collection technique: -

The data was collected daily during three weeks and the three shift, the nurses were allowed to fill questionnaire by them, it look about (5-8) minutes, no one refuse to participate and there was no missing.

3.9. Data analysis:

The data was analyzed by using computer software "statistical package for social sciences"SPSS program version (16.5) and presented in forms of tables and figures.

3.10. Ethical consideration:-

The proposal was approved from the scientific committee board, and then permission was taken from general hospital manger and the head nurse to conduct the research.

The purpose of the study has been explained verbally clearly to participant and their information should be used for the purpose of study only and there have chance to continuous, or stopped at any time they wish.

CHAPTER

FOUR

- **Results**

4. Result

Table No (1) Distribution of nurses according to their education level.

Level of education	Frequency	Percent
Diploma	4	8%
Bachelor	41	82%
Master	5	10%
Total	50	100%

The above table showed that 8 % o nurse have diploma, 82%bachelora and 10%master degree.

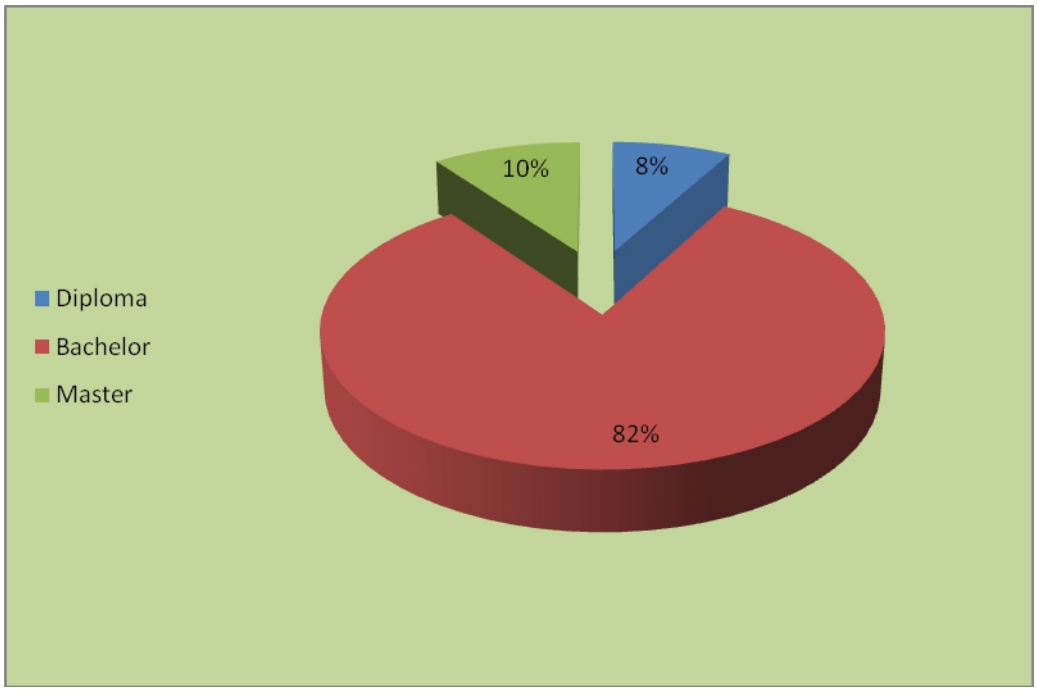

Figure No (1): distribution of nurses` according to their education level.

Table No (2) distribution of nurses according to the experience duration.

the experience level	Frequency	Percent
less than one years	7	14%
1-2 years	19	38%
3-5 years	15	30%
more than 5 years	9	18%
Total	50	100%

The above table showed 14% of nurses less than one years , 38% 1-2 years ,30% 3- 5years and 18% more than 5 years.

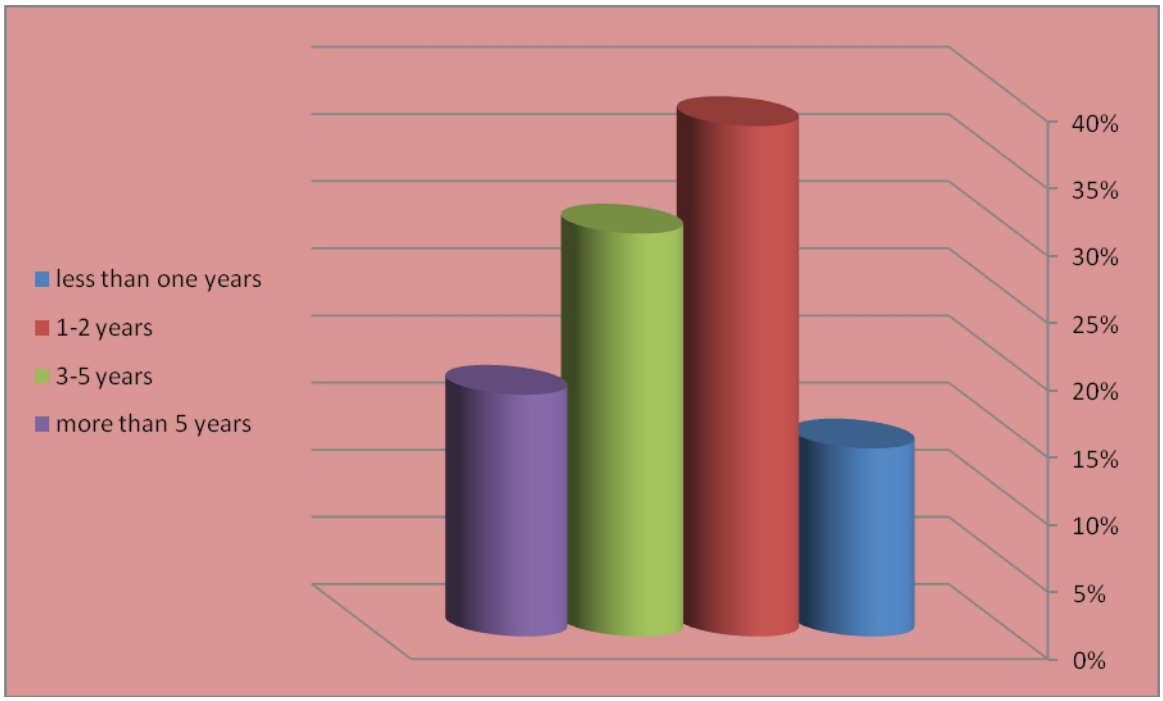

Figure No (2): distribution of nurses according to the experience years.

Table No (3) distribution of nurses according to the area of work

area of work	Frequency	Percent
ICU	12	24%
CCU	10	20%
Medicine	3	6%
Surgery	2	4%
Obs &gyna	16	32%
Oncology	3	6%
Nursery	2	4%
Dialysis	2	4%
Total	50	100%

The above table showed 24% of nurses work in intensive care unit, 20% cardiac care unit ,6% medicine , 4% surgery 32%obs &Gyna 6%oncology ,4% nursery and 4% dialysis .

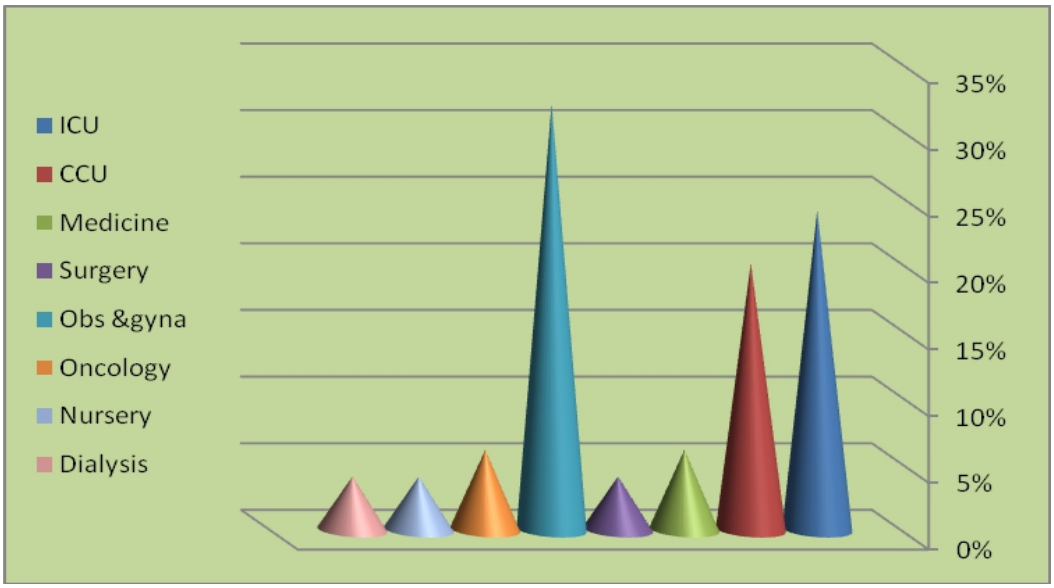

Figure No (3): distribution of nurses according to the area of working area.

Table No (4) distribution of nurses according to the training course

training course	Frequency	Percent
Never	50	100%
One	0	0%
Twice	0	0%
Total	50	100%

The above table showed all of nurses never attending training course.

Table No (5) Distribution of nurses according to the knowledge about indication of oxygen therapy.

indication of oxygen therapy	Frequency	Percent
Hypoxemia	25	50%
increased work of breathing	6	12%
increased myocardial work	12	24%
pulmonary hyperventilation	7	14%
Total	50	100%

The above table show 50% of nurse know hypoxemia as indication ,12% increased work of breathing ,24%incresed myocardial and 14%pulmonary hyperventilation as indication of o2 therapy .

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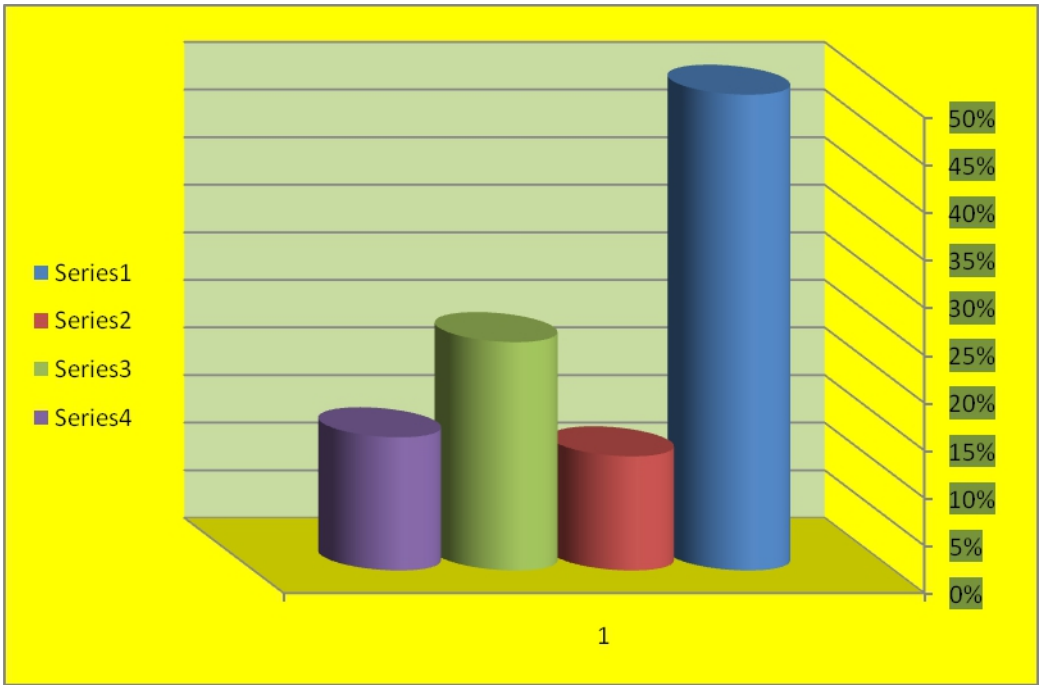

Figure No (4): Distribution of nurses according to the knowledge about indication of oxygen therapy

Table No (6) Distribution of nurses according to the knowledge about contraindication of oxygen therapy.

contraindication of oxygen therapy	Frequency	Percent
no absolute contraindication	5	10%
chronic carbon dioxid retention	23	46%
fire hazard	12	24%
related to danger of hypoxia	10	20%
Total	50	100%

The above table showed 10% of nurses know no absolute contraindication ,46% chronic carbon dioxid retention ,24% fire hazard and 20% related to danger of hypoxia as contraindication of oxygen therapy .

Table No (7) Distribution of nurses according to the knowledge about selection of appropriate oxygen delivery device.

selection of appropriate oxygen delivery device	Frequency	Percent
based on pao2	10	20%
based on guideline	5	10%
based on doctor order	29	58%
patient condition	6	12%
Total	50	100%

The above table show 20% of nurses know based on pao2 ,10% based on guideline ,58% based on doctor order and 12% patient condition .

Table No (8) Distribution of nurses according to the knowledge about oxygen administered by right rate, percentage and level.

Oxygen administered as	Frequency	Percent
Rat	17	34%
Percentage	18	36%
Level	15	30%
Total	50	100%

The above table show 34%of nurses know rate, 36% of nurses know percentage and 30% of nurses know level.

Table No (9) Distribution of nurses according to the knowledge about caution in oxygen therapy.

caution in oxygen therapy	Frequency	Percent
carefully assesses its effect on each patient	15	30%
oxygen is a medication	10	20%
prescribed by physician	19	38%
the nurse assesses the patient frequently	6	12%
Total	50	100%

The above table show 30% of nurses had knowledge about carefully assesses its effect, 20% oxygen is medication, 38% prescribed by physician and 12% the nurse assess the patient frequently.

Table No (10) Distribution of nurses according to the knowledge about method of oxygen therapy.

method of oxygen therapy	Frequency	Percent
low flow system	24	48%
high flow system	26	52%
Total	50	100%

The above table show 48% of nurses had knowledge about low flow system and 52% high flow system.

Table No (11) Distribution of nurses according to the knowledge about oxygen equipment.

Equipment	Frequency	Percent
Mask	18	36%
nasal canula	19	38%
flow meatar	2	4%
conecting tube	3	6%
Humidifier	3	6%
wall cylinder o2 supply	5	10%
Total	50	100%

The above table show 36% of nurses had knowledge about mask ,38% nasal canula ,4% flow meatar ,6% connecting tube ,6%humidifier and 10%wall cylinder o2 supply .

Table No (12) Distribution of nurses according to the knowledge about oxygen concentration delivered by nasal canula.

oxygen concentration deliver by nasal canula	Frequency	Percent
22-24%	12	24%
36-40%	18	36%
40-44%	20	40%
Total	50	100%

The above table show 24% of nurses had knowledge from 22-24% ,36% from 36-40%, 40%from 40-44% .

Table No (13) Distribution of nurses according to the knowledge about nursing care for patient who receiving oxygen by nasal cannula.

nursing care for patient takes oxygen by nasal canula	Frequency	Percent
keep nosepieces clean	39	78%
evaluate for presser sore over ears	11	22%
Total	50	100%

The above table show 78% of nurses had knowledge about keep nosepieces clean and 22%evaluate for presser sore over ears.

Table No (14) Distribution of nurses according to the knowledge about problem associated with face mask.

problem association with face mask	Frequency	Percent
mask need to be removed	33	66%
tight seal can cause facial irritation	9	18%
can feel hot	8	16%
Total	50	100%

The above table show 66% of nurses had knowledge about mask need to be removed,18% tight seal can cause facial irritation and 16% can feel hot .

Table No (15) Distribution of nurses according to the knowledge about general consideration in oxygen therapy.

general consideration in o2 therapy	Frequency	Percent
Alcohol ether and other Inflammatory	15	30%
Smoking	25	50%
kept secure position	10	20%
Total	50	100%

The above table show 30% of nurses had knowledge about alcohol ether and other Inflammatory**,** 50%smoking and 20% keep secure position.

Table No (16) Distribution of nurses according to the knowledge about assessment of patient response.

Nurses assess the patient response	Frequency	Percent
oxygen saturation	18	36%
quality and rate of respiration	2	4%
vital sing	22	44%
comfort level	8	16%
Total	50	100%

The above table show 36% of nurses had knowledge about oxygen saturation, 18%quality and rate of respiration, 44% vital sing and 16% comfort level.

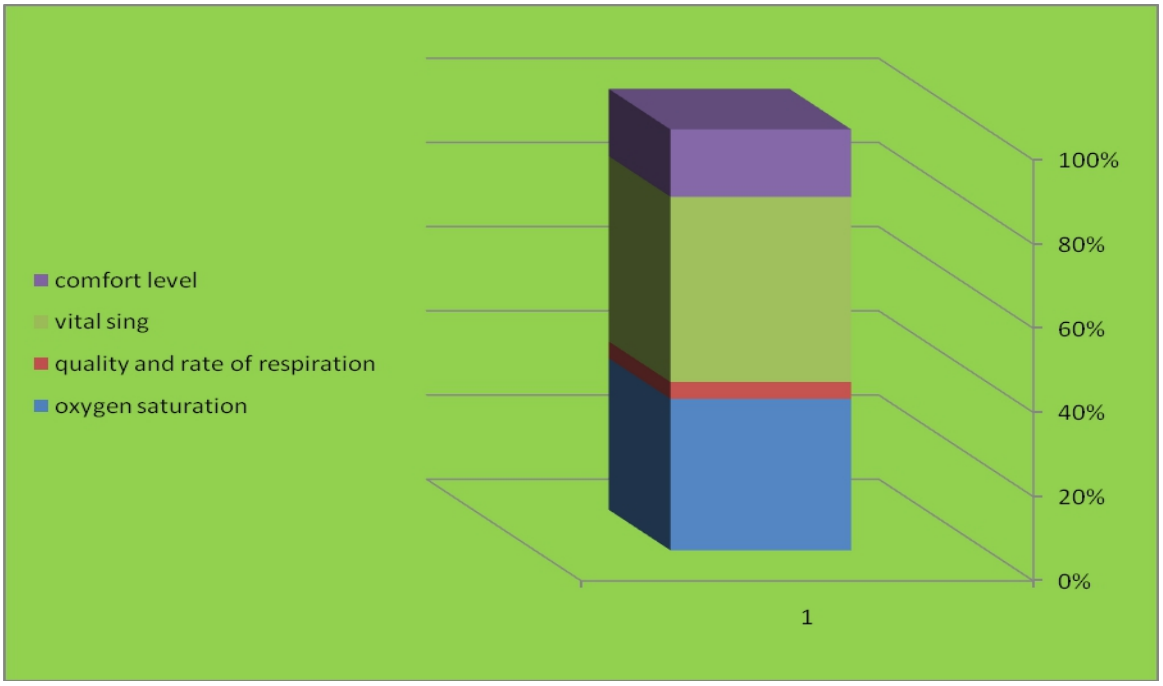

Figure No (5): the distribution of nurses according to the knowledge assess the patient response.

***Table No (17)* The relation between nurses level of education and knowledge about assessment the patient response .**

Level of education	Assess the patient response				*Total*	*P.value*
	oxygen saturation	quality and rate of respiration	vital sing	comfort level		
Diploma	4	0	0	0	4	*0.5*
Bachelor	14	2	22	3	41	
Master	0	0	0	5	5	
Total	18	2	22	8	50	

**Significant at P.value ≤ 0.05*

***Highly Significant at P.value ≤ 0.01*

****In Significant at P.value* (0.5)

Table No (18) The relation between nurses experience level and their about know cautions in oxygen therapy.

Experience level	Cautions in oxygen therapy				*Total*	*P.value*
	carefully assesses its effect on each patient	**oxygen is medication**	**prescribed by physician**	**the nurse assesses the patient frequently**		
Less than one years	7	0	0	0	7	***0.9***
1-2 years	8	10	1	0	19	
3-5 years	0	0	15	0	15	
more than 5 years	0	0	3	6	9	
Total	15	10	19	6	50	

**Significant at P.value ≤ 0.05*

***Highly Significant at P.value ≤ 0.01*

****In Significant at P.value*(0.9)

***Table No (19): The relation between* The indication of oxygen and oxygen concentration delivered by nasal canula**

The indication of oxygen	Oxygen concentration deliver by nasal canula			*Total*	*P.value*
	22-24%	**36-40%**	**40-44%**		
Hypoxemia	12	13	0	25	*0.7*
increased work of breathing	0	5	1	6	
increased myocardial work	0	0	12	12	
pulmonary hyperventilation	0	0	7	7	
Total	12	18	20	50	

**Significant at P.value ≤ 0.05*

***Highly Significant at P.value ≤ 0.01*

****In Significant at P.value*(0.7)

Table No (20): Nursing practices during administration of oxygen by face mask and nasal cannula.

Method	*Performance*						Mean	Std. Deviation
	Proper		*Improper*		*Not don*			
	frequency	*Percentage*	*frequency*	*Percentage*	*Frequency*	*percentage*		
face mask	**41**	**82%**	**9**	**18%**	***0***	***0%***	**1.2**	**.39**
nasal cannula	**44**	**88%**	**6**	**12%**	***0***	***0%***	**1.1**	**.3**

N=50

CHAPTER

Five

- Discussion
- Conclusion
- Recommendation

5.1. Discussion

Oxygen therapy improves tissue oxygenation, There are several indications for oxygen therapy: Hypoxia/hypoxemia, decreased cardiac output, increased oxygen demand, decreased oxygen carrying capacity, increased myocardial work load and procedures that may cause hypoxemia.

The study revealed that most of the nurses where varied in their educational level (82%) had bachelor degree (8%) had diploma degree and (10%) had master degree. The result showed only half (50%) of nurse know hypoxemia as indication of oxygen therapy, this might due to poor knowledge about other indication of oxygen therapy. In addition that the study showed that all of the nursing staff (100%) had not training course, this might due to hospital not have staff development program.

The result showed(58%) based on doctor order selection of appropriate oxygen delivery device (20%) of nurses know based on pao2 ,10% based on guideline , and 12% patient condition this might due to hospital polices. More one that the study found about nurses opinions for general consideration in oxygen therapy(50%),said keeping oxygen away from smoking,(30%)for said keeping oxygen away from alcohol and other inflammatory ,(20%) keep oxygen cylinder in secure position.

More one the study showed that there was insignificant relation P.value(0.70),between nurses knowledge about the indication at oxygen and oxygen concentration deliver by nasal canula this might due to hospital polices not have staff development program. the study showed that most of nurses staff (78%)had keep nosepieces clean in nursing care. in addition that the study showed that most of the nurses (66%) said mask need to be removed , these might be due to nurses had good knowledge about nursing care about oxygen therapy.

Majority of the nurses which represents (88%) had proper performances regarding administrating oxygen by nasal canula, and (82%) had Proper performances regarding administrating oxygen by face mask these might be due to nurses had good practise about oxygen therapy**.**

5.2. Conclusion

The study concluded the following:

- The majority of nurses (82%) have bachelor degree.
- One third of the nurses (38%) had experience level (1-2) years.
- All the nurses are not receiving training course in oxygen therapy.
- Half of nurses (50%) knows hypoxemia as indication of oxygen therapy, this might due to poor knowledge about other indication of oxygen therapy.
- The result showed(58%) based on doctor order selection of appropriate oxygen delivery device (20%) of nurses know based on pao2 ,(10%)based on guideline , and(12%) patient condition
- Majority of the nurses which represents 88% had Proper performances regarding administrating oxygen by nasal cannula.
- In addition that the study showed that most of the nursing 82% had Proper performances regarding administrating oxygen by face mask.

5.3. Recommendation

To the hospital manager and head nurse have to :-

- Provide staff development about oxygen therapy, safety measure
- Establish training courses and work shop, continues educational program to ensure standard quality of nursing care.
- Provide poster clarify steps of oxygen administration according to standard guideline.

Appendices

- References
- Appendix

6. References

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بسم الله الرحمن الرحيم

Faculty of graduate studies and scientific research

Questioner about assessment KAP of nurses regarding O2 therapy in Elmak Nemir university hospital 2014

No ( )

1- level of education:

a. diploma ( ) b .bachelor ( ) c. master ( )

2-experience years:

a. less than one year ( ) b.1-2years( ) c.3-5 years( ) d.more than 5 years( )

3-Area of work (unit):

a.ICU ( ) b.CCU ( ) c. dialysis( ) d .Medicine e. Surgery ( ) f . Obs and Gyne ( ) g. Pediatric ( ) h. oncology( ) i.Nursery( ).

4-previous training course in O2 therapy :

a. one ( ) b. two or more ( ) c. never **( ).**

5. Indication for oxygen administration is :

a. hypoxemia ( ) b. increased work of breathing ( ).

c. increased myocardial work ( ) d. pulmonary hyperventilation ( ).

6. contraindicating to oxygen administration :

a. no absolute contraindication ( ).

b. chronic carbon dioxid retention ( ).

c. related to dangers of hyperoxemia ( ).

d. fire hazard ( ).

7. Selection of an appropriate oxygen delivery device must be :

a. based on PaO2 ( ). b. based on guideline ( )

c. based on doctor order ( ) d. patent condition( ) .

8. Oxygen must be only administered at the :

a. rate ( ) b. percentage ( ) c. level ( ).

9. Cautions in oxygen therapy:

a. carefully assesses its effects on each patient ( ).

b. Oxygen is a medication ( ).

c. prescribed by a physician ( ).

d. the nurse assesses the patient frequently for confusion, restlessness

Progressing to lethargy, diaphoresis, pallor, tachycardia ( ).

10. The methods of O2 therapy are:

a. low flow system ( ). b. high flow system( ).

11. What equipment is need for oxygen therapy:

a. mask ( ) b. nasal canula ( ) c. flow meter( ) d. connecting tube ( ) e. humidifier ( ). f. wall cylinder o2 supply ( ) .

12. approximated oxygen concentration delivered by nasal canula is :

a. 22 -24 % ( ) b. 26 -28 % ( ) c. 32 -36 %( )

d.36 -40 % ( ) e. 40 -44 % ( ) .

13. Nursing care for patient receiving oxygen by nasal canula:

a. keep nosepieces clean ( ).

b. evaluate for presser sore over ears, cheeks and noses ( ) .

c. lubricate nasal prongs ( ) .

14. Problems associated with simple face mask:

a. mask needs to be removed for eating and drinking ( ).

b. tight seal can cause facial irritation ( ). c. can feel hot ( ).

d. cause anxiety in same people (child) ( ) .

15. what the general consideration of o2 administration :

a. oil or grease around o2 connections should be avoided ( ) .

b. alcohol ,ether and other inflammatory liquid should be used with the caution in vicinity of oxygen ( ).

c.smoking in the vicinity of oxygen ( ).

d. oxygen cylinders should be kept secure position ( )

16. Assessment of patient's response:

a. Oxygen saturation, and compare to baseline ( ).

b. Quality of and rate of respirations, and compare to baseline ( ).

c Vital signs, and compare to baseline ( ) .

d. Comfort level ( ) .

بسم الله الرحمن الرحيم

Faculty of graduate studies and scientific research

Assessment KAP of nurses regarding O2 therapy in Elmak Nemir university hospital 2014

Observational Check List: Oxygen therapy through face mask

STEPS	Done		Not done
	Proper	Improper	
1. Checked physician's orders for mode of oxygen delivery & prescribed oxygen liter flow.			
2. Explain the procedure to the patient.			
3. Hand washing.			
4. Apply employed safety precautions for oxygen administration.			
5. Checked size of face mask to make sure it fit client.			
6. Turned on oxygen flow to liters prescribed. If reservoir bag was attached, partially inflated it with oxygen.			
7. Placed client in semi- or high-fowler's position.			
8. Fit mask to patient's face from nose downward during expiration. If reservoir bag attached, oxygen flowed at a level to prevent bag from collapsing.			
9. Placed elastic band around patient head.			
10. Stay with client until patient felt comfortable with mask.			
11. Assessed patient's condition by checking vital signs and oxygen saturation.			
12. Changed mask & tubing according to agency policy & provided skin care to face.			
13. Checked equipments frequently. If humidifier attached, checked Water level disposed.			