Evalyn Namubiru & Yvonne Ewane

GIVING OXYGEN TO PATIENT

Clinical guidebook for nursing students

Degree Programme in Nursing

2020

samk
Satakunnan ammattikorkeakoulu
Satakunta University of Applied Sciences

GIVING OXYGEN TO PATIENT

Clinical Guidebook for Nursing Students

Ewane, Yvonne & Namubiru, Evalyn
Satakunta University of Applied Sciences
Degree Programme in Nursing
December 2020
Number of pages: 33
Appendices: 3

Keywords: oxygen therapy, nursing students, clinical guidebook, oxygen safety and wall oxygen outlet.

The purpose of this project-base thesis is to produce an easy to read instructional clinical guidebook for international nursing students dealing with oxygen delivery from wall oxygen outlet using facemask and nasal cannula in a hospital setting. This guidebook will contain pictures of the various equipment that hospital uses when giving oxygen to patients. It will also contain the instructional text on how equipment is being managed safely when administering oxygen. The text will be evidence based.

The objective of this thesis was that nursing students could use the information of the instructional guidebook in developing their own skills and acquire knowledge on how to administer oxygen as safely as possible. The thesis deals with the human respiratory system, respiratory insufficiency, safe oxygen therapy, and the devices needed for oxygen administration from wall oxygen outlet in a hospital environment. Our objective was to improve our theoretical knowledge and practical skills about oxygen administration and produce understandable guidebook, which can be published on SAMK´s library website.

The theoretical part of the thesis deals with the basics of oxygen administration and the tools used for it, human respiratory system, respiratory insufficient that require oxygenation, and methods for helping a patient in need of oxygen therapy with safe care using wall oxygen supply. The final product is an instructional guidebook. The guidebook contains pictures of the most common oxygen supply devices as well as general instructions for oxygen supply based on oxygen saturation. After using the guidebook, it would be easier for the student to start deepening their oxygen therapy skills.

Thesis of this kind, the authors benefit in the form that they gain important, performance, professionality, experience and certainty in their future profession. Completing the thesis has served our professional growth, especially from the perspective of peer education.

CONTENTS

1 INTRODUCTION

Oxygen administration is used for a variety of purposes which include, treatment of respiratory diseases affecting gaseous exchange, carbon monoxide exposure, elevated metabolic need and improving of oxygenation while giving anaesthesia. The aerosphere is made of roughly 21 percent of oxygen. When altitude rises, the percent of oxygen in the air lowers in the atmosphere thus need for extra oxygen which is given through a nasal cannula, Oxygen mask (Venturi, simple, non-rebreather mask) or attached into a continuous positive airway pressure (CPAP) or bilevel positive airway pressure system (BiPAP). The ventilator helps to deliver oxygen to patients who are intubated. (Weekley et al. 2019)

The purpose of this project-base thesis was to produce an easy to read instructional clinical guidebook for international nursing students dealing with oxygen delivery from wall oxygen outlet using facemask and nasal cannula in a hospital setting. This guidebook will contain pictures of the various equipment use in hospital, when giving oxygen to patients. It will also contain the instructional text on how this equipment are being managed safely in administering oxygen.

The objective of this thesis was that nursing students could use the information of the instructional guidebook in developing their own skills and acquire knowledge on how to administer oxygen as safely as possible. The thesis deals with the human respiratory system, respiratory insufficiency, safe oxygen therapy, and the devices needed for oxygen administration
from wall oxygen outlet in a hospital environment.

The Satakunta University of Applied Sciences authorises this thesis due to how beneficial the instructional guidebook will be to the nursing students as it will give them an opportunity to get acquainted on how oxygen is administered. We consider it is necessary to put

together a guidebook on the subject, which will make the nursing student more confident when giving oxygen to the patient. We think this guidebook will be useful for the nursing students of Satakunta University of Applied sciences, as it will allow nursing students to develop their own safety oxygen delivery skills so that when they graduate. The guidebook will also give nursing students great insights into the importance, rationale, procedure and steps, and safety considerations in oxygen therapy.

2 HUMAN RESPIRATORY SYSTEM

Human respiratory system consists of tissues and organs that help gaseous exchange to take place between cardiovascular system and the surroundings. This consists of the upper and lower respiratory tract, the respiratory muscles, and the lung tissue responsible for respiration. The upper respiratory tract includes the nasal cavity, pharynx and larynx while the lower respiratory tract includes the trachea, primary bronchi and bronchioles. The purpose of respiration is to supply enough oxygen to the body and to remove carbon dioxide produced in the body gas exchange. Every cell in the body constantly needs oxygen and it is essential for human vital functions. (Peate & Nair, 2015, 49- 54)

When breathing, there is gaseous exchange of air inside and outside the lungs which is termed as lung ventilation. This helps to keep the sufficient alveolar ventilation, provides enough oxygen to the tissues and removes carbon dioxide in the alveoli, which is produced by cells from the lungs and is based on pressure fluctuations in the chest cavity. During respiration the most useful muscles are the diaphragm and the intercostal muscles (Figure 1). The respiratory muscles are divided into inhaled and exhaled muscles and the internal intercostal muscles of the exhaled muscles. (Peate & Nair, 2015, 49- 54)

Inhalation also known as breathing, is the uptake of oxygen and the removal of carbon dioxide in the lungs. Before inhalation the pressure in the lungs is the same as the atmospheric pressure (760 mm Hg). Inhalation has main inhalation muscles which includes the

outer intercostal muscles as well as the diaphragm used to achieve thoracic expansion during inspiration. The diaphragm which is the main useful muscle has 75% of the air that goes to the lungs as a result of diaphragmatic contraction. (Peate & Nair, 2015, 49- 54)

Exhalation also known as breathing out is as a result of the pressure exerted in the lungs which is more than in the atmosphere and it is a passive phase where no skeletal muscles are involved in the process. During activities like physical activities the inner intercostal and the abdominal muscles, contract and overpressure develops in the lungs and this results to the inferior ribs move downwards and compress the abdominal viscera and the diaphragm moves upwards. (Peate & Nair, 2015, 49- 54)

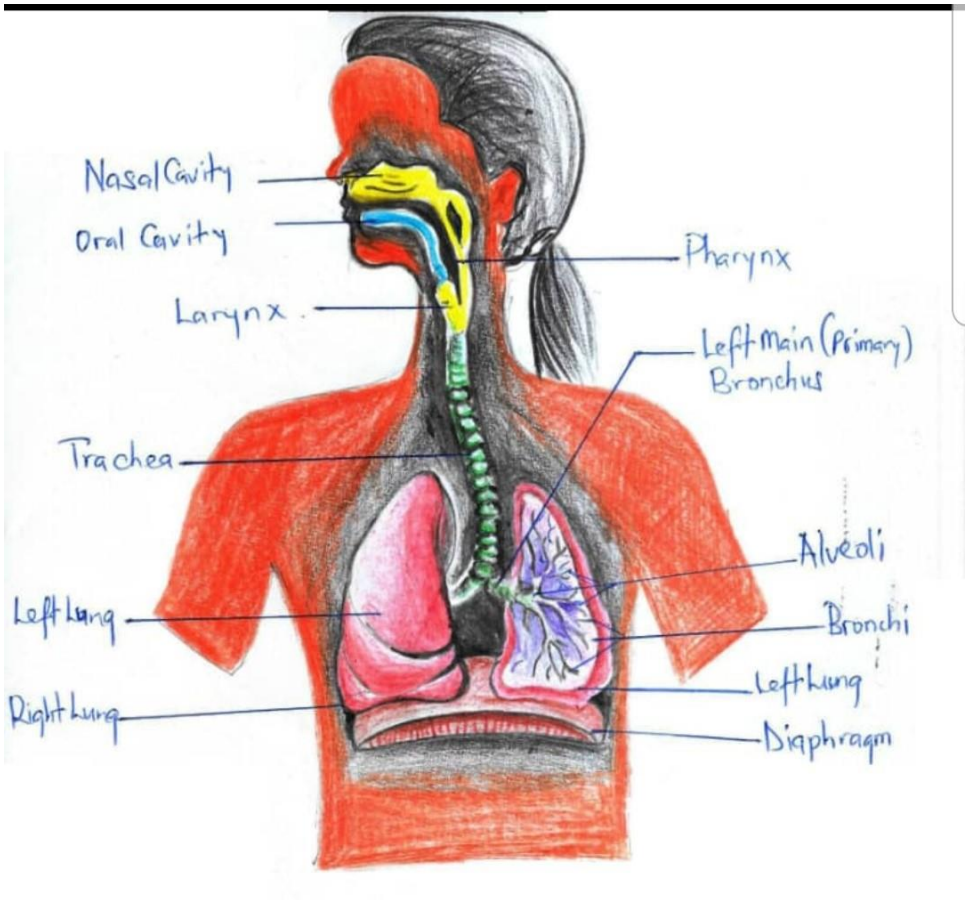

Figure 1: Human respiratory system. (Namubiru & Ewane 2020)

3 OXYGEN ADMINISTRATION

Oxygen administration is the process of giving supplementary oxygen to patients with respiratory insufficiencies. It is the most common interventions in the acute care setting and is indicated in a wide variety of acute and chronic medical conditions. Health care professionals should be familiar with the routes of oxygen administration, as well as the physiological effects of oxygen administration as a fundamental part of patient care. (Kirves & Kuisma, 2013).

In patient rooms, supplemental oxygen is delivered from an oxygen gas valve in the room wall. A flow meter with a quick connector to which is connected is connected to the valve tubular oxygen mask or oxygen moustache. Oxygen can also be dispensed from the transplant oxygen bottle. In a hospital, medicinal oxygen is stored outside the building liquid and passed through an evaporator along an oxygen distribution system to the compartments and other treatment facilities. (Ranta et al. 2011).

Bottled oxygen is used when the patient needs to be oxidized and transferred at the same time or is being treated in a state where there is no access to oxygen from the wall valve. Oxygen cylinders are usually stored in movable carts or racks that can be attached during transfer the patient's bed. (Ranta et al. 2011).

In patients with acute respiratory failure, hypoxemic patients have been successfully treated with nasal high flow (NHF) oxygen in addition to traditional oxygen moustaches and face masks. In this method, warm and humidified air is blown to the patient through a nasal cannula with a high flow. The pressure produced by the high flow, allows a small positive airway pressure at the end of exhalation, which reduces the work of breathing. In the acute exacerbation phase, carbon dioxide retention is a fairly common problem in chronic obstruction pulmonary disease (COPD) patients treated with supplemental oxygen. (Mazur, 2019).

Oxygen is an essential element of life. Our protective mechanisms against oxygen scarcity have evolved with evolution. Evolution has not exposed us to higher oxygen concentrations than at present, so we defend ourselves less against hyperoxemia than hypoxemia. The potential harmfulness of oxygen is not new, as the discoverer of oxygen, Joseph Priestley, already guessed in the 18th century that the substance was toxic. As mitochondria reduce oxygen to water as a by-product, oxygen radicals are formed that damage cell structures. Oxygen dose, exposure time, and situational factors influence the onset of damage. (Kirves & Kuisma, 2013).

The adverse effects of oxygen on the respiratory system are best known. Tracheobronchitis is possible when fraction of inspired oxygen (concentration of oxygen that a person inhales) exceeds 0.50, and when fraction of inspired is 0.95, it can begin in four hours. Exposure to a large oxygen fraction for more than two days causes diffuse alveolar injury, and prolonged exposure results in chronic lung injury. However, the exact fraction of inspired oxygen values and exposure time limits that cause such injuries are not known. Excessive oxygen administration can also, paradoxically, predispose to hypoxemia by causing ventilation-perfusion imbalance and atelectasis. Respiratory arrest is also possible in patients with severe chronic lung disease whose main respiratory stimulus is hypoxemia. (Kirves & Kuisma, 2013)

Excessive oxygen can also damage the central nervous system. In hyperbaric conditions, symptoms range from headache to convulsions and unconsciousness. Fortunately, at normal atmospheric pressure, oxygen administration does not have a significant acute toxic effect on a healthy central nervous system, but a damaged central nervous system is prone to further damage caused by oxygen radicals. However, oxygen radicals are only partly responsible for the side effects: hyperoxemia is associated with, among other things, contraction of the cerebral and coronary arteries, which can cause adverse changes in the blood flow and oxygen supply to the organs. In addition, heart rate and minute volume decrease, systemic circulatory resistance increases, and blood pressure rises, at least momentarily. (Kirves & Kuisma, 2013)

Thus, it has long been known that oxygen may be harmful, but it has been administered to patients quite liberally. Admittedly, it seems logical that a disease state associated with a lack of oxygen should be treated with oxygen. However, too much is too much. The recommendation of the British Thoracic Society directs the delivery of oxygen so that the oxygen saturation is 94-98%; in situations with a risk of hypercapnia, the target is 88–92%. (Kirves & Kuisma, 2013). The key message is that oxygen should be treated like any other drug: it has indications, contraindications, and a therapeutic window. However, if pulse oximetry does not work reliably, for example due to poor peripheral circulation, and the patient is assumed to be hypoxemic, it is safer to give the patient oxygen than not to give, as there is indisputable evidence of hypoxemia. Even in these situations, the dose can be considered reasonable, and the administration of 100% oxygen should be limited to specific situations (e.g., carbon monoxide or cyanide poisoning). A large proportion of acutely severely ill patients will continue to require oxygen therapy, but routine oxygen dosing should be switched to individual need. (Kirves & Kuisma, 2013)

3.1 Respiratory Insufficiency

When the lungs are unable to take in adequate oxygen or send carbon dioxide out of the body, is termed as Respiratory Insufficiency or Respiratory failure. (TYKS, 2020). This occurs as a result of many reasons such as shortness of breath which causes other symptoms. Usually the treatment for respiratory failure depends on the underlying disease, the kind and severity of the respiratory failure. In situations where a patient is dependent on a respiratory support device 24 hours a day due to respiratory failure caused by a neuromuscular disease is called Respiratory paralysis (TYKS, 2020).

Respiratory failure is not simply suspected to be caused by a patient with symptoms other than those with pulmonary disease. Having a morning headache can be a manifestation of an increased amount of carbon dioxide during the night, along with the dilation of cerebral blood vessels. Carbon dioxide headaches are reduced or thoroughly eliminated during the morning as ventilation is increased when awake and the carbon dioxide partial pressure is reduced. When the night is being disrupted by frequent waking up and nightmares, and

thus it will cause daytime fatigue. This leads to development of memory disorders, increased shortness of breath, stress tolerance worsens, respiratory infections and usually the develop exacerbations of dyspnoea requiring hospitalization and the need for supplemental oxygen. (Saaresranta, Anttalainen & Polo, 2011).

Chronic gas exchange disorder and chronic pulmonary ventilation disorder or both can cause Chronic respiratory failure. The most common causes of chronic ventilation failure are COPD, neuromuscular disorders, thoracic diseases, and severe sleep apnoea. Nocturnal hypoventilation is indicated by restless night-time sleep, morning headache and drowsiness, daytime fatigue and exhaustion, and impaired cognitive function. Chronic ventilation insufficiency is used to effectively treat nocturnal non-invasive ventilation. If respiratory therapy is required continuously, invasive ventilator therapy through the tracheal cavity is possible. (Saaresranta & Brander, 2014)

In respiratory insufficiency, the exchange of respiratory gases between the outside air and the pulmonary circulation is disrupted. The disorder may be in the exchange of gases between the alveoli and the bloodstream (oxidation disorder) or in the removal of carbon dioxide (ventilation disorder). Often both disorders occur simultaneously. Lack of ventilation first happens during sleep because in the waking state, sympathotonia, which enhances respiration, decreases and the respiratory muscles relax. (Saaresranta & Brander, 2014).

Impaired pulmonary ventilation may be due to dysfunction of the respiratory center , nerves involved in respiration, respiratory muscles, chest, or lungs. In central hypoventilation, respiratory function is poor, due to, for example, cerebrovascular accident, obesity-related hypoventilation syndrome, opiate overdose, or primary hypoventilation in the new-born. In neuromuscular diseases, the respiratory centre usually functions normally, but its nerve stimuli are either not due to normal or the respiratory muscles are unable to perform pulmonary ventilation according to the nerve stimulus. Typical examples are motoneuron diseases, polio, and Duchenne muscular dystrophy. In diseases that limit thoracic mobility, such as kyphoscoliosis and post-thoracoplasty, the mechanical function of the

breathing pump is impaired. Today, chronic obstruction pulmonary disease (COPD) and obesity-related hypoventilation syndrome are the most common diseases causing respiratory failure. (Saaresranta & Brander, 2014)

3.2 Safe oxygen therapy

Oxygen therapy is a treatment that provides you with extra oxygen. Oxygen is a gas that your body needs to function. Normally, your lungs absorb oxygen from the air you breathe, but some conditions such as chronic obstruction pulmonary disease, pneumonia, asthma, bronchopulmonary, and dysplasia, underdeveloped lungs in new-borns, heart failure, cystic fibrosis and sleep apnoea can prevent you from getting enough oxygen. (Stubblefield & Gotter, 2016). Oxygen itself is not a combustible gas, but it causes the combustion reaction to occur more intensively and last longer. In air with a higher oxygen content, the materials are more likely to ignite and burn more violently. The more the oxygen is mixed with the air, the stronger the effect, it is important to take extra care during oxygen therapy (Healthcare Suomi, 2019).

Safe oxygen therapy are precautions taken into consideration during oxygen administration. (Stubblefield & Gotter, 2016). As a nursing professional, you should be able to explain to the patient the purpose of the treatment and why and how oxygen is given as well as the administration of oxygen must be able to justify that unnecessary oxygen treatments can be detrimental to the patient. (Kirves & Kuisma, 2013). Oxygen dose, exposure time, and situational factors influence the onset of damage in the body. Adverse effects are best known as adverse effects on the respiratory system. At times, the flow rate is importantly higher, but the treatment time is more limited. The flow rate of oxygen must not be changed by yourself, but the flow directions ordered by your doctor must be followed. Improper oxygen administration can cause carbon dioxide to build up in the body, which impairs lung function and can lead to complete respiratory paralysis. (Seututerveyskeskus, 2019).

Oxygen therapy is easy and inexpensive compared to many other treatments. Because it is commonly considered a harmless treatment, oxygen administration is often initiated for safety reasons also in patients who do not suffer from hypoxia. Treatment has even been guided by the principle of "the more, the better". It is time to get rid of these ways of thinking, as the results of research into the potential harmful effects of excessive oxygen intake can no longer be ignored. The conditions for tailored treatment as needed are exceptionally good for oxygen administration. The dose can be adjusted precisely and the response to treatment is easy to monitor. (Kirves & Kuisma, 2013)

Oxygen is not in itself a flammable gas, but it makes the ignition reaction occur more vigorously and last longer. During oxygen therapy, oxygen accumulates in hair, beards and clothing, for example. The presence of a fire and its ignition pose a fire hazard. (Seututerveyskeskus, 2019). The more oxygenated air materials ignite more easily and burn more violently, the more intense the phenomenon oxygen mixes with air. The normal oxygen content of the air is about 21% however, materials that do not normally ignite may ignite in pure oxygen or in air mixed with more oxygen than usual. (Seututerveyskeskus, 2019).

Smoking, open fires and handling are strictly forbidden in the area where oxygen is handled and kept. After operating in an oxygen-enriched area, it is beneficial to ensure good ventilation of the clothing so that oxygen molecules are not transferred in the clothing to a location where they could cause an ignition reaction. Oxygen equipment and its tools used for handling must be totally clean and free of grease. Even a small amount of fat in the oxygen equipment can cause a sudden and vigorous combustion reaction. (Seututerveyskeskus, 2019)

Oxygen cylinder should be open by gentle turning, if possible, at an adequate distance from the patient. When oxygen is not being dispensed, the flow meter and shut-off valve must be closed. The oxygen cylinder must never be filled with other gases, such as compressed air. Compressed air contaminants pose a risk of explosion and fire. An incorrectly filled bottle must be removed off. Falling or otherwise knocking the oxygen cylinder can

cause cracks in the cylinder structure, which poses a risk of explosion when the cylinder is filled. Bottle impact the neck above can break the neck of the bottle, allowing gas to escape quickly and out of the bottle comes a brick wall piercing missile. The bottle must always be kept at a pressure of at least 2 bar to prevent the steel bottle does not rust. The oxygen cylinder must be inspected. (Seututerveyskeskus, 2019).

Oxygen delivery equipment should always be handled with proper hygiene methods. Respiratory equipment is easily contaminated during treatment with mucus, and dust accumulates on them. After using, the equipment must always be serviced, disinfected and, if necessary, sterilized. The metal hose connector from the wall oxygen supplies in the hospital are cleaned and other mouthpieces are removed, washed in a washing machine or soaked in disinfectant solution and sent to an equipment service centre in accordance with the machine's manual. Nasal cannula, oxygen mask, and oxygen tubing are patient specific. Proper cleaning of equipment and, depending on the application, disinfection or sterilization are important methods of infection control. Disinfection of the hands is necessary before and after touching the parts of the respirator. (TAYS, 2020)

3.3 Wall oxygen delivery

Today, supplemental oxygen administration is a basic procedure in medical care. Increasing the oxygen content of the breathing air is a symptomatic basic measure in the context of symptoms of hypoxia. Oxygen therapy at home may be necessary for patients with COPD and sleep apnoea. Medicinal oxygen is available in health care centres, ambulances, emergency departments and treatment units. Oxygen is obtained either from oxygen cylinders or from the hospital's gas distribution system via pipes. (Healthcare Suomi, 2019)

Oxygen can be administered through an oxygen moustache or a respirator. In intensive care ventilator therapy and during anaesthesia, medicinal oxygen is added to the breathing air at the concentrations required by the patient. Medicinal oxygen is used in the basic treatment of carbon monoxide poisoning, either in normal-pressure oxygen therapy with

high flow or in severe cases in high-pressure oxygen therapy (so-called hyperbaric oxygen therapy).

By wall oxygen, the giving of supplemental oxygen is done by an oxygen mask or nasal cannula. For this benefit, there is an oxygen supply device at the wall end of the beds (Figure 2), where the equipment is protected and prepared for use. Wall oxygen can be used when giving the patient supplemental oxygen for short periods of time. Short-term supplemental oxygenation does not require humidifying because the nasopharyngeal mucosa is moistened by the breathing air in the normal way. With this method, the patient breathes mainly from the room air and the oxygen content of the inhaled air is about 30%. (TAYS, 2020)

Figure 2. Wall oxygen. (Namubiru & Ewane, 2020)

If the patient needs supplemental oxygen for several hours, specific devices are available to heat and humidity the breathing air, which can be used to modify the desired humidity percentage. Humidifiers should always be used if the patient is intubated or tracheostomized because natural nasal wetting is bypassed. (TAYS, 2020)

3.3.1 Oxygen Mask

A basic oxygen mask can be used for a short time to supply oxygen at a moderate concentration. The oxygen content of the breathing air can be up to 35-50% and the flow rate can be 5–10 l / min. Using basic mask can cause difficulties like feeling of tightness, as the mask comes tightly to the face and can cause skin irritation and possibly even pressure ulcers in the long run. The basic mask cannot be used during oxygen therapy when eating or talking. Respiratory oxygen should be able to heat and humidity and this lengthens the tolerance of the treatment and reduces complications. (Pölönen et al. 2013).

The venturi mask, also known as a percentage mask (Figure 3), permits long-term and, above all, precise control of the oxygen content of the breathing air. This is controlled by different adapters that mix oxygen and room air according to the selected adapter. The FiO2 given by ventures is usually determined according to different colours on a scale of 0.24–0.6 (24–60%). The oxygen flow rate is 2-15 l / min. The colours of the adapters may vary depending on the manufacturer, for example, blue, white, orange, yellow, red and green. There is also an adjustable adapter, so it does not need to be replaced if the patient's oxygen demand changes. Due to the accuracy of the venturi mask, its use is suitable also for patients with carbon dioxide retention. Venturi masks cannot supply the same oxygen concentrations as a reservoir bag. The venturi mask cannot be worn when eating or speaking and can cause a feeling of tightness and skin irritation. The venturi mask can dispense lower oxygen concentrations than with a regular oxygen mask because the air intakes on the sides of the mask are larger. (Pölönen et al. 2013.)

Figure 3: Venturi masks. (Namubiru & Ewane, 2020)

3.3.2 Nasal Cannula

Oxygen nasal cannula (Figure 4) are suitable for use in a patient with normal ventilation and tidal volume, when the patient needs long-term oxygen at low concentrations and reaches an oxygen concentration in the breathing air of 24 to 60%, depending on the patient's minute ventilation and oxygen flow rate, which is usually is from 1 to 5 l / min (Pölönen et al. 2013). The benefits of oxygen nasal cannula include the ability to eat and talk during oxygen therapy, and the cannula does not create a feeling of cramping unlike oxygen masks can cause. In general, patients feel that oxygen cannula are much more comfortable than other oxygen delivery methods. The weakest aspects of oxygen cannula are the dosing of oxygen content, which is not as accurate as masks. Hap ticks also cause dryness and irritation of the nasal mucosa. (Pölönen et al. 2013.)

In acute situations, high flow moustaches are used. They provide a more reliable oxygen supplement than normal oxygen moustaches, but they also require the patient to breathe through the nose. Often, even in acute situations, the patient breathes through mouth, allowing additional oxygen given through the nose travel into the room air. (Kuisma et al. 2017.) The oxygen given by a high flow moustache would be a good moisturizer, especially for long-term use, as drying of the nasal mucosa is quite likely. (Kuisma et al. 2017).

Figure 4: Nasal cannula. (Namubiru & Ewane, 2020)

4 CLINICAL GUIDEBOOK AS AN EDUCATIONAL MATERIAL

4.1 Nursing education

According to European Union the nurses` competencies are in accordance with the European directives which includes the requirements that ensures the nursing training is an equal value throughout European EU-countries. (Opiskelu sairaanhoitajaksi, 2014)
In Finland, Nursing Education is under University of Applied sciences which are multidisciplinary and regional higher education institutions whose activities engage in the connection with working life and regional development. Both Finnish and international nursing students can apply for Nursing education after upper secondary education, basic vocational qualification or foreign qualification. Students join University of applied sciences

or polytechnics for a bachelor's degree in health care for a period lasting 3.5 years. (Ammattikorkeakoulu opintojen rakenne 2020). In order for one to graduate, as a registered nurse, he or she requires completing 210 European credit transfer system (1 ECT equals to 27 hours). (Finnish Association of Nurses, 2020).

In Satakunta University of Nursing the degree program and curriculum in nursing also requires students to get 210 credits in order to qualify as registered nurses in Finland. This includes basic studies 21 credits, elective studies 15credits and professional studies 120 credits, Internships 75 credits and thesis 15.05 credits. This helps the nursing students to develop their health promotion skills, ethical care, theoretical and clinical competence and research and development in nursing. (Satakunta University of Applied Sciences 2020). The Degree Programme in Nursing prepares students for a valued profession, in which they can be working with clients of different age groups promoting their health and well-being and treating their diseases. They will gain competences based on ethical principles, comprehensive and multidisciplinary knowledge, practical skills and interaction skills. (Satakunta University of Applied Sciences 2020).

4.2 Learning in nursing education

Nursing education requires students to offer various courses which include; Anatomy and physiology, Medical and Surgical Nursing, child and adolescent Nursing, Mental health and Substance Abuse, Gerontological Nursing, Pharmacology and other courses which include entrepreneurship in nursing, management, clinical calculations, professional communication, counselling, family nursing, nursing skills and intervention, project activities and seminars. Etc (SAMK, 2020). This gives the students an overview of the importance of the profession in society, working life and the international environment. Basic studies help the students with the theoretical foundations of nursing, communication and language skills defined in the regulations. Professional studies provide students with the ability to work as a nurse in expert positions, developing work in community and as an entrepreneur. The clinical placements familiarize students with the practical work of a nurse, where they apply the learned knowledge and skills in practice. In the thesis, the student develops and

demonstrates his / her ability to apply knowledge and skills as a nurse. Elective studies are university-level studies that students can choose from any Finnish or foreign polytechnic. (Ammattikorkeakoulu opintojen rakenne. 2020).

Learning in nursing education can be done by different means, such as, contact learning, videos, guidebooks etc. An instructional guidebook for example can be used to teach or tell the viewer how certain act is being perform. They can address any topic. Educational guidebook can now be used more easily in teaching than before. (Kredo, Tamara et al. 2016).

4.3 Clinical guidebook

The implementation of the functional part of the thesis is guidebook, because guidebook is an effective way for transmitting information. Guidebook can effectively present important information to the student. When used creatively, guidebook can be a powerful medium of expression especially when it contains pictures. There are endless ways to use guidebook as a motivating, memorable, and extensive learning experience. Clinical guidebook are written instructions of expected practice, which provide standards for individuals to potentially improve their knowledge that guidance regarding undertaking a task. It has a range of purposes, intended to improve effectiveness and quality of care, and to decrease costly and preventable mistakes and adverse events. (Kredo, Tamara et al. 2016).

A well-written manuscript is a prerequisite for a decent photo shooting. The manuscript outlines the central content and form. When the manuscript is ready, we will proceed to photo shooting and editing. It is good for the manuscripts be read by others, because self-evaluation alone can blind one's own mistakes.

There are many aspects to consider when shooting. The important thing is that the camera is straight and stable, the image should be sharp and clear, there should be enough light, and the colours should be natural. Selecting the image size is important when planning shots. More importantly, the closer the cropping must be. Different image sizes and angles

should be used differently. The shooting will be made according to the manuscripts. Well-done manuscripts make the shooting process faster and easier. The day before, we will collect all the tools I needed for the shoot. We will use our phones for shooting.

After shooting the photos, there is a work called editing. Editing means collecting, preparing, arranging, editing and compiling material for publication. In editing, all material is selected for the final output and the selected sections are compiled into a finished output. Editing is what you begin doing as soon as you finish your first draft. You reread your draft to see, for example, whether the paper is well-organized, the transitions between paragraphs are smooth, and your evidence really backs up your argument, editing enables a smooth flow of images. Editing can combine different places and times and editing is an important step of the guidebook. (Einsohn, 2011).

After this step, the guidebook is ready. After editing, the finished guidebook will be submitted to the Satakunta University of Applied Sciences' intranet system for download for use.

5 PURPOSE AND OBJECTIVES OF THE PROJECT

The purpose of this project-base thesis is to produce an easy to read instructional clinical guidebook for international nursing students dealing with oxygen delivery from wall oxygen outlet using facemask and nasal cannula in a hospital setting. This guidebook will contain pictures of the various equipment that hospital uses when giving oxygen to patients. It will also contain the instructional text on how equipment is being managed safely when administering oxygen. The text will be evidence based.

The objective of this thesis was that nursing students could use the information of the instructional guidebook in developing their own skills and acquire knowledge on how to

administer oxygen as safely as possible. The thesis deals with the human respiratory system, respiratory insufficiency, safe oxygen therapy, and the devices needed for oxygen administration from wall oxygen outlet in a hospital environment. Our objective is to improve our theoretical knowledge and practical skills about oxygen administration, produce understandable guidebook which can be published on SAMK´s library website.

6 PROJECT PLAN

The quality of project plan largely affects the overall success of a project. Project planning and plan-based project management enable the realization of the goals set for the project. A project plan is prepared for the different phases of the project. The project plan answers the questions of why and how the project will be implemented. The project plan is generally a document supporting the project start-up decision. (Mäntyneva, 2016, 49). For some projects, the project implementation decision has already been made before the project plan is made. A good project plan communicates to project clients and steering group members how the goals meet the need and how the project stays on schedule and on budget. (Mäntyneva, 2016, 42).

6.1 Project method

The concept of project is sometimes used very loosely. On the other hand, not all work tasks can be interpreted as projects. A project is defined as a unique entity, limited in time, cost, and scope. (Mäntyneva, 2016, 11). The uniqueness of the project is illustrated by the fact that a completely similar entity has not been implemented before. Looking at the project lifecycle is a good way to get an overall picture of the project. The project has a start and end time that make up the duration of the project. On the other hand, a project can be prepared up to years before it officially starts. The project is divided into several phases in its life cycle. These steps differ in, for example, their functions, features and working

methods. In this book, the project life cycle is divided into preparation, planning, implementation and closure. (Mäntyneva, 2016, 15).

The project is done using Waterfall model involving the designing and implementation process, progresses, step-by-step throughout the end of the project's initial life cycle. At the end of every step, preparation for the next step will be considered and reviewed before moving on to the next step. In the Waterfall model, only one-step will be reserved for testing and this will only be carried out at the end of the project. (Kemppainen, 2012.).

The method of the thesis was to plan, implement and evaluate an educational guidebook on the use of oxygen for the use of nursing students and teachers at the Satakunta University of Applied Sciences.

6.2 The Stages of the project, Schedule, Resources, and Evaluation

This thesis was planned to involve the theoretical section and the instructional leaflet for oxygen delivery. The theoretical part with include evidence base information from other researchers on the subject. The guidebook was to be produced as a teaching material to nursing students of Satakunta University of applied sciences. The guidebook will also contain pictures, which were planned to shoot by the authors. They also planned to do video calls twice a week (4hours) to work on their thesis plus individual hours (4 hours) as well as contact the supervising teacher on a regular base. The goal was to complete the thesis by May 2020.

In this thesis, the pictures were planned to take by authors. They also planned to arrange suitable time to take the pictures and therefore, produce the material solely by them. In the context of theoretical background, evidence base materials on the subject were planned to use. The SAMK´s simulation room, which has the available oxygen equipment that the shooting of photos was needed, was planned to use. The guidebook will be available as an electronic material. This will be less expensive because it was not needed to print a hard copy, as well as time saving.

The main risk of this thesis was presumed that the shooting of the photos might fail due to poor filming. In this situation, enough time to take the photos as many times as possible until good pictures for the guidebook were taken was allocated. In addition, the shooting location might not be available when the authors are ready to shoot the photos. In such a case, another shooting room will be booked or have alternatives shooting location, and oxygen equipment and camera will be booked as early as possible so that it will be available at the time of photo shooting.

7 PROJECT IMPLEMENTATION

The implementation of the work started from the fact that we started to think about everything that belongs to project management and project risk management. After that, we started researching what the different risks were in the project. With this, we chose some of the risks for the thesis. Next, we started looking for what kind of tools are available to manage the different risks in the project. There were a wide variety of tools from which we chose to fit the risks selected in our work. After choosing the risks and the tools to manage them, we started working on our work.

The theoretical part deals with the basics of oxygen administration and the tools used for it, human respiratory system, respiratory insufficient that require oxygenation, and methods for helping a patient in need of oxygen therapy with safe care using wall oxygen supply. The final product is an instructional guidebook. The guidebook contains pictures of the most common oxygen supply devices as well as general instructions for oxygen supply based on oxygen saturation. After using the guidebook, it would be easier for the student to start deepening their oxygen therapy skills. The guidebook serves as a lecturer's tool and possibly as online learning material. Evidence-based research data was searched for through different data carriers and content analysis was used to separate essentials for data

work. We have kept the schedule intact, as our plan was to finish our thesis by the end of May 2020.

Oxygen therapy has been studied extensively. Theoretical information was retrieved electronically from various databases, which were PubMed, Cinahl, Medical Finna. Sources with a publication year of 2010–2020 were used. Information was sought from textbooks, journals, guides, studies, the Current Care Recommendation, and various scientific publications. Theses from polytechnics were also use as sources. Paid sources as well as sources other than English or Finnish were excluded.

All the oxygen administration tools that we took photos of were taken from our place of work, which was the shooting location as well. The main goal was to gather a good theoretical basis and make an educational guidebook based on it. Couple of oxygen delivery devices were included in the instructional guidebook, and the guidebook is sure to help future students gain an understanding of how the devices are used. We used our phone in shooting the photos ourselves.

After receiving the idea of the thesis, we continued gathering theoretical information on the topic. The preliminary plan for the thesis was completed in December 2019. The final thesis plan was completed in February 2020, based on that we started working on the thesis in November 2019. We sent the final plan to the supervising teacher of this thesis, and the plan was accepted in February 2020. While doing the thesis, we often make video calls, exchanged ideas by e-mail, and had discussions related to the thesis over the phone. Based on this framework, we divided the tasks for among ourselves. We had couple of supervision discussions with the supervising teacher of the thesis by emails, and we received various instructions and suggestions for supplementation for the written work. Simultaneously while writing the theory, we wrote the manuscript for the instructional guidebook. This guidebook will contain pictures of the various equipment that hospital uses when giving oxygen to patients. It contains the instructional text on how equipment is being managed safely when administering oxygen. The text will be evidence based.

8 EVALUATION OF THE THESIS

The supervising teacher evaluated the thesis plan, then we proceeded in writing our thesis. In the process of writing the thesis, the manuscript is based on theoretical knowledge, and our supervising teacher evaluated it. After the guidebook was ready, we made an electronic evaluation form that contained four questions concerning the guidebook and sent to the second and third-year nursing students as well as some teachers in the nursing department to give their feedback on the guidebook. We got six feedbacks from the nursing students and two feedbacks from the teachers. From three of the questions where we asked, Did you think the guidebook was clear and easy to understand?, Was the guidebook useful for your studies? and Did the guidebook meet your expectations?, we got similar answers from the six students and the answers were positive. On the other hand, one of the one question asked, Was the guidebook useful for your studies? was not necessary for the teachers thus we go a negative response from that question from both teachers. We also received great suggestions from the teachers to shorten the length of the guidebook to make it very easy to ready for students. The students and teachers who responded were satisfied with the quality of the guidebook.

Overall, the supervising teacher gave encouraging feedback on the guidebook. The guidebook will be added as an attachment to the written part of this thesis. Completing the thesis has given us more exposure in our professional pursuit. We have also gain additional skills in teamwork while doing this thesis together. We did self-assessment from the beginning to the end of the thesis.

8.1 Suggestions for improvement

In the future, it could be investigated whether the educational guidebook made has been useful and possibly edit the guidebook as methods and tools change. Guidebook functionality could be examined, for example, by showing it to a group of students, after which it would be tested how effectively the learning has taken place, for example compared to previous teaching material. The nursing group could further express opinions on the

guidebook and make suggestions for improvement based on which the instructional guidebook could be developed more in line with school needs. Topics for future theses could include, for example, explaining deeper than the surface into the use and features of an individual device. Also, it will be good to have creat the evaluation form in such a way that, questions for students should be different from questions given to teachers that is questions ask to teachers should not require a yes or no answers but written suggestions that can help students to improve their work.

8.2 Ethical viewpoints of the project

Research ethics involve broad range of moral practices and principles that govern researchers when conducting a research, so that the research will not be detrimental to the participants. These principles are very essential in every aspect of research. Thus, researchers must abide to these guidelines when conducting research. Ethical issues must always be taken into consideration by a researcher. (TENK, 2019). These principles are essentiality, honesty and non-plagiarism, voluntariness, non-exploitation and justice, privacy and confidentiality, carefulness, competence, accountability, openness and transparency, legality, and responsible publication.

The driving forces of scientific research are scientific methods and their correct use, and the reliability of the information were displayed. The reliability criteria must be met in order for the finished end product to be of high quality and reliable. There are two separate processes in development research, which are development work and research work. The research work uses reliability examinations and methods of research and science, while the development work uses its own processes and laws. (TENK, 2019).

The sources used were scientific and reliable, so the thesis was obtained from good and comprehensive theoretical basis and the sources were not more than 10 years old. The theses of the lower polytechnic have not been used as sources, although the theses of the higher polytechnic have been used. There is no plagiarism in the thesis sources. The source entries were made to follow the instructions as much as possible exactly according to the

institution's source labelling guidelines. We adhered to the standards of scientific practices and knowledge during our planning, implementing and evaluation of our project. All our sources were moral, evidence based and have legal regulations acceptable by the scientific body. (TENK 2012)

There was Respect for anonymity, confidentially and we properly cited well relevant publications and cited facts and conclusions form original texts of other authors. (TENK 2012)

Finally, we obtained permission from the hospital where we took our pictures and collected our instruments. Since we used an actual human being in shooting the photos, we did not show the face as to hide the identity. (TENK, 2019).

8.3 Conclusion

After choosing the topic of the thesis, we thought that making an educational guidebook is easy to do. When doing the thesis, it became clear that it is not that easy. For the guidebook, we looked for a lot of theoretical information that was relatively scarce related to this topic. As the guidebook was ready, we are happy with the result and that we chose a project-type thesis. For the future, it would be good if more teaching guidebook were made as theses. We think we learned a lot of new information on that topic while making the instructional guidebook. Instructional guidebook gives students the opportunity to learn easily. We think that learning with the help of instructional guidebook is a meaningful part of helping to put the theory of a perceptual-learned matter into practice.

REFERENCES

Ammattikorkeakouluopintojen rakenne. 2020. Opintopolku. [refered 30.4.2020]. Saatavissa: https://opintopolku.fi/wp/ammattikorkeakoulu/ammattikorkeakouluopintojen-rakenne/

Einsohn, Amy. The Copyeditor's Handbook: A Guide for Book Publishing and Corporate Communications. 3rd ed. Berkeley: University of California Press, 2011. Referred 3.3.2020. https://writingcenter.unc.edu/tips-and-tools/editing-and-proofreading/

Finnish Nurses Association. 2019. Finnish Nurses Association. Referred 13.12.2019 www.nurses.fi/nursing_and_nurse_education_in_f/

Finnish National Board on Research Integrity (TENK) guidelines. 2019. Referred 15.12.2019. https://www.tenk.fi/sites/tenk.fi/files/Ihmistieteiden_eettisen_ennakkoarvioinnin_ohje_2019.pdf

Kemp, J., 2017. Nursing Guidelines. Approved by the Nursing Clinical Effectiveness Committee. Referred 13.12.2019. https://www.rch.org.au/rchcpg/hospital_clinical_guideline_index/Oxygen_delivery/

Kemppainen, Sante. 2012. Vesiputousmallista Scrumiin. Laurea-ammattikorkeakoulu Opinnäytetyö. Referred 29.1.2019. https://www.theseus.fi/bitstream/handle/10024/51111/Kemppainen_Sante_lopullinen__ONT.pdf?sequence=1&isAllowed=y

Kredo, T., Bernhardsson, S., Machingaidze, S., Young, T., Louw, Q., Ochodo, E., & Grimmer, K. 2016. Guide to clinical practice guidelines: the current state of play. International journal for quality in health care: journal of the International Society for Quality in Health Care, 28(1), 122–128. doi:10.1093/intqhc/mzv115. Referred 10.12.2019. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4767049/

Koski, E. & Malinen, L. 2019. Hapen Antaminen Potilaalle. Opetusvideot hoitotyön opiskelijoille. Pori. SAMK-thesis. Satakunta University of applied sciences. Referred 11.12.2019 https://www.theseus.fi/bitstream/handle/10024/160424/Hapen%20antaminen%20potilaalle.pdf?sequence=1&isAllowed=y

Kuisma, M., Holmström, P., Nurmi, J., Porthan, K. & Taskinen, T. 2017. Ensi-hoito. Helsinki: Sanoma Pro Oy. Refered 24.09.2020

Lindberg. M. & Riisiö.T. 2019. HAPPIHOIDON MENETELMÄT JA VÄ-LINEET SAIRAALASSA. XAMK-Thesis. Kaakkois-Suomen Ammattikorkeakoulu. Referred 26.4.2020. https://www.theseus.fi/bitstream/handle/10024/168866/lindberg_matias.pdf?sequence=2&isAllowed=y

Mayo Foundation for Medical Education and Research. 2019. Referred 9.12.2019. www.mayoclinic.org/symptoms/shortness-of-breath/basics/definition/sym-20050890

Manyneva Mikko. 2016. Hallittu Projekti. Pronto, Viro. Referred 29.4.2020. https://kauppakamaritieto-fi.lillukka.samk.fi/ammattikirjasto/teos/hallittu-projekti-2016#kohta:Hallittu((20)projekti.

Manuel S. Weekley, Lauren E. Bland. 2019. Oxygen administration. University of Tennessee. St Francis. Referred 3.5.2020. https://www.ncbi.nlm.nih.gov/books/NBK551617/

Opiskelu sairaanhoitajaksi. 2014. Sairaanhoitajat. Refered 30.04.2020. Saatavissa: https://sairaanhoitajat.fi/artikkeli/opiskelu-sairaanhoitajaksi/

Peate, I. & Nair, M. 2015. Anatomy and physiology for nurses at glance. Eletronic book.Referred 26.04.2020.

Pölönen, P., AlaKokko, T., Helveranta, K., Jäntti, H. & Kokko, A. 2013. Akuuttihoidon. Helsinki: Kustannus Oy Duodecim. Referred 26.04.2020

Ranta, J. Ylikoski, P.& Ylikoski, R. 2011. Happihoidon Ohjeistus. DIAK-thesis. Referred 11.12.2019. https://www.theseus.fi/bitstream/handle/10024/28202/Happihoidon+ohjeistus.pdf;jsessionid=47AA1ADED4CD64154A8D583EA24A3064?sequence=1

Responsible conduct of research and procedures for handling allegations of misconduct in Finland. Referred 25.5.2010. https://www.tenk.fi/sites/tenk.fi/files/HTK_ohje_2012.pdf

Satakunta University of Applied Sciences. 2020. Referred 3.5.2020. www.samk.fi

Saaresranta, T. Anttalainen, U. & Polo, O. 2011. Kaksoispaineventilaatio kroonisessa ventilaatiovajauksessa. Refereed 20.04.2020. https://www.duodecimlehti.fi/duo99748

Saaresranta, T & Brander, P. Oppiportti. Kustannus Oy Duodecim. 2014. Referred 25.4.2020. https://www.oppiportti.fi/op/kes00234/do

Scala, R. 2016. Challenges on non-invasive ventilation to treat acute respiratory failure in the elderly. Pulmonary Medicine. Referred 26.4.2020. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5111281/

Seututerveyskeskus.2019 Seututerveyskeskus. Refered 20.04.2020 http://www.seututk.fi/fiFI/Asiakkaalle/Hoitoohjeita/Potilasohjeet/Kotihappihoidon_opas(57881)

Stubblefield, H. & Gotter, A. 2016. Oxygen therapy. Healthline. Referred 10.12.2019. https://www.healthline.com/health/oxygen-therapy

Tampereen yliopistollinen sairaala. 2018. Tampereen yliopistollinen sairaala. Referred 26.4.2020. https://www.tays.fi/fi-FI/Ohjeet/Infektioiden_torjunta/Aseptiikka_hoitotoimenpiteissa/Hengityslaitteiden_kayton_hygienia(48514)

The Linde groups. 2019. Healthcare Suomi. Referred 25.4.2020. https://www.linde-healthcare.fi/fi/products_services_ren/information_for_the_public_patients/medicinal_gases/medicinal_oxygen/index.html

Ward, J. J.2013.High-Flow Oxygen Administration by Nasal Cannula for Adult and Perinatal Patients. Respiratory Care. Referred 26.04.2020 http://rc.rcjournal.com/content/58/1/98.full

Wiltold Mazur. 2019. Käypähoito. Suuren virtauksen happiterapia keuhkoahtaumataudin pahenemisen hoidossa. Referred 3.5.2020 https://www.kaypahoito.fi/nak09409

Zhang, J., Lin, L., Pan, K., Zhou, J. & Huang, X. 2016. High-flow nasal cannula therapy for adult patients. Journal of International Medical Research. Referred 26.04.2020. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5536739/

APPENDIX 1

LITERATURE REVIEW

Maker of research publication year, country	The purpose of the research	Target groups of participants, data collection methods/Analysed method/Project method	Results
Koski, E. & Malinen, L. 2019. Hapen Antaminen Potilaalle. Opetusvideot hoitotyön opiskelijoille. Finland	The purpose of the thesis was to produce two teaching videos for nursing students of Satakunta University of Applied Sciences on oxygen administration from wall oxygen and transport oxygen.	Nursing students of Satakunta University of Applied Sciences	The subscribers were satisfied with the final video tutorials and were very pleased with how the video was organised
Ranta, J. Ylikoski, P.& Ylikoski, P. 2011. Happihoidon Ohjeistus. Finland.	The purpose of this thesis was to produce an easy-to-read guidebook for the use of the nurses in Basic Services Center Tapala on oxygen therapy and on the types of devices necessary to each situation	The nurses in Basic Services Center Tapala.	The nurses felt that they had received completely new information about Oxygenation from their training

APPENDIX 2

PROJECT SCHEDULE

Date	Task	Allotted Hours	Outcome/ Status
January to February 2020	Approval of the project plan Project	30hrs	40
February to March 2020	Gathering information, analysing relevant information, summarizing information, creating the manuscript, shooting of photos, creating the manuscript of the guidebook and writing of the thesis.	200hrs	250
March to April 2020	Requesting feedback from our supervising teacher on the manuscript, creating and finalizing contents of the of our guidebook.	35hrs	
April 2020	Finalizing the thesis. Presentation of the project and Collecting feedback	35hrs	
May 2020	Evaluation report and discussion meeting. Project completion target time, Reflection and summarizing feedback.	30 hrs	

APPENDIX 3

FEEDBACK FORM FOR NURSING STUDENTS AND TEACHERS FROM SATAKUNTA UNIVERSITY OF APPLIED SCIENCES

Instructional Guidebook on the Use of Wall Oxygen

Circle the option you think is appropriate.

Did you think the guidebook was clear and easy to understand?

Yes No

Was the Guidebook useful for your studies?

Yes No

Did the guidebook meet your expectation?

Yes No

What would you like to recommend on the guidebook?