KNOWLEDGE AND PRACTICE ON ENDOTRACHEAL TUBE SUCTIONING AMONG NURSES IN CRITICAL CARE WARDS AT HOSPITAL UNIVERSITI SAINS MALAYSIA

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by

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LIST OF ABBREVIATION

AARC	: American Association of Respiratory Care
CPP	: Cerebral Perfusion Pressure
ETT	: Endotracheal Tube
HTAA	: Hospital Tengku Ampuan Afzan
HUSM	: Hospital Universiti Sains Malaysia
MAP	: Mean Arterial Pressure
MICP	: Mean Intracranial Pressure
SICU	: Surgical Intensive Care Unit
SPSS	: Statistical Package of Social Sciences
VAP	: Ventilated Associated Pneumonia

PENGETAHUAN DAN AMALAN TERHADAP SEDUTAN TIUB ENDOTRAKEAL DALAM KALANGAN JURURAWAT DI WAD RAWATAN KRITIKAL DI HOSPITAL UNIVERSITI SAINS MALAYSIA

ABSTRAK

Sedutan tiub endotrakeal adalah prosedur penting dalam unit rawatan kritikal. Ini adalah prosedur yang boleh memberi manfaat atau bahaya kepada pesakit. Kajian penyelidikan ini dilakukan untuk mengetahui tahap pengetahuan dan amalan penyedutan tiub endotrakeal dalam kalangan jururawat dalam wad rawatan kritikal di Hospital Universiti Sains Malaysia (HUSM). Satu kajian keratan rentas dilakukan terhadap 113 responden melalui persampelan rawak menggunakan soal selidik untuk pengumpulan data dari Oktober 2020 hingga Julai 2021. Analisis deskriptif dan ujian 'Pearson's Chi Square' dilakukan menggunakan 'Statistical Package of Social Sciences' (SPSS) versi 26.0. Hasil kajian menunjukkan 61.3% jururawat mempunyai pengetahuan yang baik manakala 37.7% mendapat pengetahuan yang lemah. Sementara itu, untuk amalan ini, 92.1% jururawat mempunyai amalan yang baik manakala 7.1% mempunyai yang lemah. Di samping itu, tidak ada hubungan yang signifikan antara data sosiodemografi (umur, jantina, tahap pendidikan, pengalaman bekerja di wad penjagaan kritikal dan wad kerja) dengan tahap pengetahuan dan amalan jururawat mengenai penyedutan tiub endotrakeal (nilai $p > 0.05$). Tiada korelasi yang signifikan antara tahap pengetahuan dan tahap praktik penyedutan tiub endotrakeal dalam kalangan jururawat di wad rawatan kritikal. Sebagai kesimpulan, majoriti jururawat di wad kritikal mempunyai pengetahuan dan amalan yang baik terhadap penyedutan tiub endotrakeal.

KNOWLEDGE AND PRACTICE ON ENDOTRACHEAL TUBE SUCTIONING AMONG NURSES IN CRITICAL CARE WARDS AT HOSPITAL UNIVERSITI SAINS MALAYSIA

ABSTRACT

Endotracheal tube suctioning is a vital procedure in the critical care unit. It is a procedure that either can give benefits or harm to the patient. This research study is done to determine the level of knowledge and practice in endotracheal tube suctioning among nurses at the critical care wards at Hospital Universiti Sains Malaysia (HUSM). A cross-sectional study was involving 113 respondents via random sampling. A questionnaire survey used for data collection from October 2020 to July 2021. The test used in this study was descriptive statistics and Pearson's Chi-Square test using Statistical Package of Social Sciences (SPSS) version 26.0. The findings revealed that 61.3% of the nurses scored good knowledge while 37.7% scored poor knowledge. Meanwhile, for the practice, 92.1% of the nurses scored good practice while 7.1% scored poor practice. In addition, there was no significant association between the sociodemographic data (age, gender, level of education, working experience in critical care wards and working wards) with the nurses' level of knowledge and practice on endotracheal tube suctioning (p-value >0.05). Plus, there was no significant correlation between the level of knowledge and level of practice on endotracheal tube suctioning among nurses in critical care wards. As conclusion, majority of the nurses in critical care wards have good knowledge and practice on endotracheal tube suctioning.

CHAPTER 1: INTRODUCTION

1.1 Background of the Study

Suctioning is an important nursing procedure for intensive care unit patients especially those who have an endotracheal tube (ETT) in place (American Association of Respiratory Care, 2010). ETT suctioning is a regular invasive procedure to keep the airways patent by mechanically remove accumulated pulmonary secretions in patients using artificial airways (Justin, 2018). Generally suction systems can be classified into two methods which are open and close method. Open suction requires the use of single-use catheters that are inserted through the tracheostomy tube's open end. Besides that, closed suction method are attached to the tracheostomy and facilitate numerous uses of the same catheter. After usage with sterile saline, closed systems are washed and typically modified every 72 hours, or according to the manufacturer's instructions (Blue et al., 2015).

The practice on ETT suctioning starts with patient’s preparation, by giving an appropriate explanation resulting a reduction in stress, pain and increase the effectiveness of the suctioning procedure (Mwakanyanga et al., 2018). The management of the artificial airway is one of the core competencies of the bedside respiratory therapist by maintaining the airway including the tracheal tube secure, the tube position, patency maintaining, and appropriate regulation of cuff pressure (Branson et al., 2014). Therefore, there are several methods for tube secure from simple adhesive tape to complex devices that combine bite block, a method for

moving the tube to prevent skin breakdown and mucosal ulceration, and a fixation system.

Moreover, maintaining airway patency also includes routine treatments, such as humidification of inspired gases and suctioning, as well as techniques to reduce biofilm or clear obstruction. The monitoring of cuff pressure is an essential routine to maintain a balance between adequate lower airway protections from silent aspiration and reduce the risk for mucosal damage. As time passes, automated cuff pressure management is a new method to achieve this result that is gaining popularity (Branson et al., 2014).

1.1.1 Complications and Management Related to ETT Suctioning

Suctioning is a procedure to remove accumulated mucus in the trachea and the lower airways that resulting the deterioration of cilia movement and cough reflex, the accumulation of secretions in the airway leads to increased airway resistance and workload of respiration, and hypoxemia, hypercapnia, atelectasis, and infection (American Association of Respiratory Care, 2010; Negro et al., 2014). In addition, a research was done involving serious traumatic brain injury to assess the effect of suction tube insertion and tracheal stimulation on cerebrovascular and systemic vascular status. Thirty intubated patient and mechanically ventilated adults with brain damage with average age of 31 years old showed that suction tube inclusion and tracheal stimulation, inaccessible from other constituents of the suctioning process caused enlarged cerebral perfusion pressure (CPP), mean arterial pressure (MAP), and mean intracranial pressure (MICP)(Khimani et al., 2015).

As an initiative to minimize the complication of this procedure, a study regarding the tracheostomy mechanisms through the professional team approach by combining multiple health care practitioners with experience in the care of tracheostomy patients showed improvement when they practice the treatment regularly. These results have provided new ways of understanding the role of tracheostomy teams for successful implementation of complex procedures and processes that resulting positive implications to the patients with tracheostomy. (Mitchell et al., 2013).

1.2 Problem Statement

Unsafe ETT suction practices remain the problem worldwide even though there are scientific evidence for the safe and efficient technique of endotracheal suctions are available, the recommendations practice have not been observed in nurses' clinical practice, due to poor knowledge about this procedure (Jansson et al., 2013). Moreover, most of the critical care nurses act in line with their own personal experience in their suctioning practice, rather than relying on scientific evidence (Zainib et al., 2017). They may also influence by associate factors such as demographic data include age, level of education, the working experience in the critical unit based on the research done in Tanzania (Mwakanyanga et al., 2018). On other hand, a study on standard guidelines about open and closed system suctioning whereby, increased the level of knowledge, and brought the level of skills to a desired level. It is also stated that most of the nurses skipped the steps of ETT suctioning, such as hyper oxygenation, hand- washing, recording of the procedure, and they did not base their practice on scientific evidence (Özden & Görgülü, 2012). Furthermore, majority of studies practice of ETT suctioning acknowledge and determined it by examine the practices before, during and after

doing the ETT suctioning procedure to identify any differences from other studies which may resulting accurate result (Pedersen et al., 2009).

Although there are many published studies on ETT suctioning worldwide, the data in Malaysia however is limited. Based on researcher's observations and research evidence within critical care areas, it is possible to say that suctioning procedures differ between critical care nurses, but not many published studies in this country consistent with the aims of this current study. Thus more data are needed regarding the knowledge and practice of critical care nurses in Malaysia about ETT suctioning. This is important to justified the existing data and presents different aspects of ETT suctioning. At the end of this study, data that obtained regarding the level of knowledge and practice on this procedure and believe that this result will enlightened the awareness of critical care nurses in this study to reduce the complications. In addition, the results of the study are thought to improve the suctioning practices in critical care wards and to increase the quality of care.

1.3 Research Question

1. What is the level of knowledge and practice on ETT suctioning among nurses in critical care wards at Hospital Universiti Sains Malaysia (HUSM)?
2. Is there any association between the demographic data (age, gender, level of education, working experience in critical care wards and working wards) with level of knowledge and practice on ETT suctioning among nurses in critical care wards at HUSM?
3. Is there any correlation between knowledge and practice on ETT suctioning among nurses in critical care wards at HUSM?

1.4 Research Objectives

1.4.1 General objective

To determine the level of knowledge and practice on ETT suctioning among nurses in critical care wards at HUSM.

1.4.2 Specific objectives

1. To identify the level of knowledge and practice on ETT suctioning among nurses in critical care wards at HUSM.
2. To examine the association between the demographic data (age, gender, level of education, working experience in critical care wards and working wards) with level of knowledge and practice on ETT suctioning among nurses in critical care wards at HUSM.
3. To examine the correlation between knowledge and practice on ETT suctioning among nurses in critical care wards at HUSM.

1.5 Research Hypothesis

1. **Ho:** There is no association between the demographic data (age, gender, level of education, working experience in critical care wards and working wards) with level of knowledge and practice on ETT suctioning among nurses in critical care wards at HUSM.

   H_A: There is an association between the demographic (age, gender, level of education, working experience in critical care wards and working wards) with level of knowledge and practice on ETT suctioning among nurses in critical care wards at HUSM.

2. **H_o:** There is no significant correlation between level of knowledge and practice on ETT suctioning among nurses in critical care wards at HUSM.

   H_A: There is a significant correlation between level of knowledge and practice on ETT suctioning among nurses in critical care wards at HUSM.

1.6 Significance of the Study

The safety and effectiveness of the ETT suctioning are dependent on the knowledge and skill of nurses who perform the procedure. The poor practice may result in avoidance of complications that may threaten patients' safety. Published work indicated that nurses' practice varied across contexts and highlighted that patients received suboptimal care and incorrect techniques that may cause death or morbidity. Furthermore, an updated guideline in keeping the patient's comfort and safety can be created using this study as a reference on how the level of nurses' knowledge and practice towards the patient with ETT suctioning in association with one another. In addition, this study was to improve and enlightened the level of knowledge and practice on ETT suctioning to prevent any error and malpractice to the patient, especially in critical care wards by analyzing the results from the study and share the findings with the nursing management of Hospital USM, thus they can take appropriate action to overcome the limitation.

1.7 Conceptual & Operational Definition

Table 1: Conceptual and Operational Definition

Terms	Conceptual Definition	Operational Definition
Knowledge	Understanding of or information about a subject that you get by experience or study, either known by one person or by people generally. (Cambridge Dictionary, 2021)	Knowledge in this study is referring to nurses understanding and information about the ETT suctioning.
Practice	The actual application or use of an idea, belief, or method, as opposed to theories relating to it (Oxford Dictionary, 2021)	Practice in this study refers to the actual application or method used by nurses in critical care wards in performing ETT suctioning.
ETT suctioning	The process of applying negative pressure to the distal ETT or trachea by introducing a suction catheter to clear excess, or abnormal, secretions (Allison, 2020)	Endotracheal suctioning refers to the procedure that is performed by the nurses in critical care wards in HUSM
Critical Care	The specialized care of patients whose conditions are life-threatening and require comprehensive care and constant monitoring, usually in intensive care units (MedicineNet, n.d.)	The care which is important for patients who have a life-threatening condition that requires a skilled and efficient nurse's providing comprehensive care to the patient.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

This chapter reviewed the current literature related to knowledge and practice on ETT suctioning. In addition, this chapter also provides a detailed description of the operational or conceptual framework chosen for the proposed study.

2.2 Level of knowledge on ETT suctioning

Endotracheal suctioning is the most common procedure in the critical care unit. One cross-sectional study that was done in Tanzania to assess the knowledge and practice regarding ventilated associated pneumonia (VAP) conclude that the nurses in critical care have adequate knowledge but poor practice in ETT suctioning causes VAP (Said, 2012). This result was agreed by one study in Iran (Zainib et al., 2017) that shows a similar result and determined that correct performance of the nurses can minimize the side effects to the patient. However, in Baghdad, the results show that the nurses' practice is better than the knowledge where the nurses correctly practice the procedure for instance wearing personal protective equipment (PPE) and hand hygiene (Majeed, 2017). To increase the knowledge, studies had been reported in Finland and India where the researcher assessed the knowledge of the nurses before and after the teaching intervention regarding the ETT suctioning (Jansson et al., 2013). Moreover, one study conducted in Hospital Tengku Ampuan Afzan (HTAA) Kuantan shows that 19 (24.7%) nurses responded as uncertain towards the question regarding whether paroxysmal cough will be the possible complication of suctioning due to the irritation of the carina. Similarly, 14 (18.2%) nurses responded as uncertain to the

question of whether normal saline should not be instilled through the ETT because it will damage lung tissue (Afandi & Ludin, 2020).

A cross-sectional study design was used with 95 nurses working in different critical care units of two teaching hospitals at Nepal by using a non-probability, purposive sampling technique. A semi-structured self-administered questionnaire and structured observational checklist were used to identify knowledge and practice regarding endotracheal suctioning among nurses. The data analysis was made by using descriptive and inferential statistics resulting that the respondents were above 20 years (66.3%) with the mean age of 21.77 ± 1.91, 87.4% were Hindu, 82.1% had completed Proficiency Certificate Level in Nursing, 76.8% had work experience of more than 6 months in critical care units and 11.6% had participated in in-service education. A total of 55.8% had adequate knowledge of endotracheal suctioning with a mean percent of 61.6%. The significant influencing variables for the level of knowledge on endotracheal suctioning were working hospitals ($p = < 0.001$) and working wards ($p = < 0.001$). Results showed that 44.2% had satisfactory practice on endotracheal suctioning with a mean percent of 47.5% (Adhikari & Subba, 2020).

2.3 Level of practice on ETT suctioning

A study on the effect of endotracheal suctioning with and without normal saline on hemodynamic and respiratory parameters in patients undergoing mechanical ventilation in intensive care unit of hospitals supervised by Guilan University of Medical Sciences was conducted. This study was done to determine the effects of suction methods with and without normal saline on hemodynamic and respiratory patients using a randomized crossover clinical trial that involved

two groups consisting of 37 mechanically ventilated patients by comparing the effect of suctioning with and without normal saline . The result showed that for at least 2 hours, the second stage was conducted and the patients were placed in groups A and B, respiratory and hemodynamic parameters were measured at different intervals. After the suctioning, the systolic blood pressure ($p = 0.20$), diastolic blood pressure ($p < 0.0001$), average arterial pressure ($p < 0.0001$), and heart rate ($p < 0.0001$) increased over time immediately then declined in approximately 5 minutes after suction, it approached its baseline (Adib et al., 2014).

Besides that, a study in Chennai, India had been conducted to compare the physiological effects of suctioning with and without normal saline instillation. The study indicated that there were no differences in respiratory mechanics, airway pressures, or gas exchange (Mary Asphone, 2017). However, other researchers have shown conflicting results. In their study of 26 critically ill patients on the effects of normal saline instillation on oxygen saturation resulting oxygen saturation levels fell significantly after suctioning, and those who had received a bolus of normal saline beforehand suffered a much greater fall in oxygen saturation (Khimani et al., 2015).

2.4 Association between the demographic data with level of knowledge and practice on ETT suctioning among nurses in critical care wards at HUSM

Some factors may attribute their knowledge and practice, proven by studies in Egypt and Sri Lanka the nurses that work more than 5 years in critical care wards had better knowledge and practice than nurses that work less than 5 years because they are unaware of recommended practice, lack of relevant knowledge, not up to date to the new guideline, misunderstanding of procedure

and the confidence level performing the procedure (Aboalizm et al., 2019) Moreover, in Brazil, the practice is based on rituals or tradition thus the knowledge regarding the procedure is poor (Pereira Frota et al., 2013). In addition, one study in Malaysia, that assess the level of knowledge, attitude, and practice on endotracheal suctioning and the relationship between each variable using a cross-sectional study was conducted via convenient sampling at two intensive care unit using a set of a questionnaire showing the result that age does not represent the score gain in knowledge, attitude, and practice questions. As for common, the score gain was not affected whether the nurses had a post-basic background or not (Afandi & Ludin, 2020). Besides age, working experience in critical care wards was also incorporated to determine the level of knowledge, attitude, and practice among critical care wards nurses and working experience in critical care wards is not significant with the level of knowledge, attitude, and practice on endotracheal suctioning, which concurs with the study by who stated that no relationship was seen between working experience with the level of knowledge of critical care wards nurses (Ansari & Alavi, 2012).

2.5 Correlation between the knowledge and practice on ETT suctioning among nurses in critical care wards at HUSM

A study in Baghdad, Iraq, shows that the knowledge and practice of nurses regarding ETT suction were poor, with no significant correlation between the two (Majeed, 2017). Other than that, there is a weak correlation between nurse's knowledge and practice scores as r=0.031 and p=0.736 it is not statistically significant in Egypt. It means that nurses have knowledge about standard guidelines but they do not put it into practice (Zainib et al., 2017). However, the study by Zeb et al., (2017) at Peshawar, Pakistan, identified that nurses working

in intensive care unit of tertiary care hospitals in the region have average knowledge of ET suctioning, though their practice was good still there is need for policies for improving nurses' knowledge and practice regarding ETT suctioning. Previous studies in Italy show that correct performance by nurses in endotracheal suctioning can minimize its undesirable side effects to the patients (Maggiore et al., 2013). A study in Iran showed that the quality of nurses' performance in ETT suctioning and tracheostomy tube in critical care wards was weak in 19.2% cases, moderate in 65.4% cases, and good only in 15.4% cases, and none of them showed an excellent performance (Hakime et al., 2015).

Most of the studies showed that nurses have knowledge and but have poor practice. In addition, some factors may contribute the knowledge level and practice level on this procedure for instance the age, level of study, and working experience also the technique in performing the ETT suctioning. Therefore, this study aims to determine the knowledge and practice of ETT suctioning among nurses in critical care wards.

2.6 Conceptual/ Theoretical framework

The Health Belief Model (HBM) is one of the most widely used conceptual frameworks for understanding health behavior. The Health Belief Model (HBM) was developed in the 1950s by social psychologists Hochbaum, Rosenstock, and others, who were working in the United States of Public Health Service to explain the failure of people participating in programs to prevent and detect disease (Karen Glanz, 2020). The health belief model asserts that when a person believes he or she is susceptible to a health problem with severe consequences, the person will more likely conclude that the benefits outweigh the barriers associated with changing one's behavior to prevent the problem. There are three components in this model which are the individual's perceptions about health. Next, the modifying factors include demographic, socio-psychological, and structural variables and lastly the benefits of taking preventive measures.

According to the HBM, it contains several constructs that predict health behavior which are perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action, and self-efficacy. Firstly, the perceived susceptibility which means the belief about getting a disease or condition. Second, perceived severity which means the belief about the seriousness of the condition, or leaving it untreated and its consequences. Third, perceived benefits mean that the belief about the potential positive aspects of health action. Fourth, perceived barriers which is the belief about the potential negative aspects of particular health action. Next, cues to action factors that trigger action. Lastly, self-efficacy is the belief that one can achieve the behavior required to execute the outcome (Abraham & Sheeran, 2014).

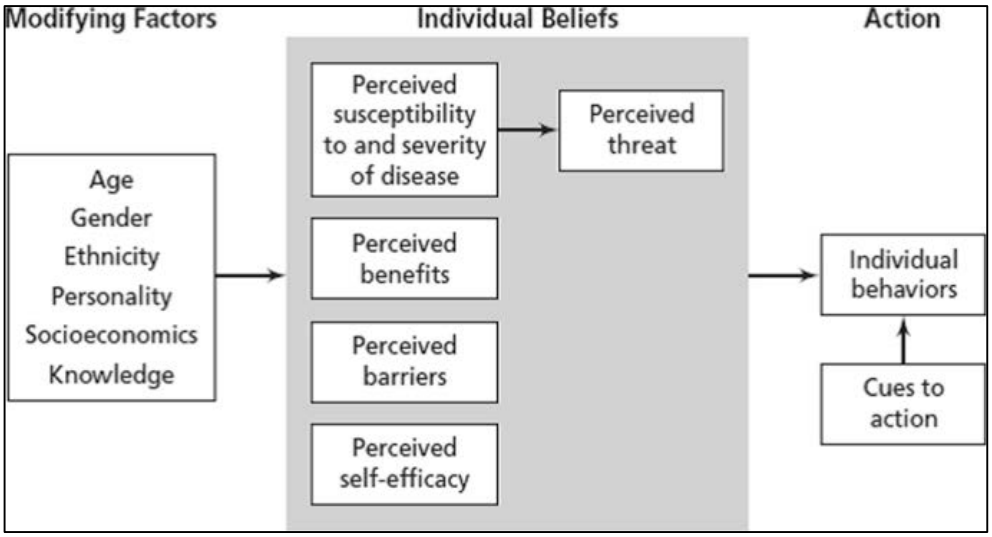

Figure 2. 1: Theoretical Framework of Health Belief Model

Figure 2.2 below shows the modification of the Health Belief Model. This conceptual framework differs from the original model as the situation is different, focusing on the knowledge and practice of critical care unit nurses regarding ETT suctioning. In this study, the perceived susceptibility focus on the belief of critical care nurses that patient may have benefits after the suctioning procedure otherwise patient may have complications if they do not take attention on the procedure. This is due to the factors that influence the nurses' beliefs. Thus, cues of action will be done to perceive the susceptibility to the patient. But there are also perceived barriers that affect the nurses' belief, for example, inadequate knowledge of the procedure and misconception of the ETT suctioning. Thus, to minimalist the barrier, nurses should take health action to adapt to the situation.

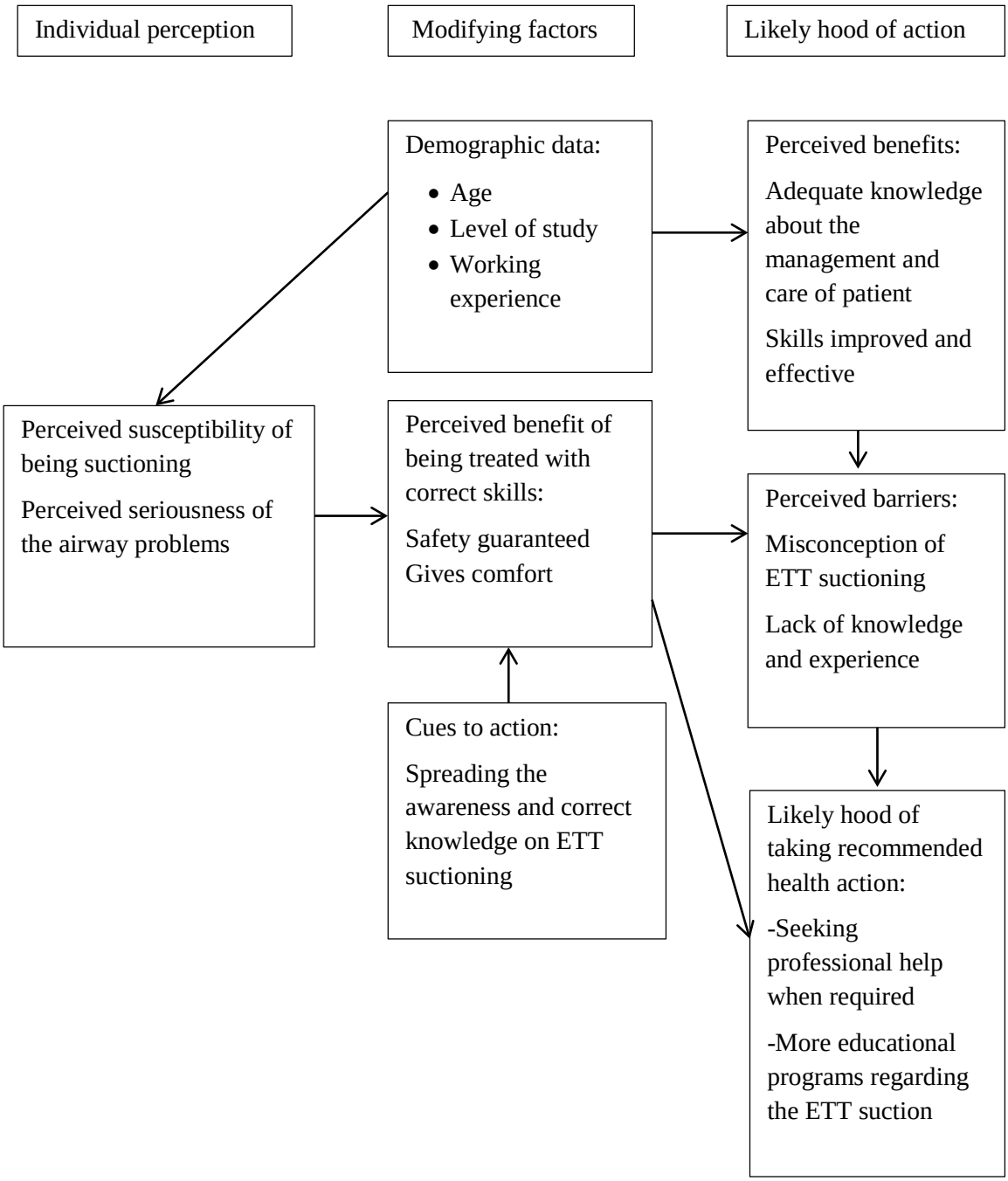

Figure 2. 2: Modified Health Belief Model

CHAPTER 3: METHODOLOGY

3.1 Introduction

In this chapter, the researcher described the methodology and methods used in conducting the study. This included the research design, sample selection, data collection, and data analysis. In addition, the detailed ethical consideration is also attached and listed here as a part of the requirement to conduct this study.

3.2 Research Design

This study used a cross-sectional study design to determine the level of nurses' knowledge and practice on ETT suctioning among nurses in critical care wards at HUSM. A cross-sectional study design measures the outcome and the exposure of the study participants. The cross-sectional study design begins the investigation at a single point in time and they continue the progress forwardly in terms of the direction of investigation in time until the proposed date soon (Wang & Cheng, 2020).

3.3 Study setting and population

This study was conducted in critical care wards at HUSM includes 1 Mutiara with 45 nurses, 1 Fairuz subsist 20 nurses, 8 Selatan wards consist of 30 nurses, 2 Delima with 39 nurses, and Surgical Intensive Care Unit (SICU) with 26 nurses. Data collection was done from October 2020 until June 2021. The target populations in this study were nurses that engaged in critical care wards at HUSM.

3.4 Sampling plan

3.4.1 Sample Criteria

Inclusion criteria

1. Registered nurse who are currently working at five critical care wards in HUSM (2 Delima, 1 Mutiara, SICU, 8 Selatan and 1 Fairuz).
2. Have one year and above working experiences in critical care wards.

Exclusion criteria

1. Student nurse in the wards.
2. Sister or wards manager in the wards.

3.4.2 Sample Size Estimation

The total population samples which are the nurses who are working in critical care wards at HUSM are 158. This study used the sample size formula proposed by Cochran (1977):

$$n0 = \frac{z^2 p(1-p)}{e^2}$$

Whereby,

n0 = Required sample size

Z = Value representing the desired confidence level (CI: 95%, Z= 1.96)

e = Level of precision, ± 5% (0.05)

p = Anticipated population proportion, p = 50% (0.5)

Calculation:

$$n0 = \frac{Z^2 p(1-p)}{e^2}$$

$$n0 = \frac{(1.96)^2 (0.5)(1-0.5)}{0.05^2}$$

$$n0 = 384.16$$

$$n0 = 384$$

Since the sample size calculated from the formula is more than the targeted sample population, thus modification is made using the equation:

$$n = \frac{n0}{1 + \frac{(n0 - 1)}{N}}$$

Whereby,

n0 = Unadjusted sample size, 384

N = Targeted population sample size, N= 158

Calculation:

$$n = \frac{384}{1 + \frac{(384 - 1)}{158}}$$

$$n = 112.15$$

$$n = 112$$

From this equation, the sample size is 112 and need to consider the 5% drop out, and then the calculation will be:

$$n = \frac{n\ calculated}{1 - dropout\ rate}$$

$$n = \frac{112}{1 - 0.05}$$

$$n = 117.89$$

$$n = 118$$

Therefore, the sample size for this study is 118 nurses that engaged in critical care wards at HUSM.

3.4.3 Sampling Method

In this research, simple random sampling was used to collect the data. A simple random sample is a subset of a statistical population in which each member of the subset has an equal probability of being chosen (Hayes Adam, 2020). A simple random sample is meant to be an unbiased representation of a group. By this method, we have target in which wards have practice ETT and get all the nurse inside the wards to involve in this study. The researcher had defined the population of study by recognizing the characteristics that contribute the population of interest which is the nurses that working in the critical care unit in HUSM. Next, the researcher prepared the list of the population subject for instance the name list of the critical unit nurses. Then, the researcher labeled the subject according to the number and select subjects randomly using the lottery method via a computer program and the selected subjects had been approached and the investigation was done (Elfil & Negida, 2017).

3.5 Instrumentation

3.5.1 Instrument

A self-administered questionnaire was used in this study for the data collection. The tool and permission to use were obtained from the original author (Colombage & Goonewardsena, 2020). The instrument was divided into four sections. The first section was on demographic data. The second section assessed their knowledge of ETT suctioning. The third and fourth sections were related to practices of ETT suctioning.

In section 1, it focused on the demographic data which are age, gender, educational level, working experience, and working wards. In section 2, respondents had been answered about the knowledge of ETT-related care and

suctioning. These questions had determined the level of knowledge among nurses regarding the ETT suctioning whether they apply the knowledge in the procedure. In addition, section 3 focuses on the practices related to ETT care and suctioning to identify the practices that nurses apply before, during, and after the procedure. On the other hand, in section 4, the respondent also had chosen the best answer for the question related to the suctioning via ETT. From these questions, the researcher had identified the correlation between the knowledge and practice regarding suctioning.

3.5.2 Validation and reliability of the instrument

The study had used the original version of the questionnaires by Goonewardsena and Christine Sampatha Colombage (2020). It is a validated and reliable questionnaire with Cronbach alpha of 0.80. Thus, no validation test was done for content validity. The pilot study had conducted where 10% of the sample size that consist of 12 respondents in 2 Delima and that have the inclusion criteria. The respondents involved in pilot study was excluded from answering the questionnaire. The pilot study in research was conducted to identify potential problem areas and deficiencies in the research instruments and protocol before implementation during the study (Hassan et al., 2006).

3.6 Variables

Table 3. 1: Types of Variables

Independent Variable	Demographic data (age, gender, level of education, working experience in critical care wards and working wards)
Dependent Variable	Level of knowledge and practice on ETT suctioning among nurses in critical care wards at HUSM.

3.6.1 Variables measurement

The self-administered questionnaire consisted of four sections. The first section is on demographic data which include the age, gender, level of education, working experiences, and working wards. The second section was to assess the nurses' knowledge on ETT and suctioning, consist of 18 multiple choice questions which respondents need to answer between the true, false, or don't know. The third section consists of 9 questions regarding the ETT care and suctioning where respondent needs to answer on option always, sometimes, and never. While for the fourth section is also relate to practices of ETT suctioning which is based on the guidelines developed by the AARC clinical practice. This section consists of 10 questions which the respondent needs to choose one correct answer.

3.6.1.1 Variables scoring

Total scores were calculated for both knowledge and practice sections separately. Each correct answer was given 5 marks and incorrect answer zero marks. The mean marks obtained for knowledge was 70 and based on this value, a score of 70 or more considered good knowledge and a score less than 70 as poor knowledge. Practices were divided into two categories a score of 63 or more considered as good practices and a score less than 63 as poor practices.

3.7 Data Collection Method

3.7.1 The procedure of data collection

The collection of data was conducted after achieving ethical approval from the Human Research Ethical Committee (HREC) Universiti Sains Malaysia and permission for data collection from the Director of HUSM. Firstly, the researcher approached the Chief Nurse of each wards involved to obtain the contact number of total nurses in the wards. After that, the targeted sample based on the inclusion criteria had been contacted through the Whatsapp application. The researcher had explained the aim of the study and briefly explain the instruction to complete the questionnaire that will be given. Next, after the subject agreed to participate, a link was given and a consent form must be fulfilled before answering the questionnaire. The researcher had explained that participants must answer with honesty by participants themselves and willingly. Next, the researcher had explained that participation in this study is expected to last 15 to 20 minutes and the link for the questionnaire had been opened for 24 hours. Finally, the completeness of the questionnaire had been checked by the researcher after the participants had finished answering and submitting the questionnaire. Figure 3.1 demonstrates the overall flow of the data collection process.

3.7.2 Flow chart of data collection

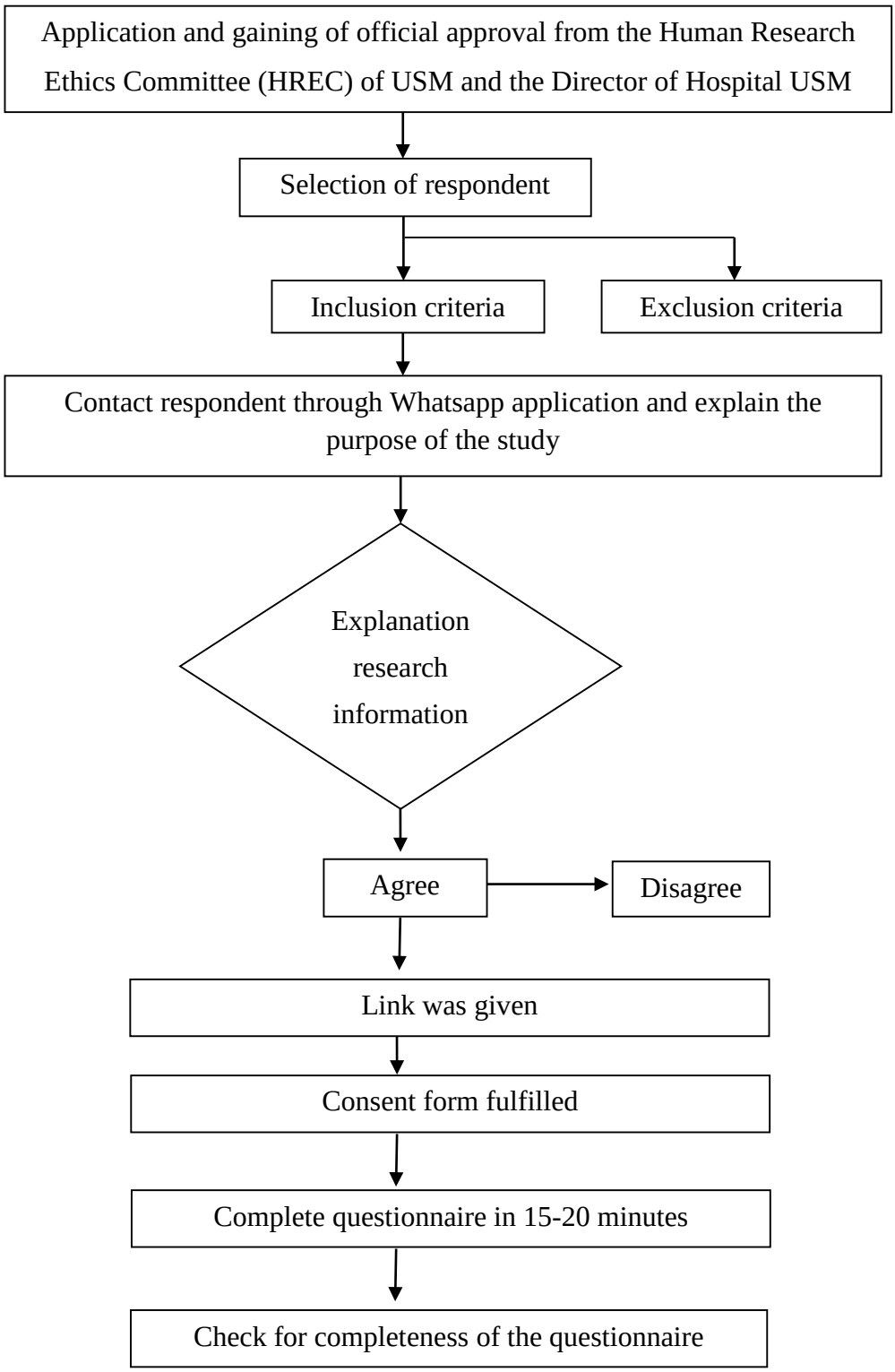

Figure 3. 1: Flow Chart of Data Collection