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NURSES' PERCEPTION ON THE IMPACT OF TECHNOLOGY ON NURSING CARE PRACTISE IN THE INTENSIVE CARE UNIT: A GROUNDED THEORY APPROACH

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Thesis presented in fulfilment of the requirement of the degree of Doctor of Philosophy

THE UNIVERSITY OF EDINBURGH

2022

Abstract

Using Charmaz's (2006) constructivist grounded theory methodology, this study sought to establish a theory that explains how nurses perceive the influence of technology on their nursing care practises. This study used individual in-depth interviews and participant observation as a primary data collection method. In addition, participant observations were conducted before participant interviews to understand the phenomenon and practises in the ICU and corroborate with the participants' stories.

During semi-structured face-to-face interviews, 19 staff nurses, one nursing manager and one medical assistant from an adult general ICU at a public hospital in Malaysia shared their experiences. The grounded theory of the emancipatory practise of ICU nurses was developed by a continuous comparison analysis of transcribed interview data. The predicament of practice was explored within the context of the theme 'navigating through complexity,' which implies that nurses were confronted with a conflicting situation that prompted them to gravitate toward a more "technologized" rather than humanised approach. This option might lead to professional value conflicts and a feeling of powerlessness. In order to reconcile the conflict, nurses attempt to shape their ideal professional identity by incorporating humane and technological values into the care of their patients. A new care paradigm is incorporated into the professional identity that accommodates human needs from a technological standpoint.

Emancipatory practise in the context of this research, refers to the practise in which nurses have the opportunity to self-reflect and become conscious of the significance of striking a balance between humanistic nursing and technological care. This awareness assists nurses in constructing a viable professional identity within an environment heavily

influenced by technology. Emancipatory practise entails the practise that is not only done but also developed and altered as nurses attempt to construct and reconfigure how to operate in a 'complex and dynamic environment due to pervasive technology. A new practice that prioritise both technological advancements and humanistic nursing would be gaining traction, and this theory provided the health care authorities with a realistic assessment of the nursing workload necessary to facilitate this transformation.

Acknowledgement

My heartfelt thanks go to my two great supervisors, Dr. Jennifer Tocher and Dr. Susanne Kean. There are no words to express how grateful I am to you both for your essential advice, unwavering support, inspiration, and sensitivity during my PhD journey. Both of you have been quite helpful in this research and have been patient with me through my tough periods. You guys have always motivated me to believe that, even in the midst of adversity, the sun will rise again. You have offered me advice and encouragement for many years, and it gives me comfort to know that I can chat to both of you when things are tough and my spirit seems tired. I used to wonder what I had done to earn such supportive and amazing managers and confidants who cared so much about not just my job, but also my health and welfare.

I'd also want to extend my gratitude to Dr. Sarah Rhynas for providing me with constructive feedbacks about this thesis, Emily Gribbin and Alison Grahamlaw for their wonderful support during the study process, providing crucial information and guiding me so that I could sort out and organise my study calendar.

My mother, Ramlah Ahmad, and my brother, Zulkifli Makhdzir, both passed away while I was working on my dissertation, so I wanted to make sure they were honoured. I want you to know that my love for you both is embodied in this thesis and that I think you would be pleased with it. You two keep inspiring me and keeping me motivated to get this done.

Not to mention, thank you to my family and friends that encouraged, supported, and believed in me.

List of abbreviations

EHR	Electronic Health Record
ETT	Endotracheal tube
HIS	Hospital Information Systems
HOD	Head of Department
ICU	Intensive Care Unit
IT	Information Technology
KIV	Keep in view
MA	Medical Assistant
MOH	Ministry of Health
PEEP	Positive End-Expiratory Pressure
RN	Registered nurse
SCOT	Social Construction of Technology
WHO	World Health Organisation

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CHAPTER 1:INTRODUCTION

Since Malaya's independence on 31 August 1957, the country's healthcare sector has been subjected to a number of significant shifts and developments. The advancement of the healthcare system was a significant stride forward. Initially, the healthcare system established after independence obviously reflects the legacy of healthcare services left behind by the British colonial authority (Wahab and Rose, 2012). Ever since, there were subsequent adaptations made to the healthcare system in order to meet the rising demands posed by newly emerging diseases, shifting demographics, and increasing political pressures (Quek, 2014).

Recently, the government has exerted a great deal of effort to modernise healthcare technology in order to remain at the forefront of healthcare and assure optimal patient results (Lee, Ramayah, and Zakaria, 2012). In the early stage, only diagnostic units including radiology departments and laboratories utilised modern technology. Thenceforth, direct patient care witnessed the introduction of many digital medical technology, such as digital thermometers, digital blood pressure monitoring, electronic monitoring systems, and infusion pumps, as a result of the transformation of the healthcare system. In addition, several innovations have been included into the healthcare system in order to guarantee efficient and well-coordinated patient care. In particular, healthcare workers have begun adopting electronic health records to capture patient care data (Samy, Ahmad, and Ismail, 2010).

The government initiated the modernization of the healthcare sector when it launched The Government Transformation Programme as part of the Tenth Malaysia Plan. This

transformation programme was created to promote the new economic model, which centred on improving vital areas such as education, healthcare, the environment, labour, public utilities, and welfare. The new economic paradigm has expanded the government's power to influence and gather information beyond natural constraints (Valverde, 2016). The outcome of this programme saw several hospitals in Malaysia have been integrated with hospital information technology since 2011. Since 2011, various hospitals in Malaysia have been integrated with hospital information technology as a result of this effort. As a result, there is a rising awareness of the importance of technological adoption in ensuring a smooth transition and successful acceptance of the new technology by healthcare personnel (Lee et al., 2012). Since the implementation of the hospital information system for patient care, a growing number of studies have focused on the usage and acceptance of technology by healthcare workers (Lee et al., 2012; Ng and San, 2013; Samy et al., 2010).

Because the integration of technology is still in its infancy, the acceptance of healthcare staff has been the primary emphasis (Turner, Kitchenham, Brereton, Charters, & Budgen, 2010). What is worrisome is that the emphasis put on nurses to master the use of technology might, in the long term, cause them to become technologically dependent and divert their attention away from the patients (Drago, 2015). Since 2001, nursing researchers have argued consistently about the necessity to examine the dehumanising impact of technology (Barnard & Sandelowski, 2001; Dean, 1998b; Kongsuwan & Locsin, 2011; Stayt, Seers, & Tutton, 2015). Where there is an emphasis on the technological modernization of healthcare, the nurses' perspectives on the harmony and tension between technology and patient care must also be highlighted (Cassano, 2014). In the Malaysian healthcare environment, where technology adoption is still in its infancy, it is crucial to comprehend the influence of technology on nursing care. According to a study of the

available literature, the majority of studies examining the influence of technological advancement on nursing and caregiving were undertaken in the West, whereas none were conducted in Malaysia. Consequently, this demonstrates the necessity for a research that focuses on the influence of technology on nursing care, especially the experiences of Malaysian nurses who have used technology to their nursing care delivery. This is the basis for this thesis's research topic.

This chapter begins with my own views on the study problem's outline. Next, the context of the research is presented. The purpose of the study and the research questions are then stated. The structure of this thesis is described in the chapter's conclusion. This thesis uses the words 'technology,''systems,' and'machine' interchangeably to refer to the kind and context of technology used.

1.1 Personal reflections on the research problem

My clinical practise experience in Malaysia as an Intensive Care Unit (ICU) nurse before this and as a nurse educator now inspired me to write this dissertation. As an ICU nurse, I was exposed to a range of patient care technology, including mechanical ventilators and electronic monitoring. This equipment contributes to the technical nature of the clinical setting. In recent years, technology has invaded almost every element of providing health care.

In other words, the advent of information technology represented one of the most significant changes in the delivery of healthcare services. During my clinical experience, the information system was mostly used in the laboratory and radiology department for patient

care behind the scenes. There were only a few sophisticated technologies were made accessible in the ICU during my experience as a nurse, such as transportable x-ray equipment and arterial blood gas analyser. Following the expansion of the healthcare system, more new technologies have been implemented into the clinical setting throughout time, including the incorporation of technology to facilitate the admission and discharge of the patients.

Within the modern healthcare sectors, it appears that sophisticated electronic monitoring medical equipment and computerised documentation systems started to replace the previous physical monitoring and manual recording procedures. The fundamental premise of nursing care delivery changed with the transition. As a substitute for mercury thermometers, the digital thermometer facilitated a quicker temperature check and indirectly lowered the amount of time nurses spent with patients. Nonetheless, the fundamental changes in innovation need the use of technology into the healthcare system to enhance the patient experience (Mohamadali and Aziz, 2017).

In reality, the World Health Organization (WHO) advocates increasing use of techno logy and health information systems in order to attain universal and inexpensive access to health care (Safurah, Kamaliah, Khairiyah, Nour, and Healy, 2013).

Similarly, the use of technology in patient care is equally important in improving the nurses' understanding of the patients to facilitate the delivery of nursing care delivery. Hence, it is vital for the nurses to constantly update themselves with new skills to meet the ever-evolving technological needs. Considering the major change in the nursing profession following technology integration over the last decade, there is increasing evidence in the literature to show that the integration of technology could contribute to the risk of limited

patient engagement and dehumanisation of the nursing profession. Inarguably technology has benefited healthcare in many ways, however, it has also cast certain undesirable effects on nursing care as reported in several studies (Buchanan-Oliver and Cruz, 2011; Harrison, Koppel, and Bar-Lev, 2007). Very soon, technological competency will no longer be optional to have but rather an essential element of nurses' job performance. However, the innovation in healthcare delivery often focuses mainly on the technology itself. Therefore, in certain clinical settings such as in the ICU where technology is ubiquitous, the integration of technology and nursing is not seamless enough as the technology is not adjusted to fulfil the nursing need of patient care. This brings on the question of whether patient care is driving the technology use or the process of patient care is led around by technology? Undeniably, this question became even obvious after the introduction of paperless hospital information systems (HIS) following the National Health Transformation Plan. Because of this, I became more interested in the impact of technology on nursing. I believe that a better understanding of this issue is necessary to identify both desirable and undesirable impacts from technology on nursing care. It will also provide valuable information to guide future research to ensure successful integration of healthcare technology in the healthcare system.

1.2 Context of the study

Prior to design this study, the literature related to the utilisation of technology in the nursing context was examined (Hsiao, Chang, and Chen, 2011; Huston, 2013; Kongsuwan and Locsin, 2011). Furthermore, research on the impact of technology on healthcare workers in other clinical disciplines was also examined, including anaesthetists (e.g.; Delaney, 2010), dentists (e.g.; Sbaraini, Carter, Evans, and Blinkhorn, 2011), physicians (e.g. Hunt et al.,

2009), and pharmacists (e.g. Pontefract et al., 2018). Despite a considerable amount of studies on technology integration in the Malaysian healthcare system (e.g.; Lee et al., 2012; Ng and San, 2013; Samy et al., 2010), very limited study focused specifically on the impact of technology in nursing care. Furthermore, the existing literature on healthcare technology is only limited to the adoption of HIS and the successful integration of technology from the aspect of the functions and structures of the HIS (Mohamadali and Aziz, 2017; Samy et al., 2010; Sarlan, Ahmad, Fatimah, Ahmad, and Dominic, 2013). However, there were research studies from other countries that provided an insight into the influences of technology based on the ICU nurses' view (Bagherian, Sabzevari, and Mirzaei, 2017; Kongsuwan and Locsin, 2011). The findings showed that the ICU nurses who practised technology in nursing care had a lower perception of caring as the technology had limited their interactions and connections with the patients.

On the other hand, the patients might also experience a confusing paradoxical relationship with the nurses within the clinical environment. They might feel invisible and alienating when technology was used in the delivery of care, yet at the same time well cared for and reassured when they were provided with the human touch by the nurses (Stayt et al., 2015). This was supported by some studies in which technology was found to contribute to dehumanisation in nursing as a result of the inherent features of modern medical settings that shaped the delivery of nursing care in such settings (Rashid, 2011). Nurses who were too technology-oriented were also found to negatively impact the nurse-patient relationship (Jasmine, 2009) (Barnard and Sandelowski, 2001; Bridi, Louro, and Da Silva, 2014). These findings led to the development of the research question in this thesis.

Specifically, the Malaysian hospital information system (HIS) was still in the initial stage of implementation when this study was conducted. Whilst multiple strategies have

been implemented to increase the technology adoption among healthcare workers, the uptake remains low due to technological barriers such as ineffective design, data loss caused by errors in the system, slow system speed, and unexpected system outages (Mohamadali and Aziz, 2017). The technological barriers also added complexity in patient care due to the additional time and workarounds needed to accomplish the extra steps (Garrett and Craig, 2009). In other words, the nurses might be spending more time on the technology rather than on the patients (Aslan, Karaaslan, Yildiz, Dogan, & Evirgen, 2016). They would also need to invest more time in learning a new skillset to keep themselves up-to-date with the emerging technologies (Huston, 2013). These barriers and additional burdens represent a major roadblock to complete implementation and adoption of HIS in Malaysia (Mohamadali and Aziz, 2017).

To date, little is known about the perception of nurses about the impact of technology on nursing care in Malaysia. Moreover, most of the research in the past about HIS implementation in Malaysia highlighted the importance of ensuring good system integration. In developed countries, healthcare settings are always at the technology frontier and making full use of the latest available technologies. In contrast, as a developing country, Malaysia is still lagging in the adoption of modern technology. The comprehensive use of health information technology very much depends on the prioritisation of the government towards technology adoption and utilisation (Rumball-Smith, Ross, and Bates, 2020). Some researchers had published studies on technological adoption among healthcare workers in Malaysia (Lee et al., 2012; Ng and San, 2013). Nevertheless, none of the studies focused on the impact of technology on nursing care delivery. Little is known about how nurses perform nursing care in the age of technology. Without this vital information, it is difficult to

understand what factors and how do the factors influence nurses' adoption of technology as well as how they integrate technology in their daily practises.

CHAPTER 2: CONTEXTUAL BACKGROUND

2.1 Introduction

In this chapter, the evolution of healthcare technology will be discussed from a Malaysian perspective. It will start with an overview of the healthcare systems and the background of technology development in Malaysia. The structure of the nursing organisation in Malaysia and the issues surrounding nursing practise in Malaysia will also be outlined. This is followed by a discussion about healthcare technology in Malaysia and its possible impact on nursing based on the empirical studies available. Subsequently, an analysis of the context of healthcare technology from the perspective of Malaysian healthcare professionals will be provided by exploring their experience. Finally, the gaps in knowledge from existing literature on healthcare technology in Malaysia will be outlined.

2.2 Background of Malaysia

Malaysia is a Southeast Asian country and shares its borders with Brunei, Indonesia, and Thailand. The West (mainland) and East (Borneo) Malaysia are separated by the South China Sea, with a total area of 127,354 square miles (329,847 square kilometres). As of now, the population is estimated to be 32.2 million (World Population Review, 2020). Based on the data in 2018, the majority of them (24.4 million) lived in urban areas (Hirschmann, 2020).

In terms of technology, Malaysia is a developing Asian country that inspires to move towards becoming a technology-driven country. In fact, Malaysia has been categorised as

an Asian Pacific country that has the potential to create its own technologies (Lai and Yap, 2006). However, Malaysia is still lagging, especially in the healthcare setting, if compared with the rapid technological development in other developed countries over the past two decades. In view of the economic benefit of the other countries that had undergone transformation, Malaysia has also attempted to formulate its own technological development strategy (Smith and Mckeen, 2007). For instance, national technology development plans have been established to systematically guide the nation to be on par as the other technologically-advanced countries (Lai and Yap, 2006). Furthermore, Malaysia is also striving to improve the technology infrastructures as part of national development so that the people can better utilise and benefit from the information and communication technologies (Haris et al., 2009). In the context of human resources, the Malaysian government has also focused on building an information-intensive and knowledge-based society with a technologically-literate and innovative workforce that are competitive by the standard of the global environment (Haris et al., 2009).

2.3 Malaysian Healthcare Systems

At the time of Malaya's independence in 1957, there were only ten major hospitals, 56 district hospitals, and 7 specialised institutions for leprosy and mental health patients (Safurah et al., 2013). The public healthcare services in Malaysia encompass primary and tertiary hospitals across the country. Other than public hospitals, there are also other government-linked hospitals such as university teaching hospitals and military hospitals that provide healthcare services in collaboration with the MOH. The number of public hospitals nearly doubled between 1960 and 2009. Currently, there are 130 public hospitals in Malaysia

operated by the Ministry of Health (MOH) (Safurah et al., 2013). The number of private hospitals also increased from 225 in 2012 to 239 in 2018 (compared to 130 MOH hospitals) (Sarlan et al., 2013). According to Malaysian Ministry of Health (2015), the overall number of public and private hospital beds has increased throughout time. In 2009, there were 1.82 hospital beds per 1,000 people in Malaysia. In spite of this, the bed-to-population ratio decreased from 1:494 in 2000 to 1:735 in 2008, as a result of the fast-growing population. In 2008, the average bed occupancy rate (BOR) for public hospitals was 65.5%, up from 60.0% in 2001 (Ministry of Health Malaysia, 2015).

2.4 Technology in Malaysian Healthcare Systems

Malaysia has undergone a significant transformation in the healthcare sector since its independence in 1957. The current healthcare system is a combination of the medical care left behind by British colonial rule and its subsequent evolution to meet the rising demands of emerging diseases, demographic shifts, and political pressures (Liu et al., 2002). Initially, hi-tech technology was exclusively used in diagnostic settings like radiology and pathology. For instance, radiologists at various clinics received a patient's MRI or X-ray data through an online patient reporting system as reported by the Malaysian Pharmaceutical Society in 2016 (Malaysian Pharmaceutical Society, 2016).

Then, in 1995, the government launched a programme to advance healthcare IT throughout the country (Safurah et al., 2013), demonstrating its dedication to internationalisation. In the realm of education, the growth of technology became more noticeable in the year 2000 when a central database of all medical studies conducted in Malaysia and published in electronic form was developed and made available to all

healthcare professionals. This initiative has made worldwide electronic journals accessible to healthcare practitioners. In the same year, an online health portal was also developed to help the general population learn more about important health topics.

In the 21st century, the Malaysian healthcare industry has also seen a profound transition in the context of clinical practise (Lee et al., 2012). The Health Management Information System (HIS) was implemented in clinical settings in 2001 and has since become an integral part of the technological infrastructure (Safurah et al., 2013). The original strategy called for three distinct stages of HIS adoption in a chosen number of hospitals: initial, transitional, and final. In the first stage, HIS focused only on ED procedures such patient registration, admission and discharge (World Health Organization, 2012). After then, other departments were included into the existing structure. 2011 saw the beginning of the implementation of a more unified system of hospital information technology as a direct result of the presentation of the Tenth Malaysia Plan (Samy et al., 2010). In this context, priority was given to improving the quality of healthcare by, among other things, devoting a significant fraction of total national expenditures to increasing the scope of HIS's use. In the outset of the Health Information System's (HIS) introduction in Malaysia, electronic health records were only used by a small subset of the country's hospitals. To this day, almost all of Malaysia's public hospitals have integrated HIS into their operations in order to record patient care information. Malaysia is getting very close to finishing the HIS implementation process (Valverde, 2016).

The use of technology in medical care has made significant evolvement in recent years. This may be seen in the clinical context through the progressive replacement of less complex and older medical equipment with those that are more technologically sophisticated. Mercury-in-glass thermometer, sphygmomanometer and traditional infusion pumps, to name a few, are being replaced by more high-tech and sophisticated options such as digital thermometers, automated blood pressure monitor and smart infusion pump. The fact that the majority of today's medical equipment are automated has led to a change in the way that registered nurses offer care for patients in clinical settings (Pepito and Locsin, 2019). The transformation that has occurred has resulted in the emergence of new issues for nurses to face in the twenty-first century. For instance, Barnard and Sandelowski, (2001) ponder whether or not conventional nursing methods would become obsolete as a result of the increased use of technology in the field. Given the rapid pace at which technology is advancing, researchers in the field of nursing are beginning to wonder how well-established will be the new and old technologies that may have implications on patient care and nursing practise (Almerud, Alapack, Fridlund and Ekebergh, 2007; Barnard and Sandelowski, 2001; Cipriano and Hamer, 2014; Mcgrath, 2008a). These are the primary considerations that led me to make the decision to investigate this phenomenon further.

2.5 Nursing Organisation in Malaysia

Only students who have completed their high school education are eligible to enrol in nursing school. In order to become a registered nurse, students must complete either a three-year diploma programme or a four-year degree programme at an accredited institution or university. After graduating from nursing school, new nurses are often required to work in

a specific hospital, whether it be a public or private establishment, for a set amount of time (Barnett, Namasivayam, and Narudin, 2003). The Sijil Pelajaran Malaysia (SPM), which is the comparable to 'O-levels,' is the minimum admission requirement for diploma courses. In contrast, the Sijil Tinggi Pelajaran Malaysia (STPM) or matriculation certificate, which is the equal to 'A-levels,' is the minimum entry requirement for degree programmes in Malaysia. Every nurse who completes their education at a public nursing school and registered with The Malaysian Nurses Council will be offered a job in a public hospital upon graduation. Those who have graduated from public or private institutions are required to keep an eye out for job openings that have been publicised. According to the results of a study that was carried out by Mun Tang and Idris (2016) nurses who had educational sponsorship bonds had been actively connected with the hospital ever since they were students there (if the hospital also operate a nursing institution). Therefore, it may seem that this phenomenon offers an explanation for why the nurses who had educational sponsorship connection ties had a propensity to have a pessimistic view of their working environment. This occurred as a result of the educational sponsorship relationship links that these nurses had.. From this vantage point, it is understandable how a nurse's length of service at the same institution may promote boredom and apathy towards the job role itself. This apathy is what ultimately becomes the rationale for higher inter-organizational turnover intention among Malaysian nurses (Mun, 2018).

Further, some nurses may choose to practise nursing abroad to better their own financial standing and get international nursing experience owing to low compensation and the competition of the neighbouring nations (i.e., Singapore and Brunei) and Middle East countries (i.e., Saudi Arabia, Dubai, and Bahrain) that provide greater salary. In addition, the monthly compensation of a nurse in Malaysia is on average between MYR 2,000 and

MYR 3,000 on a regular basis. As a result, it may be difficult for nurses to put aside enough money to pay for the additional education that is necessary for either continuing their professional growth or advancing on in their careers. Thus, it is possible that most nurses do not put much emphasis on continuing their education (Mun, 2018). Given the fact that the average monthly wage of a nurse in Malaysia is considered to be low in comparison to the average monthly wage of a nurse in other neighbouring countries (such as Singapore and Brunei) and Middle Eastern countries (such as Saudi Arabia, Dubai, and Bahrain), it is plausible that this is one of the factors influencing some nurses' decisions to practise nursing in other countries that offer higher salaries in order to improve their individual financial status (Jamil & Ibrahim, 2017). Although it was stated in 2003 that a total of 174,000 registered nurses would be needed by the year 2020 in order to meet the aim of a nurse population ratio of 1:200, as of 2018, only 65,153 registered nurses were employed in Malaysia (MAMPU, 2019). It seems from this data that there will be more than 100,000 available jobs between 2018 and 2020. This scarcity is made to seem even more severe in public hospitals by the fact that a significant number of registered nurses have moved on from their positions in public hospitals and taken jobs in private hospitals since 2005. This migration is a direct result of the more favourable working conditions offered by private hospitals in comparison to those offered in public hospitals (World Health Organisation, 2013).

2.6 The background history of the Intensive Care Unit

During the Crimean War in the 1850s, Florence Nightingale is recognised with being the first person to recommend that critically sick patients need special and distinct treatment

(Vincent, 2013). She recognised that the frequency and intensity of monitoring by a designated nurse to record changes in a patient's condition was an important component of the intensive care of the patient (Gold, 2013). Ten years later, in August 1952, polio was rapidly spreading across Copenhagen, Denmark, and many of the very sick polio patients at the Blegdam Hospital needed respiratory assistance (Berthelsen and Cronqvist, 2003). The only treatment option that was available at the time was a mechanical respirator device called an iron lung (Berthelsen and Cronqvist, 2003). This iron lung was developed by Bjrn Ibsen, who was the elected Head of the Department of Anaesthesiology at the time (Berthelsen and Cronqvist, 2003). He advocated an active strategy in the establishment of a separate unit for the very sick polio patients so that they could be examined and treated in a special ward by doctors and nurses educated in repairing and/or preserving the function of key organs. This would allow the patients to have a better chance of recovering from their condition. In light of the growing number of individuals suffering from polio at an advanced stage of the disease, his suggestion was approved. Consequently, the first intensive care unit (ICU) was set up in 1953, and the same idea has since been reproduced across the globe. In Malaysia, the first ICU was established in 1968 (Rusiman, Tun, Onn, Adnan, and Nasibov, 2011). The ICU has come a long way since then, adopting cutting-edge medical technology and improving upon established care protocols to better serve patients in critical condition. In the decades since the first intensive care units were established, there has been a discernible rise in the number of technological improvements that have been made in the field of critical care medicine. Current medical instruments have progressively superseded the instruments that were used in earlier eras. For example, ventilators have come a long way in the decades since the first iron lung was used to provide respiratory assistance to critically sick patients, with improvements including more precise control facilitated by computers. This

technological innovation in medicine has contributed greatly to the knowledge base of healthcare professionals in regards to the improvement of survival for patients requiring ventilator assistance (Vincent, 2013). The development of electronic monitoring systems has also progressed significantly. In addition to allowing for the non-invasive monitoring of a wide range of vital sign indicators, they may also store this data for a considerable amount of time, allowing medical practitioners to look back on a patient's clinical history and find any relevant information (Evans, 2016). Additionally, computers are enabled at every part of the patient's bedside, providing healthcare professionals with access to evidence-based tools that may aid them in choosing the best course of therapy for their patients.

2.7 The setting of Intensive Care Unit (ICU) in Malaysia

Similar to the other countries, progressive improvement in critical care technology is essential to improve the quality standards and health outcomes. This can ensure an efficient and cost-effective healthcare system (Ministry of Health Malaysia, 2005). The development of the ICUs in Malaysia is based on two factors, namely to improve patient care and secondly, to enhance collaborative and coordinated approach in sharing the decision-making of patient care among multidisciplinary healthcare workers (Bion, 2011). The design and the intensity of technology used in the ICU distinguish it from other ordinary clinical settings. ICU is dominated by various technologies in the form of software and hardware. The software system provides a platform for ICU personnel to manage clinical, administrative, and other unit staff activities. From the aspect of hardware, there are technologies such as smart beds systems, advanced monitoring, medical devices (infusion pumps, electronic monitoring, ventilators, etc.). The data from the hardware is fed into the

software application for display and analysis. This data can be accessed on a customary laptop computer by the patient's bedside and also displayed on the screen monitor. Furthermore, the data can be stored in a clinical charting tab to ensure that patient clinical records are accessible at all times. This replaces the conventional paper-based documentation method. The system enables nurses and other healthcare professionals to better manage and link all the clinical, administrative, and staff activities. In the ICU, the technology that is applied as the patient's bedside point of care system included a customary laptop computer, blood glucose monitors, blood gas analysers, electrocardiography machines, automatic transfer devices, and assistive devices. Apart from that, the typical ICU is also equipped with various bedside medical devices, including patient monitors, infusion pumps, and ventilators. All these technologies help the nurses to manage their clinical workflow and care plan for patients.

2.8 Summary

This section provided vital information about the healthcare systems in Malaysia and the process of healthcare systems transformation. Progressive development in healthcare technologies was also discussed. Nevertheless, despite the various efforts to make use of health information technologies to increase the quality of patient care, a few obstacles hinder the plan. Some of the obstacles being the shortage of nursing workforce and the lack of research being conducted to evaluate the effectiveness of the incorporation of technology into healthcare settings. Despite the interest of the country to keep up with the technology phenomenon in the age of globalisation, many of the latest technological advancements have not been examined comprehensively. This is especially true for the nursing sector in which

the experience of nurses following the adoption of technology is examined from a technology-driven perspective, rather than focusing on the impact of technology on nursing care quality.

CHAPTER 3: LITERATURE REVIEW

3.1 Introduction

In this chapter, I provide information the current literature, including literature from disciplines other than nursing. It focuses on key aspects of technology, nursing, intensive care, and patient experiences that are related to the research questions. To put this study in context, I will first provide a summary of the theoretical perspectives underlying the use of technology. This is followed by a discussion of studies centred on nurses' experiences with using technology to deliver nursing care. In the discussion, I highlight the following: how nurses perceived contemporary nursing practise; how nurses perceived the benefits and drawbacks of technology in nursing practise; and how nurses strike the right balance between electronic documentation in nursing workflow and patient care quality.

As this study is based on grounded theory methodology, therefore literature review was conducted at the beginning of the study. However, Glaser criticised the conduct of a literature review prior to data collection as he believed it could "derail the theory development process as a result of the intrusion of pre-emptive and pre-conceived concepts that emanated from existing theories in the literature." (Glaser, 1978, p.32) Another school of thought disagreed and emphasised on the need to conduct an initial literature review before data collection to set the scene and place the research in context (GetanehAlemu, Stevens, Ross, and Chandler, 2015). This was also in line with Charmaz's argument that "the literature at this stage helps to weave the discussion in the light of earlier works." Charmaz's (2006, p. 165)

In this thesis, the literature search was conducted with the developing analysis. Thus, this literature review included certain aspects that emerged from data analysis and therefore became wider. The main intention of this review was to provide a theoretical context on the essential nature of the relationship between technology and nurses, patients, and intensive care based on the embedded data in the literature.

3.2 Timeline of the literature review

3.2.1 First stage literature review

The review of the relevant literature was carried out in two stages: the first review (which served as an initial review), and the second stage review (a more recent review). The first review took place while the research proposal was being prepared for the first-year examination board. Because of the grounded theory methodology used in this study, the initial review of the literature was broad in scope. The aim was to identify gaps in the subject being studied, which would aid in defining research questions and a suitable methodology for exploration. During this stage, I provided information on current literature on the utilization of technology, including literature from disciplines other than nursing.

3.2.2 Second stage literature review

The second stage of the literature review was carried out after the categories emerged during the theoretical coding. This literature review takes into account the concepts that explained the core category of this study; therefore, it is more narrowly focused. The purpose of this review is to provide the insights and context that underpins the theoretical

category of the study. This review will focus on the concept that underlining the impact of technology on nursing care practise which support the theory of emancipatory practise. of the relationship between technology and intensive care patients.

Studies conducted and published between 2010 and 2022 were chosen for this review because it was assumed that their findings would more accurately reflect the current state of nurses' technical expertise in healthcare settings. In the search of the scholarly literature, only articles that had not been peer-reviewed were included. Aside from that, I searched for relevant papers that were cited in the articles' reference lists. This procedure was carried out with regard to each and every one of the items that was discovered. Due to the limited availability of translation resources, the only articles that were considered for inclusion were those that had been initially published in either English or Malay. However, after applying the language filter to the literature search, it appeared that there had been no studies written in Malay that had been published.

3.3 Search strategies

In order to carry out this literature review, a search was conducted through the following six electronic databases: CINAHL (Cumulative Index for Nursing and Allied Health Literature), PubMed, Scopus, Web of Science, ProQuest, and DiscoverED. The following words and phrases were utilised in the search of each database: "nurses," "technology," "intensive care," "nursing care," "technology," and "technology impact nursing." All searches were conducted in the English language. These keywords and phrases were used to assess the impact of technology on nursing care practise in the intensive care unit.

The phrase 'technology impact nursing' yielded 365 articles after searching the six databases. CINAHL, which is a preferred database, was able to produce 145 full-text articles from the search term "technology impact nursing." After determining that 65 of the articles that were returned as a result of this search were pertinent to providing support for the question that was posed, I concentrated on the contextual aspect in order to narrow my analysis even further. I was particularly interested in the fields of intensive care and critical care during my research. In addition, all studies published between the years 2010 and 2022 were considered for inclusion in the search filters. This was done to accurately reflect the progression of technology within the context of the current clinical setting. Only articles from nursing, sociology, and other health-related fields, in addition to articles that have been published in both Malay and English, are considered for selection. Due to the lack of resources available for translation, however, there were no articles written in Malay language; therefore, only articles written in the English language were included in this collection. Flowchart in Appendix 1 illustrates a more detailed search strategy.

3.4 Findings from the first stage of literature review

Based on the review of the literature, several key topics that characterised the nature of technology and patient experiences in ICU were identified, including definition of technology, technology and nursing care, technology and critical care, technology and care- a paradoxical relationship.

3.4.1 Critical Care, technology, and technological competency

A critical care unit is a high-tech facility for treating and caring for patients with life-threatening conditions. It has been recognised for a long time as one of the most complex settings in a healthcare institution due to its daily utilisation of cutting-edge technology (Shostek, 2007). As discussed earlier, the development of new technology, devices and equipment have been a major contributor to the dramatic shifts seen in the critical care environment. When compared to other clinical settings, the rate of technology advancement in intensive care units (ICUs) during the past century has been much faster.

Continual advancements such as this are revolutionising the way nursing is typically done. This is why many studies on the impact of technology on nursing have been conducted in critical care units and related settings. In one study by Wikström et al. (2007), she concluded that nurses believed that technology had a role in the authoritative character of care settings which made them saw technology as something they can rely on as a resource for making informed decisions in the delivery of care.

Likewise, Alasad (2002) claimed that the dependability of technological monitoring tools can be attributed to nurses' perceptions of technology as "facilitating" and "contributing" to a sense of "safety." Additionally, nurses report feeling "in control" of their work because they can rely on technology when making clinical decisions. Finally, nurses reported feeling "reassured" because technology can validate their clinical judgement about patients' health (Alasad, 2002). Similar to Alasad's results, Browne and Cook (2011) discovered that nurses had a high degree of trust in technology assistance because they

believed it to be reliable. Clearly, the interaction between people and technical systems depends on trust. Many discussions of technology frame the connection between humans and technologies as one between independent, external entities that may influence but not constitute one another (Huang, Tanioka, Locsin, Parker, & Masory, 2011; Kiran & Verbeek, 2010; Matthewman, 2011). From this vantage point, trusting relationships may vary from total dependency, as in the technological extensionist perspective, where people can place their confidence in technology to help them in all the ways they need, to technological sceptics, which causes them to emphasise the precautionary methods due to their fears about technological risks (Kiran & Verbeek, 2010). There are benefits and drawbacks to both technology extensionist and technological sceptics arguments. The potential for human dependence on technology to become excessive is one of the concerns connected with technological extensionist perspective. This is supported by the fact that industrial psychologists who research the human operators of sophisticated machines have long recognised "the control problem" as the main impediment to technological advancement. In the long term, a person's faith in technology might trap them in a human-machine feedback loop where they could become overconfident in the system's skills if they often see success (Zerilli, Knott, Maclaurin, & Gavaghan, 2019).

The findings of Browne and Cook (2011) research show that highly trustworthy automation technology may exhibit unreasonably high levels of confidence in the technology, which might result in complacent among nurses which may lead to poor patient monitoring. Particularly, ventilators and monitoring equipment feature displays that may show all the data indicating the patient's physiological function. This feature can result in a higher reliance on technology support (Stayt et al., 2015). Being required to handle technical equipment like ventilators, infusion pumps, and monitors has made nursing care for critically

sick patients more specialised and complex (Wikström et al., 2007). Because of these characteristics, intensive care unit nurses have substantially more hurdles than nurses working in other clinical settings while providing intense care to very sick patients. In addition, they are required to do so while maintaining a high level of focus and compassion for their patients (Shostek, 2007).

From the perspective of technological sceptics, they are very careful about using technology into their practise which means the things that matter to them, and ultimately, how technology can fulfil both their expectations and the requirements of patients and create (Kiran & Verbeek, 2010). They use technology in a manner that may help them engage with patients in a more personal way in order to establish trust (Browne and Cook, 2011). The conflict arises for the nurses who take a stance of technological scepticism because they concern over whether or not they have the knowledge to carefully manage technology so that it may successfully support the patients who rely on life-supporting technological devices (Kongsuwan and Locsin, 2011). In this regard, many nurses may be afraid that a lack of expertise might lead to life-threatening situations while they are caring for patients.

In fact, Wilkin (2004) discovered in her research that nurses were able to regain trust in the quality of the care they deliver after learning how to use technology successfully. This conclusion is supported by the findings of study conducted by Mcgrath (2008). She discovered that nurses thought intensive care unit nurses required to be digitally literate and adept in order to deliver high-quality care for their patients. In order to ensure that patients get high-quality care, ICU nurses, as reported by Shostek (2007), stressed the need of ensuring that nurses have the necessary technical abilities to handle the technologies and equipment appropriately. Several other studies corroborated their results, showing that

nurses do, in fact, value technology management abilities because they believe it's essential to provide safe, effective care to critically ill patients (Almerud, Alapack, Fridlund, and Ekebergh, 2008; Kongsuwan and Locsin, 2011; Mcgrath, 2008). This information is essential since, in the past, nurses lacked the technical know-how required to operate and maintain the technological devices (Wikström et al. 2007). Instead, only nurses with advanced nursing degrees experienced a period of "technical orientation" or "technology culturing" that made them less intimidated by technology (Alasad and Ahmad, 2002). On the other hand, nurses with less expertise felt that using technology was challenging. Many of the terms associated with the new technology and the management of the technical equipment were unfamiliar to them when they initially started working in the ICU (Valdez, 2008).

3.4.2 Technology and caring: A paradoxical relationship

The main concern in the studies on technology in the nursing field is regarding the juxtaposition of technology within the nursing culture of caring (Stayt et al., 2015). Prior research has suggested that technology and caring are incompatible (Bunch, 2002; Noh, Arthur and Sohng, 2002; Peacock and Nolan, 2000; Stayt et al., 2015). These studies have highlighted that nurses' overreliance on technology might be causing them to overlook the importance of caring. Apart from that, the central issues in the relationship between technology and caring often revolve around how technology can be paradoxically detrimental to humane care (Barnard and Sandelowski, 2001) and the blurry boundaries of competing paradigms (technological, medical, and nursing) faced by the nurses as a result of the increased focus on technological care than direct patient care (Mazzotta, 2016). Arguably, nursing care can be explained in technical terms, but while the variation in caring

experience is acknowledged, it is often minimised due to the manifestation of technology (Pipe, 2012). The competing paradigms between caring and technology can accentuate the tension as caring is viewed from the humanistic perspective.

In contrast, technology is viewed from a mechanistic or functional viewpoint with only instrumental meanings, which may lead to caring being judged as an instrumental-conscious technology (Kitson et al., 2014). The predominance of the instrumental perspective has reinforced the thinking about the dominant culture of mechanistic nursing (Jones, 2010) . Mechanistic nursing refers to how nursing care is performed based on the conceptualisation of human beings in different components, such as bio-psycho-socio, body-mind-spirit, and emotional-physical-spirit. However, some of these components might be incongruent with the patient's needs for compassion and dignity (Stayt et al., 2015).

Based on my experience, the boundaries in the nurse-patient relationship have extended ways beyond just the concerns of technologies. Gadow (1984) who explored the two paradigms of touch and technology, suggested that "the violation of dignity and autonomy that seems to accompany technology is, in reality, a result not of the role of machines in patient care but the view of the body as machine" (p.65). In examining the practice of nursing in a technological working environment, Orland-Barak and Wilhelem (2005) indicated that mechanistic nursing was transpired through the use of technical language that is devoid of 'psycho' and/or 'socio' dimensions of the patient as a person when reporting the patient's condition. Nursing care may be relegated to a superficial level of feelings and connections with the patients (Orland-Barak and Wilhelem, 2005). In truth, while mechanistic thinking may be necessary to help nurses manage technology, it will not help nurses create meaningful partnerships with patients (Fiore & Wiltshire, 2016; Locsin,

2001). Therefore, this picture of the paradox between technology and caring represents a research gap for any researchers who plan to study technology and caring in light of the contexts and boundaries of the two opposing and competing paradigms. The opposing paradigms might provide an essential tension of dissonance that prompts the nurses to shift between divergent views in the moments that require nursing actions with the patients.

3.4.3 Technology and changing role for nursing

Since new technology have been integrated into nursing practise at a rapid rate, nurses have adopted new roles and duties that go along with them (Kongsuwan and Locsin, 2011; Pipe et al., 2012). However, in a technologically-dominated caring environment, nurses are increasingly expected to play a pivotal role in the delivery of nursing care, notwithstanding any reassignment of duties or redefinition of clinical roles and responsibilities (Stayt et al., 2015). The use of technology and machines in nurses' everyday work is often perceived as evidence of their scientific and technological expertise. Their expertise in technical matters is also seen as a tangible representation of the progression of technological advancement (Pepito and Locsin, 2019). In actuality, they welcomed technology as an integral aspect of their job that is conducive to their professional growth. As a result, the vast majority of nurses are eager to take on the responsibilities that come with the development of new technologies (Crocker and Timmons, 2009).

The outsourcing of tasks to technology may be seen as reasonable or even necessary by nurses, according to research by Kongsuwan and Locsin (2011). She coined the word "deputisation" to describe this ongoing phenomenon in nursing, which is marked by the adoption of multiple technical and administrative roles and responsibilities.

On the other hand, if nurses solely regard technology as the greatest way to guarantee the quality of nursing care, it may make them less concerned about the potential drawbacks that technology may have on patient care. According to Pepito and Locsin's research, those who hold this viewpoint are more likely to discount the efficacy of nursing care and to believe that providing nursing care requires a significant amount of time (Pepito and Locsin, 2019).

3.5 Findings from the second stage of literature review

3.5.1 Methods of comprehending the emancipatory practise

This section's objective is to examine the definitions and methodologies used in the literature to describe and explain the emancipatory practise. The section opens with a definitional study of emancipation. This is followed by a study of the background of emancipation as well as an analysis of the pertinent and significant literature on the various emancipatory practises employed by the organisation. This discussion will focus on the suitability of emancipation practises in nursing. The connection between conceiving the identity of nursing professionals and emancipatory behaviour nursing professionals and emancipatory behaviours is then discussed. This section will conclude with an examination of the role that technology may play in relieving nurses from their constrained working environment.

3.5.2 Emancipatory practise

The term emancipatory comes from the word emancipation. According to Oxford Learner's Dictionary, emancipation is the act of liberating someone from legal, political, or social constraints that restrict their actions (Oxford University Press, n.d.).

Emancipation refers to the act of freeing someone from the intellectual, social, or emotional dominance of others who are more powerful (Tristan, 2020). Emancipation has been explored in diverse contexts, such as political, educational, healthcare, and social institutions. (Tristan, 2020) elaborates on the concept of education in line with Kantian humanism, recognising that modern emancipatory human potential necessitates the growth of an independent and rational mind. Hoggett and Thompson (2012) analysis of politics and liberation demonstrates that the emancipation process is emotionally driven. In this environment, emotions are also closely implicated in the governance and policymaking processes, which may cause societal concerns. If governments are unable to address issues, they will project or embody them. When governments seize the chance to focus on characteristics that exacerbate social anxiety and attach them to specific target groups where these aspects of social anxiety are seen as social problems, projections are generated (Hoggett and Thompson, 2012). Lindebaum (2017) states that emotions have a part in emancipation inside an organisation since they are a key instrument of oppressive social control in terms of how employees experience and express it. However, a psychological system that regulates emotions is activated when emotions are triggered. He establishes two distinct methodologies for emotional management. He proposed two potential solutions: antecedent-focused and response-focused regulation strategies. Antecedent-focused tactics occur prior to the induction of a complete emotion and its associated cognitive,

physiological, and behavioural response patterns. In contrast, response-focused regulatory mechanisms are activated after an emotion has been experienced and its cognitive, physiological, and behavioural reactions have been fully formed.

Few studies on emancipation have examined the role of emotions in emancipation, finding that people are motivated to emancipate themselves when they face ideological constraints, as well as to construct new purpose and meaning and new societal norms and connections that serve as a foundation for constructing a new future (Bargetz, 2015; Chandra, 2017; Lindebaum, 2017). Most authors review the concept of humanisation by Paulo Freire, an influential philosopher of education of the twentieth century who laid out a theoretical basis for a pedagogy of the oppressed, explaining why such a pedagogy is necessary to understand the dichotomy of humanisation and dehumanisation (Roberts, 2016; Sharlene Swartz and Nyamnjoh, 2018; Suzina and Tufte, 2020) It is important to stress that Freire develops this pedagogy with the intention of reshaping the world and the social order in according to the needs of the people, and that from this vantage point, education in the conventional sense implies moulding individuals in accordance with the aims of an oppressive class (Freire, 2000). According to Freire, "humanization" entails more than merely putting the oppressed in a better position. It is about entirely redrawing the oppressed-oppressor relationship and resolving the power imbalance that exists within this connection.

Despite the fact that, from an ontological standpoint, humanisation issues have always been a big societal concern, this issue has become inevitable. Concern for humanity leads a person to recognise dehumanisation not only as a possible ontology, but also as a justification for humanity. Suzina and Tufte (2020), who investigated the topic from the

perspective of Paulo Freire's vision of development and societal transformation, contend that, upon viewing the scope of dehumanisation, one may wonder if humanization is a realistic remedy. If, historically, both humanization and dehumanisation are feasible in the context of a specific goal, then a person who lacks one of these traits should be aware of their deficiency. Humanity and dehumanisation are both possible options, but only humanity should be the individual's primary goal. Even though this goal is usually denied in theory, the rejection itself forces one to seek explanation for the denial. As Freire's (2000) emancipatory pedagogical approaches focused on humanization and dehumanisation, numerous research employed Freire's pedagogy to comprehend the duality of humanisation and dehumanisation in social structures (Bargetz, 2015; Kadri, Molinari, & Ramos, 2019; Shahjahan, 2018; Tristan, 2020). The purpose of these investigations was to investigate social identities and oppression. For instance, del Carmen Salazar (2013) attempts to comprehend the efforts of students of colour to fight assimilation, preserve their cultural roots, and reconcile their dual identities. She demonstrates that the human experience in the context of power, privilege, and oppression can lead to an understanding of repressive societal institutions. This consciousness can prolong emancipation in order to liberate and humanise individuals from oppression and injustice (Vlieghe, 2018). It should be understood from the outset that Freire created this pedagogy with a particular historical context in mind, and that the applications of his work should take the temporal element into consideration, which means that the pedagogy must be contextualised across time (Freire, 2000). In a similar manner, Shahjahan (2018) contextualises the modern university by retelling the history and exposing the possibilities for picturing the future advancement and foreseeing the advancement in technology that embodies both freedom and constraint. He interrogates Freire's emancipatory pedagogical approaches, and explicating the temporal restrictions

would aid in expanding these pedagogical approaches in order to develop autonomy and promote liberation. Then, he demonstrates how the ‘movement' of emancipation, the 'periodicities' it links to, and the 'patterns' it may exhibit serve to explain rhythms of emancipation "as they unfold throughout one's life" (Shahjahan, 2018).

This temporal perspective serves as the basis for a study to characterise emancipatory practises in healthcare or nursing background research. Even more so now when health and healthcare has achieved substantial improvement in knowledge increasing specialisation and technological advancements. The interaction between humans and technology has become more challenging as a result of the rapid advancement of technology (Christoff, 2014). This is demonstrated by the growing evidence in research in a particular context that the human element of care can be obscured by a focus on technology and specialisation in its application (Gärdenfors and Lombard, 2020; Rubeis, 2020). Numerous studies have indicated that the extensive application of advanced technologies into healthcare system delivery is likely to make patient care more impersonal and can lead to depersonalization and dehumanization of patient care (Bailey, 2011; Basile et al., 2021; Haque and Waytz, 2012; Maddock, 2019; Stayt et al., 2015). Dehumanization refers to the propensity to see others as less than human and act in a way that denies of full humanness to others (Haslam and Loughnan, 2014). If people are denied human uniqueness, they are perceived without refinement, self-control, intelligence, and rationality (Haslam and Haslam, 2017). The interpersonal relationships between patients and healthcare professionals will continue to be influenced by a variety of technological advancements as technology continues to advance (Barbosa and Silva, 2017). There are studied that suggested the use of various technologies in patient care, healthcare professionals may be less likely to listen, touch, or communicate with patients than they were before the widespread adoption of technology (Rubeis, 2020;

Rafael Celestino da Silva, Ferreira, Apostolidis, & Brandão, 2015). This conjures up the emancipatory pedagogical approaches of Paulo Freire, in which he discusses how the experience of oppression can cause people to anthropomorphize nonhumans and, as a result, cause them to dehumanise people (Freire, 2000).

3.5.3 Insights into Anthropomorphism and Dehumanization

Festerling and Siraj (2021) define anthropomorphism as a psychological phenomenon that describes the tendency of humans to interact socially with non-human entities such as technology, animals, plants, supranatural entities, natural or social phenomena as if these entities were humans. These humanlike engagements include the individuals' behaviours (i.e., how humans interact with non-human entities), feelings (i.e., how humans feel about non-human entities), and perceptions (i.e., how humans perceive non-human entities). Ever since the growing digitization of the environment, anthropomorphism has become particularly relevant in the discussion of how humans engage socially with technology (Festerling & Siraj, 2021; Pineda, 2021). One of the most important aspects of anthropomorphism that has been the focus of investigation over the past couple of decades is the question of whether or not the embodiment of a technology influences how humans perceive it, as well as whether or not it can influence the tendency of humans to anthropomorphize technology as well as the social presence that is perceived to emanate from technology. The word "embodiment" can be used to refer to more than just the physical body that a piece of technology possesses; it can also refer to elements that are used by an artificial agent to improve communication, such as proxemics and gestures. This is because the term "embodiment" can refer to more than just the physical body that a piece

of technology (Deng, Mutlu, & Mataric, 2019; Pineda, 2021). Recent advances in patient care technology at the clinical settings such as electronic monitoring and life-saving technology have also added a layer of embodiment to the discussion (Rachel, 2021). For the purposes of this study, I will focus only on how current empirical research reveal that patient care technology affects people's views of it in clinical settings. The apparatus for an interactive multi-level alert system that is described in the embodiments may be utilized by the nurses in a variety of contexts, one of which is medical ventilators. Not only can alarm embodiments alert nurses to a potentially dangerous clinical scenario, but they also provide a means of reviewing past warnings (Acker and Tham, 2010). In certain implementations, nurses are able to interact with the device's alarming capabilities, and visual indicators via a display monitor may be used to detect a patient's aberrant state or warn nurses about any clinically critical events, allowing the nurses to assess the patient's status based on both current and historical alarm data (Sanchez & Patel, 2018).

Aside from that, Rachel (2021) considers a significant development in the implementation of electronic monitoring technology enables the devices to become more personal because they are directly attached to the patient's body and can initiate some form of communication after the device detects an event. In other words, this makes it possible for the devices to become more intimate. These devices are most commonly used for critically ill patients that require a high level of dependency. Because of this phenomenon, technological dependence is evident in a wide range of interactions between ICU nurses and technology. To begin, nurses will describe their duties as "monitoring vital signs," implying that technology and its management require nurses to view patients as biomedical compositions (Crosbie, 2014). This may result in a schism in the public's perception of nurses as holistic care providers.

3.6 Summary

With the ongoing evolution of technology, nurses will continue to be expected to accept an expanded scope of roles and responsibilities. Evolving issues related to technology have rarely been discussed in terms of changes to nursing goals, technological dominance over care, or alterations in nursing practise. Undeniably, nurses must be responsive to the demands of a technology-oriented healthcare system. However, limited information is known concerning the extent and impact of technology, as well as the experience of nurses with technology. Without further research and theoretical development on this particular phenomenon, the implications of technology on nursing practise and nursing knowledge will not be fully understood.

CHAPTER 4: RESEARCH METHODOLOGY

4.1 Introduction

This chapter details the justification for choosing the constructivist grounded theory (GT) to answer the research questions. The chapter begins with the introduction, and then Section 4.2 presents the research questions and aims of the study. Section 4.3.1 focuses on discussing the philosophical position that frames this study and shapes the method of inquiry. Section 4.3.2 elaborates on the decision to adopt the constructivist GT approach and highlights its principles. Section 4.3.3 addresses the appropriateness of using participant observation and face-to-face interviews, data analysis and trustworthiness in GT. The research process is discussed in Section 4.4. It centres around the approaches for ensuring data collection and data analysis uphold the principles of GT. The final sections of this chapter discuss the strategies to ensure this study's trustworthiness.

Several previous studies have attributed the increased survival of critically ill patients to the technological advances of recent decades (Azoulay et al., 2011; Limbu et al., 2019). Focusing specifically on how technology can change the nature of patient care and healthcare organisations, Szirák (2008) argued that the impact of technological development must be examined through a socio-cultural lens. Technology is applied to shape the social, cultural, moral, and ethical contexts to provide more efficient patient care. Mainly within the ICU, technological evolution has created a demand for nurses to utilise technology in ways that contribute to high quality and cost-effective delivery of patient care (Darvish et al., 2014; Melas et al., 2011). However, few studies have addressed the possible negative impact of technology on healthcare, such as dehumanisation and depersonalisation of

patients' experiences (Kelleher, 2006; Kitson et al., 2014; Silva et al., 2015; Stayt et al., 2015).

4.2 Research Aims and Questions

This study uses a GT approach to explore the impact of technology on nursing care delivery within a cohort of ICU nurses. The goal is to develop a middle-range theory that presents the process relating to the phenomenon. To achieve this aim, the study will be guided by the following research questions:

1. What are the nurses' perceptions of what it means to care for a patient in a high technology environment?
2. Does technology affect nursing care delivery?

4.3 Grounded Theory Methodology

I propose that the GT methodology is the best-suited type of inquiry to understand the impact of technology on nursing care delivery from the nurses' perspectives and to generate a middle-range theory that presents the process relating to the phenomenon. As a nurse with experience working in a highly technological environment, I am interested in exploring the claims of depersonalisation and dehumanisation highlighted in previous studies. I also intend to investigate the nurses' unique worldview on what it means to deliver care in a highly technological environment. Nurses have exclusive experience in patient care technology. They are also entrusted to provide continual care and simultaneously interact with patients and families. For this reason, a constructivist GT is the best methodology to investigate these scenarios as it focuses on assessing the viability (utility) as opposed to the validity (truth) of a personal worldview (Creswell, 2007).

Most previously published studies examining the impact of technology on nursing have been descriptive rather than theoretical; thus, the overall findings remain inconclusive (Almerud et al., 2008; Kongsuwan and Locsin, 2011; Mcgrath, 2008; Wilkin, 2004). An extensive literature search revealed few studies examining the impact of technology on nursing care through the Malaysian healthcare perspective, as most of the available research has focused on the accessibility and usability of healthcare technology (Lee et al., 2012; Samy et al., 2010). Hence, the GT approach will inform an exploration of this phenomenon as it is understudied (Creswell, 2014), particularly among the nursing population in Malaysia.

GT is defined as 'the discovery of theory from the data that were systematically obtained from social research' (Glaser and Strauss, 1967, p. 2). This methodology focuses on organising ideas that emerged from data before conceptually transcending the data and developing the pictures on a higher level of conceptual abstraction than the original material being analysed (Glaser, 2002). Glaser and Strauss first developed GT in 1967. Since then, several variations of GT have been developed, including Straussian GT (Corbin and Strauss, 1990), Glaserian GT (Beck, 2013; Stern, 2016), dimensional analysis (Bowers and Schatzman, 2016), constructivist GT (Charmaz, 2006), and situational analysis (Clarke and Charmaz, 2020). Despite the wide variation in the development of GT, very few study approaches have been pertinent to nursing, especially concerning diverse perspectives of technology adoption behaviour. Therefore, after careful analysis of all the possible approaches, I decided to adopt constructivist GT as proposed by Charmaz (2006). The choice was consistent with my epistemological and ontological stance, which led to adopting an interpretive paradigm for this study. I used constructivist GT methodology to ensure that

my study maintained this epistemological ground. Therefore, I referred to Charmaz (2006), which provides a definitive guide in practicing GT from a constructivist perspective.

4.3.1 Philosophical position

Constructivist GT was chosen as the preferred methodology for the study because constructivism was my epistemological position. Constructivism refers to how 'researcher and participant act to co-create interactional realities, both through enactments in transference and countertransference and through searching for new ways of being in relationships' (Charmaz, 2014). Drawing from my epistemological and ontological stance, I decided to be attentive to the voices of the nurses who were my participants and ensure the co-construction of their experiences in delivering nursing care in an intense technological environment. When using GT, the researcher contributes to the participant's experience and extra meaning is constructed through the interpretive understanding of the qualitative researcher. This ensures a relativist and reflexive stance toward the data consistent with the assertions of Charmaz (2006) and Mills et al. (2006). In these studies, the researcher and participants co-construct meaning an interpretive paradigm without objectively verifying an existing hypothesis.

4.3.1.1 Ontological perspectives

Ontology identifies with the researcher's belief about existence or reality, how people view the world and how it will influence their understanding of what exists (Creswell et al., 2018). The relativist notion linked to constructivist GT is that each individual has 'constructed' reality with the truth. It is also assumed that individuals' experiences of a

phenomenon are likely to be unique. According to Creswell (2007), researchers who follow this perspective assume no single or objective reality or truth. In this study, my ontological position stemmed from relativism. As someone with working experience as a registered ICU nurse, I have often experienced conflicts in nursing care, especially from social, cultural, moral, and ethical perspectives. Thus, I seek the meaning of these experiences. After several years of working, I began to appreciate the importance of diversity and the significance of various contexts of experience. Ontologically, there is no absolutism and rigidity in social lives. Instead, as a researcher, I consider realities formed by the co-construction of participants' views based on their social lives, cultural background, and moral and ethical stances. Hence, my ontological position can be described as relativism with roots in constructivist GT. Charmaz best describes my position: 'a naturalistic or constructivist GT arises from the interaction between the researcher and participants, with the researcher's perspective being part of the process' (Charmaz, 2014, p. 521).

4.3.1.2 Epistemological perspectives

My epistemological perspective on the impact of technology on nursing care delivery was derived from my experience as an ICU nurse. Such experiences have provided me with prior knowledge about the phenomenon that first sparked my interest in this research and shaped my approach to the research inquiry. Furthermore, social reality is multiple, processual, and constructive for me. Hence, constructivist GT was chosen as my method of inquiry as it embraces different perceptions and meanings and is founded on the premise of relativity and subjectivity (Charmaz, 2014). By undertaking a constructivist enquiry, I was able to use my prior knowledge about the reality of working in a high technology environment as a basis to construct the meanings of participants' perceptions, thoughts, and

stories in this study (Breckenridge et al., 2012; Mills et al., 2006). This approach is consistent with the constructivist GT in which the researcher's position, privileges, perspectives, and interactions should be taken into account as an inherent part of the research reality (Charmaz, 2006). By comparison, the Glaserian GT was not an ideal methodology of inquiry for this study as it endorsed the assumptions of objective external reality. Furthermore, the researchers who apply Glaserian GT need to be passive, neutral or following detached narrow empiricism (Alasuutari et al., 2008). While I agree that prior knowledge should be acknowledged as it may shape the analysis, it is essential for the researcher to constantly examine multiple meanings and complexity to avoid adherence to preconceived ideas. To do this, the researchers need to engage in self-reflexivity as part of the data analysis to avoid oversimplifying the reality or generalising thoughts to the extent of decontextualisation during data analysis (Holloway and Biley, 2011)

4.3.2 Grounded theory characteristics

GT is characterised by the iterative process and the interrelatedness of planning, data collection, analysis, and theory development (Vollstedt and Rezat, 2019). Similar to other qualitative approaches, GT methodology requires flexibility, thoughts, and creativity in its application. However, GT is distinct from other qualitative research methodologies as it provides explicit strategies for defining and studying processes. To conduct a compelling GT study, the researchers must adhere to the commonly accepted GT framework (Alasuutari et al., 2008).

4.3.3 The principles of grounded theory

The generation of theory in the absence of an a priori conceptual framework or hypothesis is the most significant criterion of a GT study (Wimpenny and Gass, 2000). This approach requires that GT researchers avoid preconceptions before conducting a GT study. Instead, the theory is developed inductively via data accumulation (Charmaz, 2014). Glaser (1978) emphasised emergence as contingent on and not forcing data into extant data. His well-known dictum about GT is that 'all is data' (p. 32), regardless of the source, be it an interview, observations, documents, or another medium. For this study, the data were gathered via two main collection methods: (1) individual in-depth interviews and (2) participant observations.

4.3.3.1 Individual in-depth interviews

This study used individual in-depth interviews as a primary data collection method. Charmaz (2014) suggested that GT researchers seek detailed descriptions from intense interviews with the participants. The researchers must facilitate an open-ended, in-depth exploration of an area in which the interviewees have substantial experience. The intention is to allow the participants to share their full accounts portraying their perceptions, what they mean to them, and the factors influencing their perceptions. Only then do new viewpoints emerge freely. Therefore, GT researchers need to enter the field with an open mind (Glaser, 2002). The researcher must rely solely on the data discovered without any preconceptions or construction of the meanings to permit the emergence of the concepts grounded in the data.

Nevertheless, under a constructivist orientation, interview data enables the construction of data representing the mutual interpretation between the interviewer and the interviewee. This means that the data are constructed via interacting interpretations. The GT researchers may have to enter study sites and engage with the data with an open mind, knowing that the perspectives may grow or change. They must also ‘employ the inquiry structure for more content to emerge’ (Hesse-Biber and Leavy, 2006, p. 161). Such rich information can only be obtained from an intensive interview. This indicates that a constructivist approach and the interviewer–participant relationship is vital as it enables a mutual construction of meaning and a meaningful reconstruction of participants' stories. Thus, the researchers can never underestimate how lengthy or in-depth interviews may be since it depends on the length of the social bonds the interviewer develops with the interviewee (Charmaz, 2014). Although the interview in both Glaserian GT and constructivist GT approaches focus on exploring discussion points, the constructivist GT interviews should also proceed towards emergent understanding and validation of experience from subsequent interviews. Thus, constructivist GT needs to ascertain the saturation point of all the emergent concepts during analysis.

4.3.3.2 Participant observation

Participant observation was included in the data collected in this study. An initial observational period was conducted before the data collection proper began to gain some preliminary understanding of the ICU environment and the nature of nursing care. Participant observations were conducted before participant interviews. These observations allowed me to corroborate the participants’ behaviour with the participant’s stories. Furthermore, during this period, the full-day shifts of ICU nurses were continuously

observed. Each participant was observed two to three times from 9 am until 12 pm on separate days as they provided nursing care to ICU patients. In addition, the participants were observed in the activities they conducted during the working shift. The purpose of the observation was to gather information on how the nurses engaged with technology in delivering nursing care. This practice enabled me to extract more in-depth information on their views of patient management in the technological environment. From the observation data, most of their time was spent on direct care, indirect care, support activities, non-patient related activities, and personal activities. Direct care is defined as hands-on activities near a patient's bed, such as monitoring vital signs, bathing patients, maintaining patient airways and mechanical ventilators, positioning patients, drawing blood, performing diagnostics, administering prescribed therapy or treatments, and interacting with the patients and their families. Conversely, indirect care refers to the nursing tasks performed away from the patient (Mador and Shaw, 2009), such as working with electronic health records or paper-based documentation, exchanging information during the shift change and preparing drugs. The observations provided information about the nurses' caring behaviours, interactions, technology types and context.

In contrast, support activities included activities related to intradepartmental training, such as in-house training and the mentoring of other nurses. Non-patient related activities involved searching for equipment, arranging the unit, endorsing medication and other supplies, using the computer for non-patient related tasks, and transferring the patient to another bed within the same unit or to other departments or wards. Finally, personal activities included breakfast/lunch breaks, non-patient related social interaction, and conversation.

The findings from the observations were recorded in a reflective diary. Fieldnotes were completed after daily observation to help me explore and clarify issues that arose during the face-to-face interviews. For example, when participants provided their assertions about their skill levels, I could use the findings from my observation to support their claims. At certain times, I needed to repeat the questions to maintain the participant's focus or reframe the questions to simplify them. The primary data collection was unstructured face-to-face interviews with the participants to explore their views on nursing care with the availability of advanced technologies. The interviews also aimed to explore their perceptions regarding the use of technology in the ICU and its influence on their nursing practice. During interviews, participants were encouraged to think more about the subject matter and elaborate on ideas that appeared vague. Interview techniques such as probing were used to facilitate the expression of ideas and redirect the participants when they lost their focus and strayed from the topic.

4.3.3.2.1 Describing Observational Data

The description of the observation data collected in this study depended on recognising patterns of events. As suggested by Dey (1993, p.18), 'the researcher will identify events, processes, things, and people by attending to their characteristics, and by recognising the boundaries which separate these "things" from the flow of experience in which they are implicated; for example, what is "technology", how does a "nurse" react, and what does "nursing care" mean when the unique sequence of events occurred?' In addition, I did monitor interviewees for nonverbal expressions of feelings. I also observed nurses' interactions and how they communicated with each other, aside from determining how much time was spent on various activities. I observed possible situations that participants

described in the interviews by observing the participants. Furthermore, I could also observe events that participants might be unable or unwilling to share. The observation data provided the context for developing the initial guidelines to support the interviews and the analysis (Musante and DeWalt, 2010).

4.3.3.2.2 Memo writing

Memo writing is an integral part of GT and, as Charmaz (2014) proposes, the skeleton of the developing theory. Despite being an optional component in GT, memo writing is an essential part of the process as it can be helpful for data analysis. Through memos, subject interactions and other objective aspects of research can be openly acknowledged, reflected upon, and incorporated into a productive relationship (Tetley, 2013). Mutepa (2016) supported this assertion by stating that the act of reflection enables the researchers to turn intuitive or nonverbal understandings (tacit knowledge) into something that can be explicitly communicated (propositional knowledge) so that new insights can be realised. I maintained a written memo to record my experiences, including my observation notes, thoughts, feelings, and conversations with the nurses. Thus, the record also represented an audit trail of my GT development.

4.3.3.3 Data analysis

An integral step of the data analysis process is to search for patterns in the data. There should be a systematic process of sifting and arranging all the information obtained from interview transcripts, fieldnotes, and other material in all the GT approaches. This process then enables the researcher to present the patterns and processes in data that have been

discovered (Kolb, 2016). Nevertheless, the initial coding process in constructivist GT methodology is more interpretive, intuitive, and impressionistic (Charmaz, 2006). Hence, it is recommended to use incident-by-incident or fragment-by-fragment coding because both approaches enable the constructivist researchers to remain open to the data. These two approaches also help them assess the data critically from certain aspects, actions, and behaviours.

Coding strategies are also incorporated into the GT methodology. These strategies involve open coding, constant comparison, selective coding, memo writing, and theoretical coding. Theoretical saturation is achieved following the iterative process of conceptualisation to ensure that the theory developed is grounded in data (Glaser, 1978). Specifically, the constructivist GT method focuses on initial or open coding, followed by focused coding and theoretical coding (Charmaz, 1997). During initial coding, the goal is to remain open to exploring any theoretical possibilities discerned from the data. This initial level of coding is progressive to permit the researchers to re-examine codes to ensure that they fit the data. The researchers must scrutinise the data and define their meanings before creating codes grounded in the data. Coding evolves throughout the data collection process. During the initial stage, coding involves breaking down the data into discrete ‘incidents’ (Glaser and Strauss, 1967). The emergence of codes during initial coding is an example of inductive logic. The codes provide the researcher's direction regarding the next data types to be collected (Holloway and Galvin, 2016). Subsequently, the incidents from the data are coded into several categories during the analysis. In the event of a lack of data, the researchers must continue to collect data that can fit into the existing categories (Flick, 2018). They must also constantly examine the salient categories of information supported by the data to saturate the categories (Creswell, 2007).

This coding analysis is conducted using the constant comparative method, a strategy used in GT to provide more access to various perspectives that could explain the social processes under study. Specifically, coding plays a central role in grounded analysis and involves deconstructing data. For example, Charmaz (2014) summarised that by engaging in a constant comparative method, the researchers could sort extensive data by identifying which codes belong to the tentative categories. Hence, the emergent categories are grounded in the participants' customs and language. Furthermore, Guba and Lincoln (2001) stated that the process of constant comparison could stimulate thoughts that lead to both descriptive and explanatory categories. Moreover, simultaneous evaluation and comparison of the categories will likely expedite the inquiry.

Focused coding takes place after initial coding. The researcher must decide which initial codes are the most analytically sensible to categorise, which will permit the sorting of all the significant and frequent codes in the initial coding stage (Charmaz, 2014). Any specific incidents in the data will be compared to identify their properties. Glaser and Strauss (1967) suggested ceasing coding and scrutinizing the ideas in the memo when conflict arises in the thoughts. This scrutiny is important to prevent views from being lost. In this respect, the memo helps conceptualise, organise, and make abstract connections of one property or category until the central concepts emerge (Vollstedt and Rezat, 2019). Once the concepts have emerged, the researchers must continue collecting relevant data to explain and link the conceptual categories using theoretical sampling (Flick, 2019). Theoretical sampling is explicitly intended to develop or integrate conceptual categories within a study into a coherent explanatory model (Bryant, 2017). The model will, in turn, present a central phenomenon as the core category (Dados and Datos, 2018).

4.3.3.3.1 Use of computer-assisted qualitative data analysis software

I utilised QSR-NVivo (version 12) to help with the iterative data analysis procedure in this study. According to Bringer et al. (2006), the use of QSR-NVivo advanced the analysis beyond just describing the phenomena that were being investigated and into the construction of an explanation model that was based on the data. Hutchison et al. (2010) agreed in the context of this research, NVivo was helpful in facilitating the process of making frequent comparisons, which accelerated the formation of theoretical frameworks. The GT methodology relies heavily on this step as its central component. In addition, NVivo offers a convenient method for discriminating between instances based on the known individual characteristics of the participants, since the software enables the development and storing of the participants' characteristics (John et al., 2010).

4.3.3.3.2 Constant comparative methods as a triangulation strategy

Triangulation is shown in this study using continual comparative procedures. These methods are used to generate analytic differences and to perform comparisons at each level of analysis in order to grasp the research problem (Howard et al., 2013). This strategy for analysing the data makes use of ongoing sampling and the recruitment of new participants in order to give comparative data and explore relevant phenomena in greater depth. For instance, while I was performing participant observation, I positioned myself at the location of the event in order to watch how nurses construct values, identities, and interacts with their environment. (Fine and Sandstrom, 2011). As part of this strategy, I kept a reflective journal in which I documented my own thoughts and feelings regarding the phenomena that I observed in the reflective diary.

Throughout this process, I was vigilant about re-evaluating any of my preconceived ideas that I might have both before and after doing the observation. Concurrently, I started comparing the fieldnotes that I had acquired from the various observations by utilising the N-Vivo coding analysis software (refer to Table 2). The codes from the fieldnotes were used as "sensitising concepts" to start the interviews.

The sensitising concepts were 1) responding to the dynamic nature of the ICU environment, (2) experiencing challenges in using technology, (3) finding time for nursing care, and (4) interacting with patients' relatives. These concepts were based on the symbolic interactionalism suggested by Charmaz (2014). I used these concepts to develop the following essential questions to ask during interviews: (1) how are the nurses responding to the dynamic nature of the ICU environment? (2) how do they find time for nursing care? (3) what is the challenge in using technology? (4) does technology affect the nurses' interaction with patients and their families? According to Gubrium and Holstein (2012), constructivist GT places a focus on identifying the features of emergent phenomena by including explicit "what" and "how" inquiries into the data collection process. With the use of these questions, I was able to investigate and understand the perspectives and reasons of the people who participated in the study.

In order to begin coding, I needed to immerse myself in the data, investigate in great depth what was said by the participant, and determine specifics information about the setting of the interview. These specifics information included the manner in which participants answered questions, their level of self-confidence, and the experiences they shared in relation to what I witnessed, as noted in my fieldnotes. When I questioned Amira (the second participant) about her views on working with patients and their families, she exhibited considerable agitation. When I compared the interview's results to the information in my

reflective journals, I realised that I had seen a dispute between her and a patient's family. This information provided a justification for her demeanour when she responded to my query by mentioning the challenges of engaging with the patient's family.

Subsequently, the initial codes generated from an interview with participants were afterwards compared to the identified concepts that emerged from the observation. Charmaz (2014) stated that when a researcher engages in memo writing from the beginning, he or she might see the disparity between the perspectives and starting points. For instance, when I compared the interviews of Shona (the first participant) and Amira (the second participant) in a memo, it demonstrated that technology either encouraged technical knowledge-seeking behaviour or hindered nursing care. This prompted me to consider the conflicting impacts of technology and to formulate the idea of the "dual effect of technology," which may be both energising and inhibiting.

This idea prompted the following inquiry: "How does the nurse balance the impact between the competing effects?" Consequently, I decided to conduct an interview with Maria in order to have a better understanding of the events and their significance from her point of view. This iterative method was an important technique in the analysis of the GT research, as it helped to guarantee that the constructed codes and categories were emergences from the data (Glaser and Strauss, 1967). As soon as the data were coded, I started writing my reflection and included my analysis in the memo. My research has led me to the conclusion that nurses felt that managing technology added to their already hectic schedules distracted them from providing nursing care. At this point, I do not have a solid grasp of what it means to be considered "busy." As a result, I restarted the participant observation session after data analysis to see whether or not anything had been missed.

This demonstrates that the memo was as significant as the data collection since both helped me advance my analysis.

Both the memo and the data collection contributed to the development of my analysis, proving Corbin and Strauss's (2020) claim that the memo was equally as significant as the data collection.. Data collection and analysis were carried out in an ongoing and iterative fashion throughout the period of this study. Using the codes that I developed from the fieldnote coding analysis, I was able to determine which participant would be the most beneficial to interview and how to get the subsequent set of data. This strategy is the one that Charmaz (2014) suggested to be used by constructivist grounded theorist. I came to the conclusion that, as Tie, Birks and Francis (2019) had mentioned, future sampling would need to be based on emergent codes. In the memo, I participated in reflexivity by comparing the categories that were developed during the participant observations to the data from the interviews in order to develop concepts that were more sensitive.

The procedure for constant comparison is described in detail In the timeline section of data collection. Also, in chapter four, I discussed how my interview guide developed during the course of data collection, which assisted me in limiting my preconceptions.

4.3.3.3.3 Challenges when translation from Malay to English Language

Due to the interviews being conducted in Malay, the native language of the participants, I transcribed each interview verbatim. I had originally planned to translate into English only after the subcategories and categories in Malay were developed.

Although this strategy seems to be less costly and time-consuming, it was concluded that translating the created categories to English would be difficult due to a lack of

comparative concepts, therefore would compromise the quality of the emergence theory (Ho, Holloway, & Stenhouse, 2019). Moreover, the full meaning of the data, in my opinion, cannot be deduced from the categories that were translated from Malay to English. In making my decision, I took into consideration the argument provided by van Nes, Abma, Jonsson and Deeg (2010) that the findings of qualitative study are seen as trustworthy if they come as close as possible to representing participants' own interpretations of the data. Consequently, the researcher might struggle to develop theoretical sensitivity as a result of the situation (Charmaz, 2006).That made me rethink whether or not I should use Malay or English translations for my data analysis in light of this. In accordance with what was discussed and agreed upon with my academic advisors, I analysed and coded the raw data in English in order to provide them with the opportunity to verify the precision of the data collection and analysis. By doing so, it helped in getting to the English wordings that are close to the data in Malay and comprehending better the minor distinctions in meaning that exist between the two languages (Ho et al., 2019).

The first transcription of the interview transcript was done by a translator who was not professionally trained. But I soon discovered that the semantics of the English and Malay translations of the interview transcripts were different. I came to the conclusion that this was because the hired translation was translating the text word for word without making any adjustments to the grammar, which led to sentence patterns that were difficult to grasp. This is particularly difficult given that the English and Malay languages each have their own different syntax, phrasing, words, and norms that must be followed to in order for there to be successful communication (Latiff et al., 2016). In addition to that, several of the participants spoke using a syntax that was not appropriate for the English language. As a result, it was challenging to match the meanings of the two languages accurately.

So, I hired a professional translator to translate all of their native language interview transcripts into English. One of my main concerns at this point was whether or not the syntax had been preserved in its original form. The translator mentioned that the most difficult part of the translation was getting the excerpts to sound as natural in English as they do in Malay. After re-examining the material that had been translated, I came to the realisation that the translator had rewritten the majority of the excerpts into something that was considerably different from the narratives that came from the interviews. As the meaning is communicated by the participants and is mediated by the sociocultural context that is ingrained in the original narrative, I was concerned that the meaning would be lost. Since this research is using constructivist grounded theory in particular, I must pay great attention to how social context affects participants' expressions (Timonen, Foley and Conlon, 2018). This prompted me to have discussions with the translator, during which I emphasised to her the necessity of precisely translating the texts but also sticking to the contextual foci and making use of the relevant text in order to avoid the English discourse from sounding odd. I emphasised that the translator must capture the syntax and meaning of the participants' statements. Regarding discourse, the translator was requested to preserve participants' genuine speech characteristics such as pauses and interjections. My request is based on the supposition that the linguistic characteristics of speech may have a significant impact on a technique for analysing data that, at most, shows probable patterns or variations in response, both within and between its culture and value (Santos, Black and Sandelowski, 2015). Consequently, I employed a technique known as back-to-back translation to ensure that the original text's meaning was not lost during translation. When I used this method, I sent the data that had already been translated to a single professional translator, who then translated it into Malay for me. As a result, the significance of the information that I obtained from the

interviews was maintained, and the overall readability and comprehension of the excerpts were improved as a result of utilising this strategy. The back-translator was a teacher of Malay language at local school. Before beginning the process of back translation, I ensured that the backward translator was provided with the exact identical instructions that were provided to the forward translator. It is vital to maintain a fluidity between the texts in the source language and the language that will be used as the target language in order to better depict the cultural and socioeconomic components of the tales. By doing a back translation, I would be able to determine whether the earlier (forward) translation adequately captured these aspects.

4.4. The Research Process

This section describes the overall research process and the formation of the theory. It begins with detailing the field setting, sample collection, and recruitment of participants. The purpose of each sampling and data collection method is also outlined.

4.4.1 Study setting

This study aimed to explore the nurses' perception of the impact of technology on nursing care in a highly technological environment. Thus, it was conducted at one of the public hospitals in Malaysia's capital city because the hospital employed critical informants that could provide insight into the phenomena under study. The study was performed in a 24-bed ICU in a tertiary referral public hospital with 1400 beds. This hospital is a pioneer in paperless hospital information systems, integrating information into all areas of care delivery. It is also equipped with the most advanced clinical technological facilities in

Malaysia. The patients were primarily cared for in open ward areas during the study; meanwhile, single rooms were only used for patients requiring isolation or when no other beds were available. The ICU in this hospital admitted over 1000 patients per year based on the ward census in 2015. For this study, the nurses were recruited from the ICU because the nurse-to-patient ratio was one of the lowest in the hospital. Furthermore, the number of technology-related procedures conducted was higher than in any other wards or units in the hospital.

4.4.1.1 Staffing in the ICU

Generally, there are multiple types of nurses in Malaysia: community nurses, registered nurses, nurse-midwives, and head nurses. A community nurse has completed a two-year formal training programme in community nurse education in a community nursing college. A registered nurse (RN) has experienced a standard course of nursing education, either a three-year diploma or a four-year degree programme and is registered with the Malaysian Nursing Board.

Regarding nurse staffing in the study setting, only the RNs could work in the ICU. The institutional policy indicated that the ICU should maintain a 1:1 nurse-to-patient ratio for each shift. 100 RNs, including four ward managers, worked in the ICU during the data collection period based on the ward staffing record. This resulted in 15–20 RNs per shift, one of which was assigned as the team leader and another as a runner. However, there was a critical nursing staff shortage during the data collection. Typically, there would be two RN rostered for every cubicle to care for a maximum of four patients. However, one RN was assigned to care for four patients per cubicle during the data collection period due to the RN

shortage. According to the nursing sister in charge of the ICU, they could manage a nurse-to-patient ratio of 1:1 to 1:2 per shift. Despite the formal work distribution assigned by the unit managers, I observed that all the nurses worked together to cover all the patients during medication administration and routine vital sign monitoring. I also noticed that RNs were in direct contact with the patients regularly, and they performed most of the nursing interventions, including assisting the intensivists in performing standard ICU procedures. The nursing shifts were from 0700 to 1400, 1400 to 2100, and 2100 to 0700. Typically, night shifts had only 75% of the day shift staff number. However, there was no difference in the staffing between weekdays and weekends. It is also important to note that the ICU did not make any day-to-day changes based on the maximum patient capacity in response to the number of staff available (e.g., reduced numbers due to sick leave and emergency leave), resulting in shift-to-shift variation in nurse-to-patient ratios.

In addition to the nurses, two or three Medical Assistants (MAs) with competency in standard ICU procedures also worked shifts in the ICU. Night and weekend staffing consisted of an on-site MA who was primarily off-site after morning ward rounds but would be available to return to the ICU if required. At all other times, an MA was available to provide any advice about the ICU technologies and, if necessary, to return to the ICU to provide direct patient care. Table 1 provides the ICU characteristics and the number of the types of nurses working in the ICU. The participants were recruited based on the inclusion and exclusion criteria established before data collection (Table 2).

Table 1: ICU characteristics and nurse composition at the selected hospital (1 January 2015)

ICU Characteristics	Total number of beds	24
	Admission per year	1289
Nurses' composition	Total number of nurses Registered nurses Ward managers Total	 96 4 100
	Nursing Qualification	
	Nurses with Diploma Nurses with Degree	99 1
	Advanced Qualification Nurses with ICU post-basic qualification	24
	Working roster	
	Number of working hours per week	45 hours
	Number of nurses per shift	15–20
	Number of shifts	3 (morning, evening, and night)
	Type of shifts	Day (two shifts) and night

4.4.1.2 Technology in the ICU

The participants in this study described technology in a broad range of terms that addressed the different types of technologies used in the ICU. They labelled technology specifically from the context of its use as things, devices, machines, systems, and IT, all of which were often used interchangeably.

4.4.2 Data collection

4.4.2.1 Data collection timeline

Data collection for this study was conducted in two stages, October 2014 to December 2014 and October 2015 to December 2015. The entire data collection process lasted 127 days (See Appendix 2).

4.4.2.2 Ethical approval

Ethical approval was obtained from the Ethics Committee at the University of Edinburgh, the Institutional Clinical Research Committee (CRC) and Malaysia's National Medical Research Register (NMRR). Participants were approached via personal contact. When necessary, permission to access the participants was obtained from the hospital's relevant gatekeepers and ICU managers (for the detailed recruitment procedure, see Section 4.4.4.4). All participants gave their informed written consent to participate in the study. The informed consent forms are provided in Appendix 3. To maintain anonymity and confidentiality, the participants described in this study were assigned pseudonyms.

4.4.2.3 Gaining access to the study site

To gain access to the ICU to conduct this research, I followed the mandatory procedure required of every researcher who wants to conduct a study in any Malaysian healthcare institution. The first step was to negotiate access to the ICU with the Head of Department (HOD) through a series of emails sent in June 2014. I explained the purpose of the study and sent a copy of the research proposal to the HOD. One week after receiving the

proposal for the study, the HOD permitted me to conduct the study on the condition that I obtained approval from the Institutional Clinical Research Committee (CRC) and the National Medical Research Register (NMRR) of Malaysia.

The second step was to contact the Manager of the CRC through email. She agreed to a phone discussion with me. During the conversation, I explained the purpose and context of this study and the data collection steps. The CRC Manager helped me to obtain a signed approval letter from the HOD of the ICU to be submitted for online NMRR ethical approval. In August 2014, I received the NMRR approval to conduct the study in the ICU. With the ethical approvals from the institution (Appendix 4.1a) and the country (Appendix 4.1b), I arranged a meeting with the Matron and Nursing Manager of the ICU at the end of August 2014. During the in-person meeting in the office of the head of nursing, I explained each step of the study and asked permission to talk to the nurses before data collection. The Matron appointed the ICU head nurse to help me during participant recruitment and inform the nurses about the study before starting my fieldwork. An information package was made available to potential participants. It included an invitation to participate in the study, a participant information sheet with details, a consent form, and a short questionnaire on demographic characteristics (Appendices 4.1, 4.2, and 4.3, respectively). A box containing the information package with the designation ‘Please take one’ and a second box with ‘Returned envelopes’ were placed in the staff room to increase the chances of more nurses being informed about the study. The process of entry into the field is shown in Figure 3.

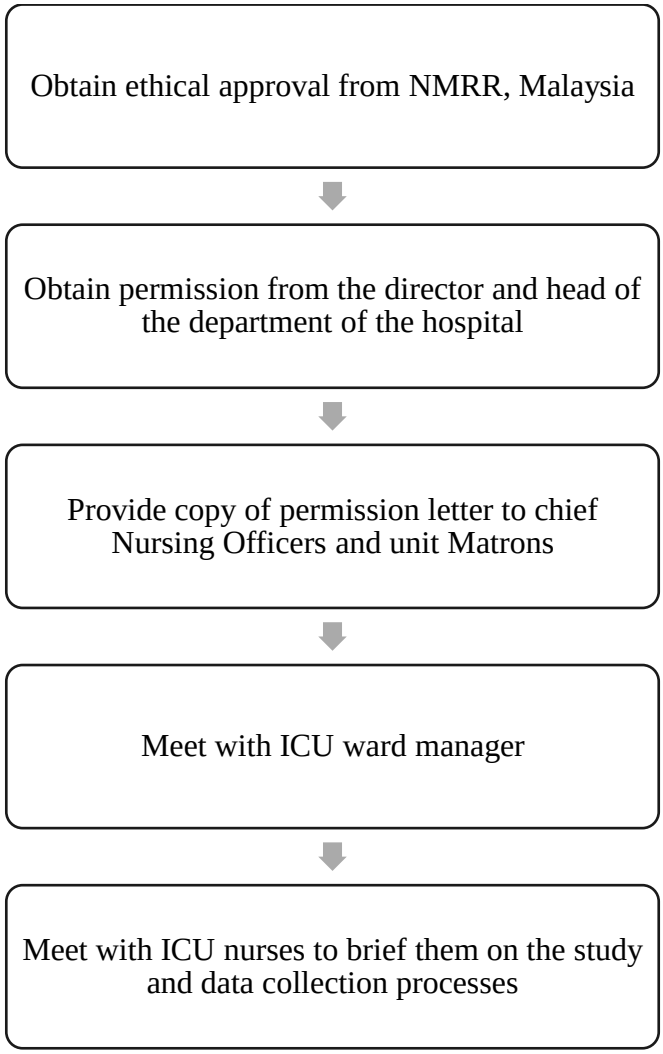


Figure 1 The process of entry into the study field

4.4.2.4 Participant recruitment

All contacted participants consented to participate in this study. They were 20 ICU healthcare personnel, including 15 RNs, four ward managers and one MA. The high response rate may be due to some personnel wanting to share their experiences and make their voice heard, whilst others may have felt authoritative pressure from their Matrons and ward managers. Bearing such potential ethical issues in mind before the outset of the fieldwork, I spent considerable time with the prospective participants to explain the study

and made an effort to establish a rapport with them. Before the interview, I ensured that they understood the voluntary nature of their participation by explaining that they could withdraw from the study at any time without consequences. Likewise, I reassured them that pseudonyms would provide them anonymity and that all published material would not disclose individual-level data. Concurrently, I would listen to their suggestion or obtain an agreement regarding convenient interview times and venues.

Participants were selected based on concepts or categories that emerged during data analysis, and they elaborated on these categories further to develop a theory. An essential principle in GT is to ensure that the recruited participants support the iterative process (Charmaz, 2014).

4.4.2.4.1 Conducting observation sessions prior to recruitment

I started the data collection with an initial week of observation to enter the field and gain familiarity with the setting and staff and for the staff to become accustomed to me being in the field. This initial period allowed me to gain a preliminary understanding of how nursing practice was performed in the ICU. This experience guided my initial observation sessions and informed later interviews with participants. One of the most critical and influential descriptions of participant observations is that this method is associated with an interpretive philosophy whereby the data can be used to assist researchers in interpreting participants' actions and experiences (Creswell and Poth, 2018). Primarily, this study was based on the constructivist paradigm that embraces the ontological assumption of multiple realities, and each individual has a different perspective on how they understand a reality (Knezevic, 2020).

I conducted participant observation as a supplement to information obtained from interviews. Participant observation is a strategy in which the researcher enters the study setting for a substantial period to observe a particular social group in its natural setting (Ciesielska and Jemielniak, 2017). As Walford (2009) argues, observing from the epistemological aspect of whether there is an ultimate 'reality' to the topic being discussed, the people interviewed may have incomplete knowledge if they cannot recall their experiences. Therefore, they will rely on subjective perception in relating their past experiences and current situations. The person being interviewed will also likely only reveal aspects of the event and opinions to the extent that they are willing to disclose. Hence, participant observation can establish a comprehensive and holistic picture of the phenomenon.

4.4.2.4.2 The participant recruitment process

I began my initial observations by immersing myself in the setting before conducting study observations. This strategy was similar to those offered by Abakah (2018), with the goal of general acclimatisation to the context. After conducting initial observations over three days, I engaged in 16 participant observations over 34 working shifts of two to four hours within eight months (Table 4). This strategy allowed me to engage in participants' inopportune and incidental conversations. As I had already been introduced to all the nurses, the nurses knew why I was there. They also knew that I could ask for their consent to participate in this study (refer to Section 4.4.4.2). I was fortunate that a head nurse was available each time I needed help finding the names and roster of the nurses. Even though I had been given the option to recruit the participants through the ward manager, I found that

recruiting participants could curtail my judgement about what potential participants will be most informative (Moser and Korstjens, 2018). In addition, nurses may have felt obliged to participate if recruited through the ward manager. Whilst in the ICU, I found observing nurses under different circumstances before recruiting to be a more suitable method because, in this way, I could recruit the participants based on the conceptual requirements and not primarily by representativeness, which would occur if I recruited through the ward manager (Moser and Korstjens, 2018).

I purposely observed the unit pantry, which was understood to be where nurses were expected to go during breaks. I would approach nurses in the unit pantry after some brief observation. I took the opportunity to explain/remind them who I was briefly and the purposes and methods of the research. Next, I handed information sheets to specific nurses and encouraged them to read them before they agreed to participate. Finally, I informed the particular nurse that I would follow up with them to ask whether they agreed to participate and contact me if they needed further clarification. Once the nurse verbally informed me that she/he consented to participate in this study, I would meet them and provide them with the consent sheet. I waited near the entrance of the staff changing room to collect the completed forms, or the nurses could put the consent form in my temporary allocated box. However, a friendly interaction would not always occur, for example, if staff were not effectively informed of the research or thought I was in the ICU to scrutinise their work practices. There was satiation that became a challenge to engage participants in the conversation, especially when I entered the unit at a busy time. One such instance was captured in one of my fieldnotes:

'I start to introduce myself to the nurses and physicians that meet in the ICU. However, some of them seem a bit distanced [*sic*]. Although some of them told me they had

heard about the project, none seemed to have [*sic*] eye contact after introducing me. They mostly nod their heads, smile, and then walk away. Maybe the workflow in the morning is bustling, which makes them stressed. Out of respect for the workers, I decided not to ask any more profound questions.'

Not all the nurses I spoke with were willing to participate. Some were reluctant, stating that they did not have time for the interview session. Others asked me when I would ask them pertinent questions. They were also interested in learning about nursing education in the UK and my experience of living away from home. I tried to maintain a professional relationship with the nurses while establishing a friendly rapport. For example, I introduced myself as a nursing research student instead of a nursing lecturer so that they would not see me as too 'senior'. Over time, my rapport enabled me to engage in relevant conversations with the nurses during my observations. I was aware that standing inside the limited space in the cubicle can be intrusive. Therefore, if nurses appeared too busy, I remained silent and removed myself from the space where I possibly felt uncomfortable. I tried to remain open to approaching as many nurses as possible whenever I needed to clarify something with them, particularly when I perceived a potential threat to patient safety. Sometimes I was invigorated by their activities, for example, when I found them exchanging words or arguing with physicians and medical assistants regarding nursing care decisions involving technology.

In addition to observing the nurses, I also observed an MA for over two hours during theoretical sampling to observe the extent of their involvement in technology-related patient care activities in the ICU. This strategy allowed me to reflect on the data obtained during nurse interviews. Although initial sampling targeted nurses as participants because they were expected to provide valuable information, the initial interviews revealed ambivalence

regarding the theme of professional identity and the newly emergent category of lack of autonomy. This ambivalence led me to search for possible explanations of ‘what is going on here’. Therefore, I returned to the ICU the next day to focus my observations on the MA practice in the ICU. I aimed to obtain their perspective on the nurses' engagement in ICU technology and clarify the concept of lack of autonomy that was revealed through the participants' narratives. Three MAs were stationed in a specifically designed room that held all the machines, devices, and equipment that were not in use. Their primary responsibility was to maintain all the equipment, such as cleaning and calibrating them, so that they would be ready for use. On the day the observation was performed, only one MA was available. After they agreed to participate, I sat in the room observing them carrying out their duties and followed them on their rounds within the ICU.

The MA interview was conducted on the same day during lunch break when the MA was less rushed. The information from the observation and interview was very helpful in gaining a different perspective of the MA’s position in this particular setting. For example, it turned out that the MA had more discretion in technology, which affected the nurses’ engagement with technology. This insight would not have been possible without observing and interviewing the MA. Necessarily, in a GT study, in addition to remaining open to unanticipated findings, formulating explanations about the origin of the patterns observed in the data is also imperative to avoid falsifying pre-existing propositions (Timonen et al., 2018).

4.4.2.4.3 Potential ethical issues

Throughout the course of the study, numerous ethical dilemmas arose, ranging from the observation of unsafe nursing practises to the observation of nurses being expected to handle situations beyond their capabilities. In one instance, a junior nurse who was asked to assist the anaesthesiologist with a bronchoscopy procedure admitted to me that she lacked experience with procedures that are typically performed in the intensive care unit, particularly those that are invasive. At the time, there were four senior nurses working the same shifts. One of them had previously cared for a patient suffering from severe gastrointestinal haemorrhage. The remaining three senior nurses cared for patients in their respective cubicles. Each nurse was responsible for the care of two ventilated patients. As I was present during the junior nurse's preparations for the procedure, she appeared hesitant. I advised her to seek assistance from another senior nurse, but she resisted. This is likely due to the fact that the senior nurses were caring for their own patients. As she prepared the equipment for the procedure, she informed me that she had lacked the required experiential knowledge and practical skills. This made me feel very concerned, and I decided at that moment that I must be present to mentor her throughout the entire procedure (avoiding harm). Fortunately, a senior nurse appeared shortly before the anaesthetist was prepared to perform the procedure, so my intervention was unnecessary. I would have reported any unsafe practise to the unit manager in order to protect patient safety. Recognizing the junior nurse's vulnerability and the impact on patient safety, I informed the senior nurse in charge of the ICU's nursing mentoring programme.

The next ethical issue I encountered was the ICU's culture of unsafe documentation practise. I was perplexed by the term "chartology" for the first month of the data collection

period. I heard it frequently from a variety of nurses in the context of a situation involving documentation. I inquired with a junior nurse regarding the usage of this term; she informed me that it was the term used by nurses to indicate that the data was documented retrospectively. In examining the situation, I discovered that the patient's chart contains no entry and only a check mark; consequently, a nurse justified to me that she assumed the patient's condition was "normal" during the observation-free period. This brought to my attention an incident that had taken place two weeks earlier in which a patient who had been diagnosed with dengue fever experienced an unexpected cardiac arrest despite the fact that normal data had been recorded throughout the shift. I came to the conclusion that the best way to ensure that neither harm nor non-maleficence would occur was for me to find a senior nurse in advance of each observation session to whom I could report any instances of unsafe nursing practise.

I was previously employed as a registered nurse, and the study setting is within my area of expertise; therefore, I anticipated that the ethical dilemmas would arise as a result of my ontological position as both a 'insider' and at the same time as a 'outsider' in the same context (clinical settings beyond my own workplace). This could be a factor in the role conflict that exists between my clinical responsibilities and my researcher responsibilities.

4.4.2.5 Writing fieldnotes

Fieldnotes are inscriptions of social life in which the observation of events, people, and places are converted into words on paper to place the reader into the setting that was observed (Emerson, 2011). In reflecting on Thornberg's study of bullying experiences among school children, Charmaz (2014) considered Thornberg's strategy of combining

ethnographic observations of numerous incidents with subsequent informal conversations as a powerful data collection strategy in GT studies. The fieldnotes written throughout the observations typically contain a 'thick' description of participants' views, feelings, intentions, and actions, as well as the contexts and structures that are necessary for building a significant analysis (Charmaz, 2014). The fieldnotes can be either formal or informal. In the present study, informal fieldnotes were written during the initial observation, conducted during the first three days. The fieldnotes were labelled informal because I entered the setting with broad areas of interest and observed whatever was relevant to my observation without a structured observational checklist to understand and interpret cultural behaviour (Mulhall, 2003). For each observation session, I wrote brief notes about the events as they occurred in situ in a notepad. Armstrong and Lowndes (2018) recommend that the researcher write short pieces of information in the setting first because they can serve as 'memory aids' later when the researcher writes the complete fieldnotes. I considered when I decided to write short notes in time to when the event was observed when I wanted a situation to be less obtrusive while in the patient's cubicle with the nurse. This practice is consistent with Armstrong and Lowndes's (2018) observation that, in several instances, the staff and residents were suspicious when the researchers wrote things in front of them.

Moreover, Abakah (2018) argues that due to the study's physical and social setting, the researcher may have limited opportunity to record observations. I experienced that type of deterrent because it was challenging for me to take notes while standing up in the limited space in a cubicle that accommodates four patients and multiple pieces of equipment. Thus, I wrote the fieldnotes in greater detail a short time later at the hospital café or when I returned home. Furthermore, Lopez-Dicastillo and Belintxon (2014) suggested that jotting notes forthwith enables the researcher to record what they observed without participants feeling

like they were being observed. This strategy can strengthen the trust between a researcher and the participants (Lopez-Dicastillo and Belintxon, 2014). In addition, this strategy promotes deeper engagement in the environment. The deeper engagement leads to participants' common responses that contribute to the co-construction of knowledge between researchers and participants during face-to-face interviews, consistent with the constructivist paradigm.

I began work on the informal fieldnotes before formal fieldnotes, an idea similar to that of Madden (2017), in an attempt to remain objective and not contaminate the data with my preconceptions, permitting the data to reflect the circumstances of their begetting as much as any truth(s) about the research topic (Ellingson and Sotirin, 2020).

Subsequently, in analysing the initial observation fieldnotes, I discovered several recurring patterns in the events, and I observed that certain events led to other events. For example, the technology breakdown in the ICU and the variability in the nurses' approach to nursing care delivery were implied by that unprecedented situation. After identifying and describing patterns through an initial analysis of fieldnotes, I categorised the patterns into more context-sensitive specific determinants such as physical environment, technological engagement, collaboration, and nursing care performance. All of these determinants are provided in a checklist used during subsequent observations. My approach to writing the fieldnotes broadly followed the suggestion of Mulhall (2003). She promotes a process whereby data collection must be followed by a period of analysis that leads to more focused fieldwork. Ellingson and Sotirin (2020) believe the data could provide deeper insights into participants' sense-making about their experiences, facilitating the recognition of commonalities of language, values, choices, beliefs, and culture across participants and constituting valid evidence to support knowledge claims about the phenomenon later in the

interview. The following list describes the general categories of information that I included in my formal fieldnote folder.

i. Physical environment

Mulhall (2003) suggests that physical environment data are vital in understanding and interpreting cultural behaviour, especially in healthcare delivery settings. Hence, this aspect of observational data should not be neglected. Mulhall (2003) postulates that the physical environment, especially in the context of the spatial arrangement of hospital wards, differentiates groups of people and creates different categories, specifically, professionals, patients, and relatives. Moreover, participant activities reproduce this specific allocation of space. For example, in this study setting, there was a large nursing station in the middle of the ICU, which occupied significant space. This physical structure was highly symbolic. One patient's relative said,

> 'The nursing counter is huge; I do not know if nurses have ever used it because they have their table inside the cubicles and rooms. Although it compromised the space for us to be beside the patient, I think it makes us feel less anxious when we enter the ICU because it blocks our view from seeing all the machines used on the patient'.

Additionally, I also incorporated the information about my observations of the equipment, devices, and resources, including technology, human resources, arrangement of technology and the distribution of equipment and resources throughout the ICU. The following is an extract from my fieldnotes:

> 'Electronic documentation systems became the primary information source and repository for nursing care. Nurses prepare for their shift by assembling either a computer terminal next to each patient's bed at a computer. Unfortunately, there

were only two mobile laptops (which were placed on the individual trolley). As a result, the physicians generally occupied the computer terminal. Hence, this space is commonly referred to as the 'physicians' area' by the nurses. They would have to either stand or sit on a high backless stool to use these machines.

Moreover, the nurses would only occupy this space before morning and evening shift changes. They would occasionally work at a desktop computer located at the central nursing counter; the cubicle layout of the ICU spatially separates nurses during their shifts. The spatial distribution often makes them unaware of what is going on in other cubicles. Therefore, most nurses rely on the opportunity to get together for social interaction during shift changes.

ii. Collaboration

This determinant comprises the information regarding the technological collaboration between nurses and other ICU care teams, namely physicians, MAs, occupational therapists and physiotherapists. For example, the following is an extract from my fieldnotes:

'A patient came back from surgery this morning at 10.00 o'clock [*sic*] and was on mechanical ventilation. About half-hour an [*sic*], after the patient is in the ICU, the ventilator keeps beeping off. The nurse did endotracheal suctioning, but the alarms kept going off. She then calls the anaesthetist to review the patient. The anaesthetist came and asked the nurse to call the medical assistant to check whether there was a problem with the ventilator machine. The medical assistant came, and he checked the ventilator machine for a few minutes. After that, he notified the anaesthetist that

there was no problem with the machine. Hence, the anaesthetist ordered a chest X-ray, and when he looked at the chest X-ray, the X-ray showed that the endotracheal tube was too deep. Therefore, he pulled the endotracheal tube out a little bit. However, the ventilator continued to go off. The anaesthetist decided that the patient's endotracheal tube needed to be replaced from a current size of 7.5mm to 7.00 mm instead. After the endotracheal tube was replaced, the ventilator stopped beeping off, and everything went smoothly'.

iii. Nursing task performance

This determinant related to the team performance encompassed information about the management and organisation of care work and the nurses' clinical decisions in the context of technology. In addition, the information on how the nurses share knowledge, the patients and other health professionals were also included. For example, the following is an extract from my fieldnotes:

> 'The nurses walk toward one newly admitted patient directly for [*sic*] the operation theatre (OT). The patient is manually bagging. Once the nurses gather around the patient, they carry out tasks without being asked and seem well-informed about their tasks. One nurse put the chest pad on the patient's chest, connected [*sic*] to the electronic monitoring, and read the patient's vital signs. Another nurse secures the Patient Control Anesthesia [*sic*] Machine to a drip stand. The third nurse continues manually bagging the patient. She asks for clarification regarding who is calling the MA to set up the ventilator so that the patient can be connected to a ventilator machine. After around 15 minutes, the MA came in from the OT. The same nurse expressed her dissatisfaction about the MA's delay in attending to set the ventilator

machine because she needed to continue the other nursing tasks. The MA replied in a firm tone to the nurse that he was required to operate the newly introduced technological equipment in the operating room'.

iv. Information on clinical workflow

For this determinant, the fieldnotes captured the ongoing activities such as the routine, the chaos or quietness of a unit, activity level, and the presence or absence of different people. The following is an extract from my fieldnotes:

'Weekends tended to be short-staffed. In contrast, weekends for residents could be quiet with few or no scheduled activities. Certain times of the day were quieter than others. Mornings are busy, especially after the physician's round. At that time, work routines could be chaotic, with staff trying to give out medications, take blood specimens, change patient positioning, and perform suctioning and wound dressing. Some nurses go to the dining room to [*sic*] continuous pump feeding'.

Patients were bathed by nurses working at [*sic*] night shift. Before the ward round, the nurses make sure that new blood investigation findings are printed on paper. At around nine in the morning, the medical team, consisting of three physicians, enter the ICU to review their patients. A senior physician led the ward round. One physician pushes a mobile laptop trolley at the nursing counter with him during ward rounds. He browses through the file on the laptop to present the patient's condition to the senior physician. The information during the ward round is written on the laptop by a physician who pushes the mobile laptop trolley whilst a nurse takes handwritten notes. During the ward round, several conversations occur between the nurse and physician where the physician gets information from the nurse

about the patient's current status before he orders further plans. After the ward round is finished, the jotted handwritten data are then entered into the computer system by the nurse. This activity takes place in the patient's designated area'.

4.4.2.6 Interview location

Due to the busy nursing practice nature in the ICU, the ward manager suggested that all interviews be conducted after the participants finished their morning duty, usually between 2.45 pm to 3.00 pm in the seminar room located inside the ICU. The venue was deemed the best interview location because it was private and quiet, and although it was within the physical space of the ICU, the location of the room was quite isolated from the central area of the ICU.

4.4.2.6.1 Advantages of the venue

It has been argued that interviews and focus groups conducted outside the workplace in the context of work-based and workplace research may not be sufficient to obtain participants' perspectives since participants' language, culture and ability may pose limitations to their desire to fully engage with the nature of the study (Wall et al., 2017). Elwood and Martin (2000) emphasize that selecting an appropriate interview site is essential in qualitative research as it produces 'micro-geographies' of spatial relationships and meanings, where multiple scales of social relations intersect in the research interview. Therefore, I found it necessary to explore ways of interviewing in an 'environment-friendly' and 'context-appropriate' setting using the physical space of the ICU. Especially in an interview that involves co-construction, a context-appropriate setting would enhance the

participants' engagement with the research process, paramount to ensuring the success of the constructivist interview process (Ryan et al., 2009). Therefore, in a work-based or workplace research, interviewing the participants within their natural environment can facilitate the co-construction of the interviewer's and participant's experience and understanding of the phenomenon because it allows the participants to maintain their roles during the interview and positions them within the phenomenon under study (Wall et al., 2017).

In addition, the nature of the study topic required me to explore participants' thoughts on some possible options and review their rationalisations of previously made actions or decisions. For example, when I asked a participant about her response to alarm sounds, she drew my attention to an alarm sound that could be heard from inside the room to explain which alarm sound was considered false.

Mann (2016) agrees that conducting interviews in a setting that embodies and constitutes socio-spatial relations encourages a reflexive perspective on varied aspects of the context in research because it constructs the power and positionality of participants regarding the people, places, and interactions discussed in the interview (Elwood and Martin, 2000). In addition, it helps shape and influence the cognition and knowledge of the participants and the interviewer. This influence is derived from aspects of a participant's identity and background, familiarity with the interview topic, and prior relationships with the interviewer (during observation) (Mann, 2016).

4.4.2.6.2 Disadvantages of the venue

The disadvantage of conducting interviews in the physical space of the ICU is that it was difficult to control the distraction. One of the distractions was background noise, such as alarm sounds that could be heard from inside the room. There were also instances in which other staff realised that the participant I interviewed after the end of the shift was still in the ICU. As a result, they interrupted the interview to inquire about a patient under their care on the previous shift. In addition, the interview in the natural environment created some tension for the participants precipitated by elements including participants' circumstances and shared collegial practices that became salient from their interactions with researchers (Oshodi et al., 2019). Such elements may cause the participants to be emotionally invested, which may cause them to set limits on self-disclosure, an awareness of biases and agendas, and concern over the implications of their story for others (McDermid et al., 2014).

4.4.2.7 The relationship between the observations and the interviews

The codes from the fieldnotes were used to form the sensitising concepts which created the line of inquiry for interviews. These sensitising concepts included 1) responding to the dynamic nature of the ICU environment, (2) experiencing challenges in using technology, (3) finding time for nursing care, and (4) interacting with patients' relatives. I used these concepts to develop the initial interview guide and explore, for example, (1) how nurses responded to the dynamic nature of the ICU environment, (2) how they found time for nursing care, (3) what was the challenge in using technology and (4) how technology affected the nurses' interaction with patients and their families. Exploring these elements helped me explore and discern research participants' viewpoints and experiences (Refer to

table 1). Charmaz (2014) assert that the constructivist GT emphasises and defines the properties of emergent phenomena by building explicit 'what' and 'how' questions into the data collection.

In terms of the recruitment of participants, a purposive sampling approach was used because it is the sampling strategy used in GT. Corbin and Strauss (2020) suggested that purposive sampling might be pragmatically justifiable for GT study as this sampling approach maintains an iterative process aimed toward theory development. I, therefore, interviewed nurses who met at least two essential inclusion criteria: (1) had experience working in the ICU for more than one year and (2) had been directly involved in nursing care.

Table 2 : Profile of the participants during the initial sampling

Code	Name	Post	Highest Nursing Educational	Working place before ICU	Years of ICU practice
P1	Shona	Registered nurse	ICU post basic	-	12 years
P2	Amira	Registered nurse	Nursing	-	Five years
P3	Maria	Registered nurse	ICU post basic	-	Ten years
P4	Anne	Registered nurse	Nursing	Burn Unit (5 years)	Five years
P5	Ruby	Unit Manager	ICU post basic	-	12 years
P6	Henry	Registered nurse	Nursing	-	One year
P7	Sara	Registered nurse	ICU post basic	Paediatric ICU (4 years)	16 year
P8	Janet	Unit Manager	ICU post basic	-	20 years
P9	Sharon	Registered nurse	Nursing	-	Five years

Table 3: Timeline of participant observation

PARTICIPANT	OBSERVATION PERIOD		TOTAL HOURS OF OBSERVATIONS
Shona	Day 1	1430–1800	3 hours and 30 minutes
	Day 2	0900–1200	3 hours
Amira	Day 1	0900–1200	3 hours
	Day 2	1400–1600	2 hours
	Day 3	1200–1430	2 hours and 30 minutes
Maria	Day 1	0900–1200	3 hours
	Day 2	1430–1630	2 hours
	Day 3	0900–1200	3 hours
Anne	Day 1	0900–1200	3 hours
	Day 2	0900–1200	2 hours
Henry	Day 1	0730–1030	3 hours
	Day 2	1430–1730	3 hours
	Day 3	1200–1500	3 hours
Sara	Day 1	0800–1100	3 hours
	Day 2	1400–1700	3 hours
Janet	Day 1	0730–1030	3 hours
	Day 2	1430–1700	2 hours and 30 minutes
Sharon	Day 1	0800–1100	3 hours
Diana	Day 1	0730–1030	3 hours
	Day 2	1030–1330	3 hours
	Day 3	1400–1700	3 hours
Liza	Day 1	0800–1100	3 hours
	Day 2	1430–1730	3 hours
Shida	Day 1	0900–1230	3 hours
	Day 2	1500–1700	2 hours
Izat	Day 1	0730–1030	3 hours
	Day 2	1430–1730	3 hours
Hans	Day 1	0800–1000	2 hours
Fuad	Day 1	0900–1200	3 hours
	Day 2	1830–2130	3 hours
Izwan	Day 1	0830–1030	2 hours
	Day 2	1430–1730	3 hours
Rika	Day 1	0800–1200	4 hours
Coleen	Day 1	0800–1200	4 hours

4.4.2.8 Interview and coding processes

A total of 20 in-depth interviews were conducted in this study. This includes nine interviews during initial sampling and 11 interviews during theoretical sampling. Based on

the information obtained from the gatekeeper (see section 4.4.4.2), I made initial contact with the potential participant. Once they consented to be interviewed, I would arrange suitable times and dates for the session. After the time and venue of the interview session had been chosen by mutual agreement, I arranged a participant observation session before the interview session. For each participant, I conducted two to three participant observation sessions during their daily work shift before I proceeded with the interview. Considering the ICU circumstances, some participants chose to be interviewed in a seminar room inside the ICU after completing their shift duty. Meanwhile, an interview with the unit managers was conducted in the unit manager's room. An interview with the MA was conducted in his room inside the operation theatre department.

The initial ten interviews lasted 45–165 minutes per session, and they were digitally recorded and subsequently transcribed verbatim. A non-identifying number was given to the participant's interview before starting with the first question to maintain the confidentiality of the participants. For example, after turning on the recorder, I verbalised, ‘This is participant 1, and today is [date]’ before giving each participant a pseudonym during transcription to ensure anonymity. Allocating a number to each participant eased the process of linking the transcription data with any other documents that belonged to them, such as observation data and memos. Next, I posted a short set of preliminary questions about their educational and professional background, demographic details, and a description of their feeling when they first started working as an ICU nurse. All subsequent questions focused almost entirely on collecting information on their in-depth experience of engaging with the ICU technologies and the processes they had undergone to reach their level of competence at the time of the interview.

Apart from that, I also posed open-ended questions to encourage them to talk freely about the subject. For example, 'Tell me about your feeling when you first started as an ICU nurse'. I also encouraged them to share their personal experience in caring for critically ill patients by prompting them with questions such as 'and then what happened'? and 'how did that experience impact you'? These strategies resembled the effective interview techniques proposed for GT (Charmaz, 2014b), in which the researcher should start with open-ended questions followed by intermediate questions. I found that these clarifying questions helped keep the participant's story flowing. This interviewing approach also made the conversations feel more natural and informal, and it managed to generate more relevant data than the first few attempts. Moreover, I also chose questions that could foster their reflections. For example, when I asked questions related to the challenges and solutions of using technologies in the ICU, I used probing questions such as how did they perceive the challenges they have encountered, what support did they receive or wish they received, the expectations regarding the use of technology in their working environment, and how these expectations fit into their overall experience as an ICU nurse.

Specifically, as this study used the GT approach, I iteratively conducted data collection and analysis. This helped me interweave the data from observation and interview sources. After conducting data collection and analysis for the third participant, I began to acquire general insights into the nurses' experiences and perceptions toward the impact of technology not strictly identified within the topic guide. At this stage, the analysis began to generate a range of data categories. As a result, I no longer referred to the interview guide as I could use the categories that emerged from participant observation and interview data as the foundation for subsequent interviews.

4.4.3 Data analysis

Data analysis began immediately after the first interview. It took place in four stages: (1) familiarising myself with the data, (2) coding, (3) creating categories, and (4) identifying themes (Figure 2). However, the process was not linear, and the analysis would regularly return to earlier stages.

4.4.3.1 Data familiarisation

First, I listened to the audio recordings of the interviews once each interview was completed to examine whether the participants' responses to my questions mirrored their actual experiences. As the interviews were carried out in the participants' native language of Malay, all the transcribed interviews were transcribed by me in the original language. An hour of the recorded interview required approximately 5–6 hours to transcribe. As I did not engage a professional transcriber throughout, the transcription helped me familiarise myself with the data. Second, all interviews were transcribed verbatim. The cues of nonverbal behaviours, including the participant's utterances and hesitations such as pauses and sighs, their tones, laughter, body postures and gestures, were all noted. This permitted the transcribed data to remain within the contextual boundary. For constructivist GT, while the emphasis must be placed on the interviewer-participant relationship, the explicit content of the interview is equally essential (Charmaz, 2014b). Thus, the words that the participants used to fill space while they were thinking and affirmations such as ‘um’, ‘uh-huh’, and ‘hmmm’ were also noted in the transcription as these words could provide the informational content of the data and help to ensure the accuracy of the data content.

The following is an example of a completed transcription segment with pauses and other nonverbal behaviour cues.

> ‘Um…When I start working in the morning, I (tone sustained) I do (short pause) what we call that? We do (um) oral toilet to patients (brief pause), right? I check (short pause) their hygiene (tone sustained), such as check bedsheets and change whichever [necessary] then um… I make sure my patients are clean, check their (tone sustained) um…what do we call that? (short pause) lines, then I assess their conditions. After that, I give medications (tone sustained), we provide medications to patients at eight in the morning. Then (tone sustained) around ten, we (tone sustained) provide, what we do call that? Nursing care. We do suction (tone sustained), follow doctors for rounds, take their prescriptions, and do whatever they ask us to do like take blood samples then perform procedures if, for example, patients need to go for operations, we need to do preparations for the operations, then um…when there is no more (tone sustained) work (long pause) directly related to patients, we do (tone sustained) we do the reporting, what have we done? We write everything about patients' conditions um… then (tone sustained) how do I put this into words’?

Once the transcription process was completed for each interview, I further examined the data by carefully reading the interview transcripts to ensure that I thoroughly understood the data and determining the issues or areas that required further discovery or understanding. This was the stage in which I had engaged with reflexivity. The following demonstrates an example of my reflexivity.

All the nurse participants appeared to be fully engaged during the interview sessions. Nevertheless, several of them were not very comfortable being observed (see excerpts from

field notes from P3, P6, and P7). Apart from that, the participants often used question tags such as ‘right’, ‘didn’t we’ and ‘are we’. When participants used the question tags, I felt that they were not seeking affirmation, but instead, they were using the question tags to fill the space while they were thinking. I believed that the question tags were used without any intent of condescension. Demirezen (2014) analysed the pitches and intonation about anthropology to explore the perception and articulation of the ‘certainty and uncertainty of the speaker’. He stated that question tags are not questions but rather a way for the speaker to ask the listener to comment to continue the conversation. However, it can also indicate politeness, emphasis, or irony, especially when the person wants to determine whether something is true. When participants ended a sentence that way (especially if they gave a slight pause), I would nod and say ‘sure’ or ‘uh-huh’.

When I listened to the interviews, I noticed that the participants often referred to themselves as ‘we’ and ‘us’. This might be because the ICU nurses worked within a highly socialised environment. As supported by the claim of Miller (2009) in his book ‘Anthropology and the Individual’, the participants in this study could have represented themselves as ‘we’ and ‘us’ in an attempt to exemplify the precise position they hold in the nursing society, as seen appropriate to their categorisation, either by class, role, hierarchical position, or gender.

When I identified any sentences that indicated that the interviewee was disconcerted, I would relisten to the recorded interview to understand the context in which the participants were disconcerted and refer to the memo that I wrote during participant observations to make sense of the sentences and prevent any loss of meaning. Then, after I was reassured that the transcribed interview matched the participants’ information, the transcribed interviews were translated to English by a professional translator for coding analysis.

4.4.3.2 Data management

A qualitative data analysis software, QSR-NVivo version 11, was used for data analysis in this study. The data analysis involved organising and managing the extensive data collected throughout the analysis. After only the third interview, I found that the manual process of rendering the data into categories using a Microsoft Excel worksheet was tedious and complicated. Therefore, I switched to NVivo, known as one of the most effective qualitative data analysis software programs that can store transcribed interviews, observation data, and memos. It can also be used to enhance data backup and data security. Furthermore, NVivo helped me manage and code the data iteratively in compliance with GT and expedite the coding process. Since NVivo can facilitate many aspects of the iterative process associated with GT, it can ensure methodological transparency and thus enhance the validity of the study (Bringer et al., 2006).

4.4.3.3 Data coding

Coding is an analytical process of deconstructing the data to identify concepts, similarities, and conceptual reoccurrences (Tie et al., 2019). Using GT methodology, coding in this study was carried out via an iterative approach involving a systematic, repetitive, and recursive process to conceptualise the possible relationships within the data (Vollstedt and Rezat, 2019). The use of NVivo enabled a more detailed and systematic comparative analysis. The properties were sorted and sifted before they were associated with codes.

The interview was conducted one week after I had completed the participant observation. My first interview was with Shona. She had worked in the ICU for 12 years. In interviewing Shona, I realised that she often compared the current working environment

with the former system. Her story began with how she initially felt that the focus on technology development in the ICU had burdened the nurses more than any other healthcare worker. Shona then reflected on how nurses had to change their working orientation to suit the current working environment. To Shona, the current practice seemed to be degrading the value of the patient as a human being. Her greatest concern was that the younger nurses who had never experienced working with the former technology systems would disvalue humanistic nursing. Shona's concerns stemmed from her experience being introduced to many advanced technologies, and she found that the complexity of technology may induce fear and anxiety. In turn, the feeling of apprehension galvanised her curiosity to learn and explore the technology, which led to a considerable amount of time being spent learning about the technology than on patients. After interviewing Shona, I began my initial coding. My strategy to code the data after each interview was consistent with Charmaz (2014), who suggested that engaging with the data in the earlier stage enables the researcher to interact with the phenomenon and the participants through the empirical material. I adopted line-by-line coding from the GT approach to managing the data's complexity and diversity (Skjott et al., 2019).

My second interview was with Amira. She had worked in the ICU for five years. In contrast with Shona, Amira's narrative interview focused on the increased complexity of nursing care caused by advanced technology. A sense of insecurity permeated Amira's account of the complexity of nursing care. The focal point of her story was her feeling of uncertainty regarding technology incorporated into the ICU environment. In addition, she felt that the technology led to her feeling pressure to possess the technical skills needed to manage the equipment. She also spoke about the challenges of maintaining an interpersonal relationship with patients' family members due to the nurses' focus on recalling the meaning

of the alarms. She also highlighted the sense of uncertainty due to her lack of technical skills to recognise, analyse and interpret data. In coping with the complexity of the environment, Amira revealed that she had to avoid engaging in empathy for the patient and family members. She anticipated that she might not be able to manage her workflow if she immersed herself in empathy-oriented care.

I continued my strategy to code the data immediately after I interviewed Amira. I began comparing the statements and incidents in Amira's interview to the comments and incidents from Shona's interview to identify data patterns between both interviews. Glaser and Strauss (1967) noted that using constant comparative methods helps the researcher establish analytic distinctions. An example of this practice is demonstrated in the following extract from my analytic memo:

> **Memo on 'dual effect of technology'**
>
> 'After comparing Amira's and Shona's statements, I realised both of their stories were filled with the pressure of working with technology. In this regard, technology elicited apprehension and complexity in the working environment. Shona responds to the complexity by engaging in technological knowledge and skills acquisition. She detailed how the pressure of working under an intense technological climate facilitates her interest to learn by trial and error. On the other hand, Amira related technology complexity to the abundant number of alarms and challenges that she faced with the relatives of the patients who were anxious to know about the patient's condition. She also recounted the experience of having to deal with patients' relatives who showed mistrust in her technological competence because of her unconfident [*sic*] in answering their questions.

> Due to constantly facing these situations, Amira resorted to expediting her nursing care to the patients. From these two participants, I gained insight into the dual effect of technology which is (1) facilitating technological, cognitive seeking behaviour [*sic*] (2) impeding nursing care'.

After engaging in constant comparison, I felt that some initial codes were still lacking condensed statements; there was a discrepancy between the pattern detected in the observation data and the ways of the interview data. A case in point was Shona's view that technology stimulates her technological knowledge-seeking behaviour, which contradicts Amira's view, which indicated that technology impeded nursing care. Regardless, an idea implied by the results of my fieldwork was the challenges nurses faced using technology. This contrasting incident led me to consider the 'dual effect of technology – stimulating versus impeding'. Hence, I developed a question, 'How does the nurse weigh the effect between the two' to be added to the line of inquiry. This strategy is consistent with Ferguson et al. (2020), who considered that the lines of inquiry must be exploratory and may occur with or without the researcher devising questions prior to the interviews. The authors also maintain that lines of inquiry would contribute to discovery interviews or non-directive interviews.

In my study, I used the identified line of inquiry as a phenomenon worth exploring in subsequent interviews. The next participant was Maria, who had ten years of experience in the ICU. My analysis of Maria's interview involved narratives of managing time constraints. She thought that the implementation of paperless technology had led to an increased demand for documentation. The simultaneous lack of effectiveness of the technology and the ambiguous objective of technology implementation burdened the nurses.

In agreement with Amira, Maria highlighted the complexity of technology and the lack of training that had forced the nurses to expedite nursing care of the patients.

4.4.3.3.1 Initial coding

Once the data was coded, I began to see the landscape of the technology's impact on nursing care practice. I saw this impact reflected in participants' emotions and responses. As shown in Table 3, the ‘navigating through complexity’ code was elucidated through the properties of ‘facing time constraints’, ‘feeling unaccomplished’, and ‘feeling uncertainty’. These properties were included in categories such as ‘identifying the complexity of technology’, ‘promoting curiosity’, and ‘influencing clinical decision making’. As suggested by Charmaz (2014), I decided to code for gerunds because the codes can produce a more concrete picture of what is happening in the data (Glaser, 1978). An example of how the initial principles were identified from the analytic memo is shown in Table 4.

Table 4: Example of Initial Coding Analysis

Categories of initial codes	**Analytic memo**
• Navigating the transition • Identifying the complexity of the technology • Acknowledging the lack of technology training	Interestingly, participants did mention that a completely paperless hospital may not be fully implementable. Although they were asked to document everything in the system, at the same time, they still needed to complete paper documentation. That is why I coded this as navigating the transition from manual to technical documentation. The participant felt like she had difficulty managing this transition because of training. She alluded to the challenge of increasing the use of technology.

• Facing time constraints	Technology increased the complexity of the nursing care delivery process of entering and retrieving information and cognitive overload. Hence, she alluded to her trouble in keeping up with her workflow. She struggled to complete nursing care, and nursing care delivery was more challenging. This phenomenon must be examined from the managerial aspect. I need to observe to what extent the implementation of a paperless ICU affects the nursing workflow and clarify the nurse's expectations from technology training.

As shown in Table 2, I wrote an analytic memo and fieldnotes to elaborate on the codes from the data and categorise them. In addition, I also wrote a reflective memo wherein I disclosed my impressions about the participants' experiences that adhered to the constructivist GT approach. I acknowledged that some grounded theorists' arguments are concerned with the emergence of data in a constructivist GT study because they insist that disclosing researcher impressions will impede the emergence of concepts and theory as the data cannot 'speak for itself' (S. Singh & Estefan, 2018) and may challenge the dictum of no preconception (Glaser, 1998). Undeniably, preconceived concepts and ideas can undermine the process of emergence, pivotal to GT; however, this was not of concern if the constructivist researcher constantly queried pre-existing arguments concerning phenomena being studied when writing the reflective memo (Clarke & Charmaz, 2020). I used this practice throughout the reflective memo-writing process to avoid bias. I found that the reflective memo was helpful because it gave me an idea of whether any additional data must be collected to fully understand the process of nurses' experiences in delivering nursing care in the technological ICU environment. Moreover, these memos and fieldnotes helped to

check individual and joint observations and explore discrepancies regarding what researchers thought participants had said, how they said it, and what they did (Mitra & O'Brien, 2021). The following is an example from an excerpt of my memo:

Navigating through complexity

'It became apparent why participants frequently talked about dealing with time constraints in the ICU. A few times during my fieldwork, I have encountered the situation whereby the system was down, and the practice of documentation now had to turn back to conventional pen and paper instead of paperless. Even though this traditional practice was commonplace for some senior nurses, they still grappled with the problem. After comparing the data from interviews, it is plausible that exposure to the emerging technology initially elicits a fear response in nurses. Each subsequent exposure to the emerging technology causes less fear and more interest in observing its benefits. After repeated exposure, the nurses react fondly to the once novel technology.

On the other hand, transposing from fear to interest has led to an increased reliance on technology for the nurses to develop skills and competency. This intention could be why I frequently realised during my fieldwork that nurses were gazing at the monitor screens and were attentive [*sic*] to the machines compared to patients. Meanwhile, the interaction with patients was technology-mediated, where technology has become the "intermediary figure", hence creating distant proximity [*sic*] between nurses and patients. On the other hand, Shona and Maria spoke about how excited they were to learn when the new technology was introduced to the ICU. I found in the data that both of them talked about time constraints that prevent them from getting involved in technology knowledge-

seeking. From my early observation, I noticed the ICU seems busy, but that is the typical characteristic of the ICU. As such, I need to clarify the meaning of "busy" to them'.

I reinitiated the participant observation session after the data was analysed. This time, I concentrated on the categories of the emergence codes to develop an interview guide which helped me form a clear picture of what had been mentioned by the participants. The subsequent participant observations required ten days. I decided to conduct the participant for seven days until it was sufficient to see that the stories told by participants were consistent with actual practice. At the same time, I could observe variations that might occur and identify possible explanations for the variations in the subsequent interviews. An example of how I tabulated the findings based on the observation guide is shown in Table 4. In this example, I noted the instances of miscommunication between the nurse and the medical officer. I recorded the behaviour exhibited by the nurse and the action taken by the nurse. After analysing the data from participant observations, I recruited five participants to obtain their views which would provide me with contextual information to support their stories using the following updated interview guide.

Interview Guide

- Are there any challenges in terms of communication in utilising the systems or technologies in the ICU?
- In what way could technology be used to improve the communication between the nurse and others?

In coding the interview data, the initial codes suggested that nursing care in the ICU represented a range of meanings that later were categorised into technological care and

humanistic nursing care. I also learned during my fieldwork that I conducted in between the interviews that paperless technology was still at the early stage of implementation. The data showed that participants endured vulnerabilities and problems which arose from technological disfunction. The data also suggested that the introduction of new technologies had been significant in the process of knowledge and skills acquisition, even though, at the same time, it creates distance in nurse–patient engagement.

I decided to write a reflective memo before coding Anne's interview to distinguish my worldview from Anne's worldview. After writing the reflective memo, I first withheld the coding analysis for Anne's interview. I decided to interview the subsequent participant (Ruby) to explore her view on humanistic nursing care and how technology influences her view. This strategy prevented any possible preconceptions that could affect my coding analysis. A similar approach was used when Conlon et al. (2015) were aware of the preconception that surfaced during a study interview. The authors stated that discovering their prejudice enriched their understanding and contributed to the emerging analysis. This approach complies with Charmaz's (2014) recommendation that the researcher must welcome their new awareness because this strategy will benefit their research. My findings depicted different perspectives between Anne and Ruby regarding how they demonstrated humanistic nursing. For Anne, humanistic nursing is the essence of contentment, whilst Ruby sees patients' suffering as a beacon for humanistic nursing.

I also compared Ruby's quote 'imagining that the patient suffers more than me' to the statement from Amira (second participant). Both Amira and Ruby reflected on how they coped with the complexity of the working environment. Amira and Ruby illuminated a distinct concept of empathy in the codes of 'avoid immersing in empathy' and 'imagining the patient's suffering'. I mulled over both ideas, and I suddenly thought Amira avoided

immersing in empathy, possibly because taking on someone else's burdens could be unpleasant and add to her already enormous responsibility. After comparing participants' concepts of humanistic nursing, the original code of the participants' story was 'instilling the humanistic element in technology'. It condensed the statement, but the neutral wording dampened its intensity and importance. Changing the code to 'negotiating with empathy' suggested the reduced value of empathy to cope with the substantial burden of technological complexity.

The concepts of 'navigating through complexity' and 'negotiating with empathy' provided me with starting points for initiating my analysis. I decided to conduct participant observation one more time to seek nuanced data and determine whether they reflected the nurses' actions, situations, and nursing care delivery process. I conducted four participant observation sessions each day. The data gathered from observation sessions were used to construct the domain of inquiry for the subsequent interview with Sara. She had worked in the ICU for ten years. In her experience of navigating through complexity, she argued that technological care is of the same magnitude as humanistic nursing but depends on the situation because the technology could be a primary contributor to the lack of humanistic nursing in certain situations. Nevertheless, she agreed that humanistic nursing demonstrates the meaningful values of nursing and the nurse. She regarded humanistic nursing as a benchmark of the standard quality of nursing care. She expressed discontent with the idea of having to work in a situation where they were conflicted between delivering quality nursing care. Still, they needed to consider their core values. The codes from Sara's interview, namely 'awareness of a sense of selves', 'awareness of emotional attachment', 'sacrificing core value', and 'acknowledging self-essence', began to reveal the process of negotiating with empathy. I used these codes to explore the implication these codes have in

negotiating with empathy in my subsequent interview with Henry. He felt that the lack of planning and redundant documentation had caused time to be wasted. He reflected on the incident that I described in my fieldnote. Henry articulated that the hidden determinant of conflicting priorities was to protect himself from getting blamed; hence for whatever reason, he must devote more attention to documentation. He expressed that he had no autonomy to decide what must be prioritised as a nurse. A powerful quote from Henry was, 'Do we have an option?' Following the analysis of the interview, I established 'identifying conflicting priorities' as a category that shaped further analysis.

At this point, I decided to interview the next two participants to ascertain data variation. The first participant was Janet, who had worked in the ICU for five years. Janet viewed autonomy according to the degree of technology engagement. Although she perceived herself as a competent nurse, the lack of acceptance of novice nurses by physicians restricted her autonomy in performing her role as a proficient nurse. The codes from my interview with Janet, namely, 'assuming the subordinate role', 'following instruction', and 'recognising generational stereotypes', revealed the extent of the lack of autonomy in this study. On the aspect of nursing care, Janet perceived that technology helped her plan nursing care for the patient. Possessing technical skills was her paramount aim during her first year working in the ICU. She believed that she could make better decisions by being proficient in technology. Understanding all the alarms made her aware of patient condition changes.

The final interview was with Sharon. Her story revolved around coping with conflicting priorities between nursing care and technological care. Sharon recounted her experience dealing with large numbers of alarms in the ICU in her early ICU work experience. She did not attend to her patient when the alarms sounded because she thought the alarms were false. Unfortunately, the patient's condition had deteriorated. Aware of the

risk when a nurse becomes desensitised to the high number of alarms in the ICU, she began to use her knowledge and reasoning when alarms sounded. Once she could conceptualise the patient's condition, she could enhance safe and effective care to distinguish between false and urgent alarms.

4.4.3.3.2 Focused coding

In engaging in focused coding, I selected only the most analytically logical codes and appeared more frequently among my initial codes to be synthesised and conceptualised. Table 9 provides the focused codes I defined after assessing the initial codes from nine interviews and indicates the focused codes were established from the events, participants' interactions, and perspectives that had more analytical value to the phenomenon under study (Charmaz, 2014a). The process of focused coding was not linear, meaning that I continued to return to the earlier data and again returned to the process of constant comparative analysis. Focused coding involves constructing a code that illuminates specific incidents or events. The codes constructed during focused coding were mainly tentative. For example, the codes' fostering 'patient care' and 'feeling of security' were categorised under 'embracing technology'. As I looked through the data and compared data with the codes, I began to realise that some of the codes had distinctive meanings that applied to them, which encouraged me to follow a different analytic direction. Hence, I began to refine the codes so that the constructed focused codes aligned with what was happening in the data. Periodically, the conceptual memo was used to record my thinking about the relationship between and how and when processes occurred, how they changed, and their consequences. This process had allowed me to identify the categories after the iterative interplay of

continuous rearrangement and aggregation of the codes. Table 6 shows the full array of categories identified following the constant comparative analysis. The focused code ‘fostering patient care’ had its roots in initial codes such as ‘imparting clinical judgment’, ‘forecasting physiological changes’, ‘defining streamlining care’, ‘perceiving technology as a helper’, and ‘becoming connected’. Another focused code, ‘feeling of security’, had its roots in initial codes such as ‘becoming insecure’, ‘being vigilant’, ‘mitigate uncertainty’, ‘feeling in control’, ‘sense of alertness’, ‘feeling safe and secure’, ‘feel reassured’, and ‘saving nurses’ time’. Moreover, the focused code of ‘embracing technology’ had its roots in the initial codes of ‘enhance technical skills’, ‘increase technical knowledge’, ‘develops intuitive skills,’ ‘avoiding blame’, ‘minimising the burden’ and ‘interacting between each other’. The focused code of ‘facing technological predicaments’ had its roots in initial codes of ‘redundant documentation’, ‘suffering the loss of time’, ‘increase complexity in nursing care’, ‘working with limited resources’, ‘perceived role overload’ and ‘compromising nursing care’ as indicated in Table 5.

Table 5 : Summary of Focused Coding

FOCUSED CODES	INITIAL CODES
Fostering Patient Care	• Imparting clinical judgment • Forecasting physiological changes • Defining streamlining care • Perceiving technology as a helper • Becoming connected
Feeling of Security	• Becoming insecure • Being vigilant in handling technology • Mitigate uncertainty • Feeling in-control • Maintaining a sense of alertness • Feeling safe and secure • Feeling reassured • Saving nurses' time
Embracing Technology	• Enhancing technical skills • Increasing technical knowledge • Developing intuitive skills • Avoiding blame • Minimizing the burden • Interacting with each other
Facing Technological Predicaments	• Creating redundant documentation • Suffering loss of time • Increasing complexity in nursing care • Working with limited resources • Feeling a perceived role overload • Compromising nursing care

Focused codes were selected, and a detailed provisional model was created that shows the impact of technology on nursing care practice in the ICU, including practicality and challenges in working in the technological environment and the sentiments underlying their utilisation of technologies.

4.4.3.4 Evolution of theoretical sampling

Before conducting theoretical sampling, I reasoned that despite the focused codes appearing sensible to me immediately and explicitly reflecting the impact of technology, I was sceptical about the focused codes that I constructed because they seemed unanchored to each other. Thornberg (2011) argued that the focused codes were not the final frame of these later analyses. Thus, this prompted me to sort the data of the entire focused codes, and I began comparing and contrasting the data within the code or with other codes.

I began by the analysis to determine whether these focused codes were interchangeable indicators of something by interpreting every statement representing each code's properties and piecing together implicit meanings to create the frame for the later analyses. It was evident from the data that many factors influenced the nurses' perception of the impact of technology from the nurses' perspective. I noted from many statements that a highly technological care environment presents a double-edged sword for nursing practice. Several factors render the outturn of implementing technology as advantageous or disadvantageous to the nurses. I believed that clarifying these factors would prove helpful in gaining a more comprehensive understanding of the commonality of the nurses' experiences. In immersing myself in the data, I noted the participants imputing their experience into the 'transition period' where they were required to work in a changing

environment. I decided to construct a significant category of 'navigating the transition' as an analytic direction. Using this category, I began to compare the codes and understand how nurses view their experiences from this perspective so that I can observe the variation in their experiences. Pursuing this analysis, I uncovered overarching statements from earlier participants that indicated the nurses' decreasing capability to provide nursing care that meets the values that embody the caring professional nurse. At this point, I wanted to understand the basis for this phenomenon. Hence, I interviewed Diana, a registered nurse with the ICU post-basic who had worked in the ICU for almost 14 years. The codes that emerged from her interview were 'being subjugated', 'clashing values' and 'enduring guilt-ridden'. At this point, I wondered whether these codes were interchangeably indicators of something else than just the impact of technology? It is apparent that technology was not directly impacting the nurses, but multi-level factors influenced nurses' experiences of technology. Diana highlighted that being subjugated to the need of the organisations had struck me. This code urged me to return to the earlier participants to understand the meaning of this code. I found that the code echoed in many of the statements that illuminated the participants' responses to organisational expectations.

For example, during initial coding, Henry, a male nurse participant who started working in the ICU two years ago, talked about how he spent more time focusing on technology than the patient because of the expectation that ICU nurses must be competent in using technology. Meanwhile, Ruby addressed the benefits of technology, but due to the lack of planning and the perplexing decision, nurses are required to document redundantly, wasting much time on unnecessary burdens.

It was apparent to me that the quotes from Ruby and Henry indicated that the time spent on technological activities was considerably more than time spent on nursing care

activities; however, the code of ‘suffering the loss of time’ does not make explicit all the circumstances that participants implied with their stories. Participants talked about ‘reaching expectation’, ‘experiencing unnecessary burden’, and ‘enduring nuisance’, but I focused on the loss of time rather than developing a detailed analysis of enduring. After I interviewed Diana, I realised the focused code of ‘sensing powerlessness’ was a more appropriate fit with the participants’ experience and explained more than what I defined in the earlier focused codes. Charmaz (2014) affirms that coding is not a linear process and could proceed in any order. In this regard, the researcher might revisit the earlier codes to seek an explanation for a particular phenomenon. Consistent with this study, when the code of ‘sensing powerlessness’ unexpectedly emerged from the data, it provided a new lead for further analysis. Therefore, I revisited the previously created codes to determine what was implicit in earlier participants’ statements that complemented the code of ‘sensing powerlessness’. Before I constructed this code, I realized that I was somewhat unconvinced about the appropriateness of the earlier focused codes that I constructed. Many related codes that emanated from participants’ experiences were of being ignored, being restricted, feeling devalued, becoming insecure, feeling vulnerable and suffering the loss of time; hence effectively utilising technology would be turned to improve those experiences. As such, I decided to establish ‘sensing powerlessness’ as a theme to facilitate the subsequent analysis. Establishing this theme was a breakthrough moment for me because this code supplied a more profound and incisive idea for my subsequent interview.

Sensing powerlessness

To conceptualise the ‘sensing powerlessness’ code, I interviewed Arisa, the ICU nursing manager at that time. I selected Arisa because I was intrigued to know the meaning

of power and powerlessness; I assumed that she had more autonomy than other nurses as the nursing manager. Arisa suggested that creating a paperless environment has accentuated the lack of recognition of nursing. From Arisa's interview, it seemed that as a nursing manager, she felt powerless to protect nursing service provision from being damaged by the ambitious planning, lack of recruitment, increasing turnover, the nursing shortage and heavy workload. I began to write a memo to identify any analytic threads that might lead me in a new direction. First, I began to define powerlessness in the context of participants' stories. Powerlessness implies a chasm between the old and current practices, resulting in spiralling consequences.

Diana and Arisa's statements and corresponding codes brought awareness of the constrained working environment into focus. For example, Diana felt powerless when she prioritised materialistic values, which contrast with her meaningful values, to the extent to which she became doubtful about her fulfilment. Diana's statement signifies her feeling disconnected from the core values of nursing, which she acquired through direct nursing care of the patient. For Diana, having more opportunities to provide optimal nursing care to the patient makes her feel accomplished, valuable as a nurse, and self-fulfilled. Meanwhile, powerlessness in Arisa's statements was apparent in the phrase 'nurses and the patients here are like "the elephant in the room" is obvious to all concerned, but they all choose to remain in denial'. This statement signifies a feeling of invalidation and helplessness. Using the code and statements in the data, I wrote a memo to define what 'sensing powerlessness' meant. Writing a memo provided me with the insight that even though the nurses regarded nursing care as more important than any other task, they still said they had to compromise nursing care to keep pace with the acceleration of technology development and deployment of paperless systems. The following memo relates to what I first wrote in my analysis of the

sensing powerlessness code. I have outlined the participants' standpoints on 'sensing powerlessness' to observe the extent to which the working environment constraints influence the participants' experiences of delivering nursing care in the ICU. What bothered me was the fact that the value of nursing that the nurses upheld had not fit into the technological environment of the ICU. It seemed to say that a nurse's needs (and patients' needs) should be subordinated to the need for (technologically based) organisation. The fact that some nurses would struggle to uphold their professional values in this way intrigued me. I thought about this idea for a while until I decided to change the code from 'conflicting priorities' to 'conflicting values' because this code fits my judgment. This conflict resonates with the notion of powerlessness. Due to lacking substance to support a more profound analysis of the 'conflicting values' code, I conducted follow-up interviews with the selected participants to gain a deeper understanding of the code. Thereby, I ran a brief interview session with Azima, who had been working in the ICU for 18 years. The statements from Azima revealed that she felt burdened by the arbitrary rules that she had to follow since the ICU transitioned to a highly technological environment. In analysing the data, I identified a statement that indicated that Azima faced an ethical dilemma because a meaningful relationship with the patients is what should be embedded in the profession's value. She identified it as an essential professional value that distinguishes nurses from other occupations. Nevertheless, the organisational desire to create a highly technological hospital environment took precedence over any further consideration. This situation has led to her spending more time focused on technology-related activities and reducing her capacity to form meaningful relationships with the patients. Her narratives reiterated the nurses' efforts to reconcile value conflicts whenever they experienced the conflicting values. Although initially I established 'making reconciliation of values conflict' as a category for analysis,

throughout the analysis, I realised a major part of her interview's statements focused on the distinction of the professional values between two generations of nurses. It made me ponder 'how does generational context apply to the event'? This question occupied my thoughts for a while; then, I realized the culture of respect is synonymous with the ICU nursing culture. I immediately wrote a memo about it. The following memo relates to what I wrote about the theme of perceived generational differences. The memo shows the connection between conflicting values, making reconciliation possible and creating an adaptive culture.

Subsequently, I interviewed Shida, a female RN who had worked in the ICU for almost 16 years, to explore the concept of 'creating an adaptive culture' developed from the previous analysis. I chose Shida because I presumed, she was an appropriate participant to talk about the working adaptation process since she had recently received the top nursing performance award before implementing the paperless system. What struck me about the Shida interview is that she recalled that changing the ideology of caring has helped her regain control over nursing care practice. In this regard, Shida imparted a sense of identity by being able to distinguish the characteristics of ICU nursing practice from that of the non-ICU nursing members. This distinction resulted in the co-creation of the professional value of nursing by including technological care in tandem with humanistic-oriented care as a core value and guiding principle. I show how I gained new insights into professional identity. The memo that I wrote on the professional identity that emerged at this point provided me with a new insight into the impact of technology. It inflicts my realisation that the participants viewed technological competency as possessing a set of traits that differentiate the characteristics of their profession from others. Hence, I had identified 'constructing professional identity through technology competency' as a theme for further analysis. From the analysis, it was evident that the pressure to acquire technological competency. The

earlier focused code of ‘feeling of security’ includes the nurses’ statements about the need to be competent in using technology because they identify it as a threat to nursing practice. In comparing these two findings, it seemed that the professional identity is rooted in nurses’ identification of the threat. What was revealed from this focused code is that when nurses possess technological competency, they begin to feel in control of their role. This insight raises a question regarding how having this identity helps the nurses fulfil their purpose.

To answer these questions, I deliberately returned to the focused codes that I had developed earlier because it seemed that the properties in the focused codes would provide me with contextual knowledge about this category. This strategy affirms Charmaz's (2014) idea that ‘when early categories were suggestive but not definitive, further data collection refined them, and a new standpoint from which to view puzzling data will lead to fresh conceptual directions’ (p. 199). Comparing the incidents in these two codes raised the possibility of the biomedical model influencing the nurses’ professional identity. However, I did not find the statements that could support this concept. Nevertheless, at the same time, I did not want to dismiss this idea. So, I resorted to interviewing Fuad, who has worked in the ICU for one year. What was implied in Fuad’s interview was that he affirmed the supremacy of technology in nursing practice as it manifested the patient’s bodily functions. Technology offers an enormous benefit for nurses with regards to caring for the critically patient with a life-limiting illness, which can often create uncertainty for nurses because of the patient’s clinical condition. Taking care of the ICU patient requires high technological competency, and Fuad’s thought of technology as a duplication of a patient's body was a revelation. How does the nurse ensure that they are not objectifying the patient? After performing coding analysis, I decided to code ‘support bodily function’. To further explore the concept behind this code, I interviewed Izwan to clarify the belief that technology is a

duplication of the patient's body and what function this belief serves. For Izwan, patients treated in the ICU mostly have severe body ailments, and technology helps nurses observe the condition. Izwan believed being trained in anatomy, physiology and biochemistry allow him to validate data with patient conditions.

4.4.3.4.1 Abductive reasoning

I used 'technological ableness' as inductive reasoning to facilitate the search for a new theoretical explanation. I chose this theme as abductive reasoning because ableness here refers to a nurse's capacity to act when such hypothetical conditions are actualised (Sattarov, 2019). For example, when the nurse can unify technological care and humanistic care but cannot do so due to experience constraints.

Maher et al. (2018) suggest that to generate the GT, the researcher must also employ imaginative insight as they attempt to make sense of the data and create understanding and theory. Charmaz (2014) sees abductive reasoning as a mode of imaginative reasoning researchers invoke when they cannot account for a surprising or puzzling finding. For Caiata-Zufferey (2018), the starting point of the described interpretative work was an enigma to the researcher, and they must ask the questions that will trace relevant paths. My reflection on constructing an emergent category is shown in the following excerpt.

My subsequent interviews following the theme that I developed during abductive reasoning imparted a great deal of knowledge about the lack of autonomy that nurses experience. The significant points implied in a large proportion of participants' statements implied that the nurses were handmaidens as well as positioned outside the authority or power of technology. This finding led me to interview Hans, an MA whose scope of work

was managing technologies, to gain his perspectives. Although this study initially intended to only focus on ICU nurses it is helpful to strategically select participants whose views and experiences can add meaning to, illuminate, and, in some cases, help explain the phenomenon under study.

Hans indicated that the nurse's responsibility is to always look after their patients and focus on providing holistic nursing care, including therapeutic touch and emotional support, because they are still lacking in that' as a response to my question, 'what do you think their job scope is'? I was also perplexed by how and why Han's perspective differed from the other participants' forms of telling. In writing the reflective memo, I contemplated whether the participants' experience with a constrained working environment plays a role in determining their decision not to work with technology as they are so busy with the existing workload. Moreover, I identified a statement in which the participant expected that technology should be the responsibility of MAs because they were explicitly trained in managing ICU technology.

After interviewing Fuad, I realised that my data on the lack of autonomy was saturated because participants kept raising similar issues, and no more new codes emerged. Nevertheless, the memo on using technology to emancipate themselves is still bothersome. I am intrigued to know how the nurses use technology to emancipate themselves from the constrained work. I seek to identify an explanation by comparing the properties of the earlier focused codes of 'embracing technology' and 'coping with conflicting priorities'. Nevertheless, what illuminated the data was the advantages of technology in delivering nursing care in the ICU. However, how can the intrinsic element of technology emancipate them from a constrained working environment? Using the codes and statements in the data, I decided to conduct a separate interview with Izwan, Rika and Coleen. The codes that

emerged from their discussion were ‘viewing technology as a bodily extension’, ‘viewing technology as a partnership in care’ and ‘viewing technology as a mediator in social interaction’. In scrutinising the data, it was evident in several interviews that the nurses spoke about being excluded regarding technology management and handling. As a result, they complained of difficulties utilising technology that impeded constructing a professional identity. Many participants expressed difficulty managing technologies because they have limited opportunities to learn technology systematically and intentionally. Furthermore, the constrained working environment of the ICU, which includes a heavy workload and redundant documentation, has further narrowed the opportunity of nurses to learn about technology which in turn may cause them to have difficulty in acquiring the technological competency expected. So, the nurses resorted to technology as a new way of knowing a patient, which can contribute to the risk of objectifying the patient. I decided to categorise the codes that I had identified at this point of analysis into a category of emancipating from constraints. This category relied partly on my recollection of the earlier data regarding the sense of powerlessness that nurses experienced because of the constraints and limitations such as lack of autonomy, the nursing shortage, and technological demand. This could become a ground into the nurses’ view of their professional identity. This evidence seemed to be describing the concepts of oppression and power.

The nurses ascribed technological competency as a professional identity to emancipate them from the constraint. This was an epiphany. ‘Professional identity’ was a major theme in the data and a turning point for nurses in realising the conflicting values they face in providing nursing care in the ICU. I began with Harlow (2017), which explains competing as empowering one’s role to winning or defending their position. In this way, they can emancipate themselves from the constraint and develop a positive professional

identity. So, my new code was emancipating from constraints. I returned to the data to see the magnitude of the constraints that justify emancipation whilst collecting the subsequent data. I decided to interview Izwan. After performing constant comparative analysis, it came to my attention that there were no new data, and the three shared similar perspectives with the previous participants, especially in the context of working constraints. The theoretical question that I asked was 'how do you assimilate technology into nursing care practice'? The categories that emerged from their discussion were 'viewing technology as a bodily extension', viewing technology as a 'partnership in care' and 'viewing technology as a mediator in social interaction.' During my subsequent interviews with Coleen and Rika, I asked the same theoretical question. The data from both participants revealed no performing constant comparative analysis no new incidents and properties of the earlier categories have been discovered. Charmaz (2014) proposes that data saturation is reached when a theoretical construct reveals no new properties. In light of this proposition, I presumed data saturation was achieved.

CHAPTER 5: TRUSTWORTHINESS OF THE STUDY

5.1 Introduction

The quality of qualitative research has been the subject of much debate and controversy. Ensuring the trustworthiness of data collection in qualitative research was important. Charmaz (2014) suggested certain criteria to demonstrate trustworthiness in GT through the development of credibility, originality, resonance, and usefulness.

5.2 Credibility

As suggested by Charmaz (2014), to achieve the credibility of the study, GT researchers must make sure that they are intimately familiar with the study setting and topic. In this study, the credibility was maintained through accurate recordings of the nurses' vivid descriptions of their experiences in using technology in the ICU. In addition, the credibility of this study was enhanced by the use of data triangulation between participant observations and interviews. The data collection was conducted in two phases, beginning with participant observation and followed by face-to-face in-depth interviews. Firstly, the participant observation helped me to establish rapport and close engagement with the participants prior to the face-to-face interviews. As mentioned in the previous section, each participant was observed for 3-4 hours of their shifts. This provided me with an opportunity to familiarise myself with the ICU settings such as the layout, staffing, the nurses: patient ratio, the types of technology used in the ICU, and the engagement of nurses with patients and technologies. The observation also allowed me to gain a better understanding of the participants' stories

and to avoid any misinterpretation of contexts that were described by the participants during the interviews. Secondly, face-to-face in-depth interviews facilitated the exploration of the substantial experience of each participant in terms of the technology phenomenon in the ICU. The interviews were conducted after the participants completed their shift duties to ensure that they had ample time and space to tell their stories and insights. Subsequently, the triangulation of data was done following Charmaz's (2004) suggestion that the categories must cover a wide range of empirical observations.

5.3 Originality of the study

This study used concurrent data collection, data analysis, and constant comparative analysis to examine the emerging categories. Cooney (2011) suggested that these procedures were necessary to ensure that the emergent theory would accurately represent the participants' experiences. The originality in this study was evidenced by the fact that the interview guide used during face-to-face interviews was not a set of fixed questions. Instead, they were constantly changed based on the emergent categories and the use of theoretical sampling.

5.4 Usefulness of the study

Morse et al. (2002) suggested that the nature of the subjectivist paradigm could make generalisability hard to achieve unless with due precautions and clarifications. According to (Charmaz, 2014) the grounded theorists needed to ensure that the analytic categories were suggestive of a generic process to ensure the usefulness of the theory. From this standpoint, the usefulness of my study was the eventual middle range theory that was transferable as it

captured a broad range of processes in the practise of the ICU nurses through the core category that emerged in this thesis. The core categories were based on major themes that were grounded in the experiences of nurses with regard to the use of technology to deliver nursing care and their perception of the impact of technology on nursing care practise. The theory was developed following repeated immersion and engagement with the data as well as intensive coding (Polit and Beck, 2010). Furthermore, the usefulness of this study also lied within the use of the constant comparative approach. In this approach, the similarities and differences in the data were sorted based on the general properties of categories (Carminati, 2018) to increase the generality of the categories (Glaser and Strauss, 1967)

5.5 Data protection

To ensure data protection, all interviews were conducted in the ICU seminar room. It was a closed room and I made sure that I changed the door signage to “in use” to avoid interruptions from other healthcare professionals during the interviews. I also used pseudonyms to protect the identities of my participants. A few participants expressed their hesitancy to disclose certain information when they noticed that the interview was audio-recorded. However, they were reassured of the confidential use of the data. The participants were also reminded about the need for the interview to be recorded as discussed before. I explained to them that the use of audio recording during the interview could provide a detailed and accurate account of the interview and helped to reduce the risk of bias in subjectivity that might arise from memorisation of the data.

5.6 Methodological rigour

Only four nurses initially returned the envelopes with the permission forms to participate in the study. Therefore, I required a different strategy for attracting more study participants. I decided to approach the nurses and make a brief introduction before discussing the research project's objectives. Nurses generally reacted positively when I identified myself as a nursing educator now enrolled in a Ph.D. programme and a former critical care nurse. Despite the participants' favourable reception, I found it difficult to monitor the nurses in the research environment without being invasive or too near to the participants. Knowing this, I was aware of the possibility of bias during the participant observation, since my presence would induce them to act differently than they would under normal circumstances. It would seem that some nurses did not have a pleasant experience while I was around. Having spent some time with the nurses, however, made it much easier to encourage them to take part in the research. Hughes (2013) claimed that prolonged exposure during observations might help to establish a relationship between the researcher and participants, and therefore, participants may open up and do things the usual way. Having said that, any researchers shall take note of these influences when preparing the research proposal, collecting data, writing up, and reporting results. As I was wearing my own clothes during the data collection, some nurses were initially suspicious about my presence and role in the ICU. Knowing that my appearance would affect the responses given by the participants, I wore minimalist clothing during the fieldwork, and it contributed to more positive responses from the participants. In addition, I also put on the identification tag given by the institution all the time.

Secondly, despite being a non-participant observer, my capacity as an ICU nurse in another hospital was helpful because I was not completely an outsider in the field setting. Whilst I was considered an outsider to this ICU team, I had insider perspectives based on my previous practise experience. However, there was the possibility of me having preconceptions about the nurses' behaviours while responding to any caring-related situations. For instance, in one of my memos, I jotted down, 'a tired-looking nurse avoided the patient's attention by disregarding the glance from the patient's families'. When I was reading the memo, I was curious about how I classified 'a tired-looking nurse'. Then I began to reflect that as a competent member of a shared place, I could feel what the nurse felt. Another issue was the preconception of how a glance would be perceived as 'being attentive' and that not glancing back would be 'avoiding someone's attention. From that point of view, Papatheodorou and Luff (2012) argued that the position as a non-participant observer taking an outsider's perspective is unlikely because (i) we all carry existing knowledge, expectations, and assumptions that we bring into the observations (ii) our mere presence changes the setting as we enter it, and (iii) our accrued knowledge from observations over time negated the detached view. Hence, Angrosino and de Perez (2000) came out with an alternative framework of observer membership within the observed setting. They suggested three levels of membership, namely (i) complete membership: immersed and affiliated, (ii) active membership: affiliated but not committed to all values, and (iii) peripheral membership: the development of desirable insider perspectives without participation in the activities. From the three categories, my epistemological position appeared to resonate with the third category of peripheral membership. Despite a low level of involvement, I kept myself from being drawn entirely into it. I interacted frequently and intensively with the

nurses to acquire first-hand information and insight. This was in line with Musante and DeWalt (2010) who proposed that regardless of whether the researchers are taking outsiders' perspectives, they still become part of the scene and end up as the peripheral members within the observed setting.

Subsequently, a common criticism of qualitative research is that data is biased because of the subjectivity of the researcher (Closs and Cheater, 1999). In addition, as I was the interviewer, my long experience in intensive care might have influenced my understanding of the data. Due to the constructivist conception of the GT approach, the data and analysis of this study were created through an iterative process whereby the researcher and participant constructed a shared reality. As suggested rather than looking for one main concern, grounded theorists should seek to build a "picture that draws from, reassembles, and renders the subjects' lives" (Charmaz, 2004, p. 270). However, during the iterative process, I became aware of the possible bias from the 'inescapable insider perspectives' within the study setting. I have a significant advantage in describing how and why the participants carried out the nursing care they did. The flip side of this was that I was too accustomed to this kind of nursing care to even notice how it had been performed. I could have taken it for granted and failed to acknowledge its significance. In several instances, I realised I did not strive to probe more deeply into the participants' responses. As a result, I may have missed some of the nuanced meanings participants ascribed to their experiences in their quest for the more conspicuous ones (Closs & Cheater, 1999). This difficulty is acknowledged by Charmaz, who suggests that it may be linked to the involvement of constructivist researchers in constructing the data (Charmaz, 2014). Furthermore, according to Glaser (2012), constructivist researchers may have neglected the qualities of conceptualization that established an abstract distance from the data. Hence, to avoid bias

from subjectivity, I constantly reflected on the data by using my experiences as sources of insight. I also tried to be explicit about my perspectives' influence on the data analysis and interpretation. Ultimately, the codes emerged from the shared reality that was constructed through the process of reflexivity. As the research progressed and more theoretical concepts emerged from the data, the initial interview guide was gradually modified to become more specific.

In the earliest coding stage, I wondered if the codes were the correct ones. Then, I realised that I was giving too much attention to the trivial details of the data. This is why Charmaz (2014) suggested that it was best to start the coding by moving quickly through the data whilst at the same time looking for codes that were most relevant and useful.

My previous experience also presented some challenges to me as a GT researcher. (Morse et al., 2002) claimed that researchers often proclaimed saturation rather than proved that they had achieved it. This misunderstanding could be due to the inability of inexperienced researchers to judge the exact point of data saturation, thus leading them to terminate data collection and analysis before any rigorous support for theoretical insights was obtained from the study. Goulding (1998) analysed this issue and found that premature closure was not just related with the researcher leaving the field too soon, but it could also occur when the researcher had acquired a lot of data, but the analysis did not progress beyond explaining what was in the data. As a consequence, too much data stayed at the descriptive level and did not go to the level of theorising.

In light of such issues, Corbin and Strauss (1990) suggested that the researchers examine, familiarise themselves, and analyse their data for a longer time for there will always be the potential for "the new to emerge". Meanwhile, Charmaz (2006) suggested grounded theorists follow an inductive-abductive methodology to facilitate theorising. As

the analysis began, the researcher must be more disciplined and cut data when necessary (Mason, 2010). In order to minimise such bias, I refrained from presenting any personal or professional information that might form a basis for inferring the preferences or values relevant to the interview's content. In addition, Charmaz (2006) indicated that the interview process would impact GT's data collection. Thus, general interviewing principles and techniques were employed to ensure the collection of pertinent and rich data. Interviews must begin with general questions to make the interviewees feel comfortable so that rapport can be built between the interviewer and the participants. With my personality and experience as a nursing lecturer, I believe my communication skills could make people relax and more open in sharing their experiences. Such skills served me well in this research context. Even though the interview guide was prepared before the interviews, it was used flexibly, allowing me to explore the phenomenon as they emerged.

Moreover, all interviews with the participants were conducted in their mother tongue, thus making them more comfortable and relaxed when interacting with me. Due to the participants' heavy workloads and unpredictable nature, interviews were scheduled after individuals had finished their shifts. Participants were allowed to schedule the interview dates and venues at their convenience.

CHAPTER 6: FINDINGS

6.1 Introduction

This chapter shows the analysis of the study findings. I drew on my fieldnotes, the interview transcripts, and literature review to analyse how the ICU nurses perceived the impact of technology on nursing care in the ICU. I contextualised the findings with a particular fieldnote and interview excerpt that served to illustrate the data and exemplify the overarching codes. This was done to draw the readers into the nurses' perception of how technology impacts nursing care and the practise of the nurses in the ICU. In Section 6.2, I discuss the codes related to the impact of technology on safe nursing practise. In Section 6.3, I discuss the codes of recursive interaction that illustrated the impact of technology on social interaction in the ICU. The code of construction of professional identity is discussed in Section 6.4 whereby the impact of technology on the roles and practise of ICU nurses shared within the group members of nursing is outlined. This is followed by a discussion on the code of the perceived meaning of holistic caring that highlighted how the nurses described caring within a highly technological environment.

The quotations from the participants are used throughout this chapter and the following chapters to elucidate their experience of working with technology in the ICU and to provide context to their statements. Some of the quotations have been edited to include only the relevant texts that supported the associated discussion. Texts omitted from the participant's original account were marked with triple dot ellipsis (…). Additionally, I used pseudonyms for every participant for anonymity purposes. The pseudonyms were inserted

after each quotation along with the post basic qualification of the nurses. For example, nurses with post basic qualification in ICU were coded as PBRN and nurses without ICU post basic were coded as WPBRN (i.e., Sharon, PBRN). This was to demonstrate the links between the nurses' level of proficiency and their perceptions of technology in the ICU. To present the rich descriptions of the participants' experiences, I included excerpts from my field notes in a few segments to provide the situational realities of the nurses' experiences. The excerpts were labelled according to the participant's code and the date of the fieldwork (i.e., S1P1, 9th September 2014).

In the discussion, "technologies" mentioned by the participants ranged from relatively simple medical equipment such as "tubing" and "syringes" to highly complex devices such as "barcode laboratory systems" and "electronic patient records". These technologies were grouped based on their sub-functions in to accomplishing the objectives of nursing care as reported by the participants. The technological sub-functions in the ICU from the perspective of the participants included 1) safe practise, 2) integration of care, and 3) provision of physical support.

6.2 Using technologies to provide safe practise

As mentioned in the previous paragraph, the participants reported that one of the main functions of technology was as a means to provide safe practise in the ICU. A prominent example of this was the reliance on a mechanical ventilator to ensure the patient received the appropriate treatment. As Sharon indicated:

> *"We are highly dependent on technology like ventilators and monitors because we need them to provide intensive care." [Sharon, PBRN]*

Another excerpt that best reflected the idea that technology could provide safe practise was via the elimination of preventable harm and promotion of better patient outcomes:

> *"In normal wards, we still have to do bagging instead of putting patients on ventilators! Patients would not be well-oxygenated with bagging. In the ICU we can connect with the new technology, so we can make it easy for patients, we can reduce the possibility of infections, so I think it's good to have the latest technology around." [Shona, PBRN]*

Fries (2001) suggested that system and patient safety factors should be incorporated into the design of life-saving technology to eliminate or minimise the potential for human error during the operation and maintenance of routine, non-routine, or emergency situations. This would help reduce the risk of causing unnecessary harm to an acceptable specified limit.

6.2.1 Utilising tacit knowledge

In response to the function of technology in providing safe practise, the participants also mentioned the important elements of life-saving technology used to complement patient safety. For instance, the provision of an audible alarm was necessary to trigger an alert to initiate the relevant interventions. In that matter, participants indicated that technology could "bring a sense of alertness":

Nevertheless, nurses viewed this "sense of alertness" from various angles. For newly graduated nurses, a sense of alertness might warrant a "cautious approach" towards technology. For example, one newly graduate nurse explained:

> *It was like when the alarm went off, I thought something had gone wrong "is there something wrong with the patient?" I also wondered, "Eh, might it be because the patient did not get enough oxygen or what?" So, I called the seniors to come and check what (was going on*). (Amira, WPBRN)

In contrast, experienced nurses tended to take a precautionary approach towards the sense of alertness. For example, Anne described a precautionary approach to setting the ventilator to a more sensitive level to trigger the proper response.

> *"Ah, it is all done by nurses here of course, because we set them up like if we want a patient's BP like this we will set up like this, so when the BP is high the alarm will be triggered automatically and we will know. For other machines, we will know if the patient needs oxygen or if saturation drops, for example. So, staying alert to sounds is extremely important here in the ICU." (Anne, PBRN)*

Anne's statement directly explained how technology capability can be dictated with different intentions. In Anne's statement, technology such as built-in alarm systems was designed to "informate" work (Orlikowski, 1992, p. 401), or in other words, to increase the nurse's capacity on patient assessment. This contributed to the sense that patient safety can be optimised on the condition that the nurses must input the knowledge into the technology. For example, in Anne's statement, she explained how the nurses could set the alarm trigger limit so that any abnormalities in the patient's conditions would be detected by the machine and then activating the alarm sounds to attract the nurse's attention. Consistent with Herschbach, With, and Design (1992), technology knowledge arises from and is embedded in human activity.

For patient safety to be achieved, it needs two-way communication and mutual feedback between the nurse and the technology. It also shows that the knowledge embedded within the machine can in turn facilitate an unplanned but effective set of actions by the nurse (Rowley and Waring, 2011). Hence, it is crucial to consider human proficiency when designing any life-saving devices to enable nurses to adopt a more vigilant approach to patient safety. Concomitantly, nurses' perception, cognition, and judgement must be reasonable to ensure that the operation of the technology is as intuitive, effective, and safe as possible (Fries, 2001). Nevertheless, many nurses presume that the technology is designed to embody the appropriate indications of patient's conditions, thus causing them to over-depend on technology. The interactions of ICU nurses with the equipment they routinely use are governed by their beliefs about that equipment (Browne and Cook, 2011). Bailey and Scerbo (2007) claimed that a person's vigilance may decline when he or she is relying too much on technology, especially those technologies with highly reliable systems. The following situation is exemplified during my fieldwork.

> Amira let out a sigh of exhaustion and looked draining when the patient's family kept asking her about the alarms coming from the continuous monitoring machine. When approached by me, Amira described the alarms as "mostly false alarms". For that reason, she ignored those alarms. Besides, she also muted them on few occasions during her shift.
>
> [Excerpt from field notes, S1P2, 21st September 2014].

Undeniably, the ICU nurses needed to deal with a lot of alarms and they were often inundated with nuisance alarms, sometimes more than they could handle effectively. (Whalen et al., 2014) explained about the simple burden of alarms, he labelled this situation

"clinical alarm fatigue syndrome" and claimed that it might desensitise caregivers to the ringing of alarms. When the alarms were more often false than true, the sense of urgency among the nursing staff' in responding to the alarms would be diminished. Based on the literature review and my interaction with the participants, this situation did not happen because the nurses wanted to be desensitised to the alarms. Instead, when the nurses set up the alarm limit on the machine, she transferred her explicit knowledge to the machine. As a result of the knowledge transfer, technology became a mode of thought and behaviour (Marx, 2016). The alarms functioned as an alert to the nurses to account for the meanings that were imputed to the technology. Thus, to understand the meaning of the sounds generated by technology, the nurses were required to utilise the tacit knowledge to evaluate which were the legitimate alarm sounds (Whitepaper, 2019). This tacit knowledge was the knowledge embodied in the nurses from their experiences, insights, heuristic procedures. It could be difficult to express and codify in a manner for the knowledge to be transferable (Kabir, 2012). Taking a quote from Amira as an example:

> *"Sometimes the monitors beep for no reason, nothing vital, for example, if SpO2 needs fixing. We, as nurses in the ICU, we are used to it. We know that it won't give a major impact to patients, like being unable to breathe or whatnot." (Amira, WPBRN)*

Echoing Amira's statement, the way most of the nurses responded to the alarm sounds showed that their experience and associated knowledge determined the way they utilised technology for nursing care. The condition in which technology engendered tacit knowledge among nurses was evident throughout the data in my field notes.

> In one situation, I was at the bedside of a patient who was connected to a continuous monitoring system. I noticed the cables connecting her chest to the machine had slipped loose. The monitor's alarm sounded repeatedly. Despite a high-pitched beep, it was not enough to attract the nurses' attention. In fact, more than five different alarm sounds (which were ignored by nurses) were heard from the same cubicle (there were four patients in that cubicle).
>
> *[Excerpt from field notes, S1P1, 15th September 2015]*

The above situation was common in the ICU and led me to ponder the fact that maybe technology was just limited to the transfer of explicit knowledge, or knowledge that could be quantified (Smith, 2001). As a result, the tacit knowledge might be relegated to the background and result in the mismanagement of knowledge (Johannessen, Olaisen, and Olsen, 2001). Hence, this opened up a theoretical question: How does the use of technology influence tacit knowledge and what impact does this have on the ability of nurses to maintain safe practise? In this study, what was evident from the data was that the nurses were able to maintain safe practise by observing cues and recognising patterns related to patients' status that required specific action or a high level of clinical performance (Burritt and Steckel, 2009). Below is an example from a junior nurse's experience:

> *"I asked quite a lot, a lot of questions about things that I didn't know. I also asked a lot of questions about machines; I got the answers from the seniors. It scares me in case I accidentally I push the incorrect buttons. Like ventilators here, they are of different types, when I first got in the ICU, I didn't know what and why were those machines beeping, I was afraid to push any button and change any setting, right?*

After a while, I finally understood what and why those devices were beeping..." (Amira, WPBRN)

The transference of intangible tacit information into the machine is more challenging than the transfer of tangible explicit knowledge.(Smith, 2001). What I observed was that the assessment of the same patient by an experienced nurse and less experienced nurse initiated different responses in which the experienced nurse would immediately detect changes in patient conditions and underlying issues. Due to different levels of competency, some nurses believed that novice nurses should always ask the senior nurse before performing any clinical procedures in order to ensure safety. One of the participants emphasised:

"Okay, some incidents happen when the juniors don't ask the seniors. For example, they don't ask what medications they should give to patients when instructed by doctors, okay, doing things as a student and doing things as a staff nurse in the ICU like dilution or giving medications is different. So, they risk patients' health if they don't ask. When we were students, we were learning about things and the environment was different! Okay? Some junior staff nurses don't even know the protocols in the ICU." [Shona, PBRN]

Rowley and Waring (2011) described this approach as appreciative inquiry, which means the art and practise of asking questions that can strengthen a person's capacity to apprehend, anticipate, and heighten the potential positive aspects of technology. Shostek (2007) claimed that the absence of this culture can result in a situation whereby individuals who are expected to implement ICU safety initiatives do not know how best to work together or how to communicate most effectively among themselves.

6.2.2 Feeling safe

When a patient is admitted to the ICU, their safety is the prime concern of nurses. With the altered physical conditions, the patients will experience haemodynamic instability once the critical bodily functions start to shut down. The signs of deterioration may be detected through observation of the patient's vital signs such as respiratory rate, heart rate, blood pressure, and temperature. These vital signs will gradually become more abnormal with the progression of deterioration. An effective nursing observation of patients is, therefore, crucial to ensure patient safety and outcomes, especially since this represents the first step in identifying signs that are of clinical concern:

> *"We need to observe patients with our eyes and ears. But then, we can also depend on technologies. Since I started using them, they (technologies) can reflect the patient's conditions. They are compatible with patients with a variety of* conditions." [Amira, WPBRN]

However, over-dependence on monitoring technologies could lead to the failure of the nurses in detecting the clinical deterioration signs, thus causing unintentional harm to patients (Atkinson, 2013). However, Amira contested this by stating that:

> *"Most of the time the lead was accidentally taken out, thus the readings appeared to be inaccurate. So, in order to verify the readings, we have to check the patients. Even when there is abnormal reading on the monitor screen, we still have to check the patient." [Amira, WPBRN]*

When using technology for nursing care in ICU, maintaining the necessary level of safety requires a circumstantial intervention in which both explicit and tacit knowledge plays an important role (Johannessen et al., 2001). Otherwise, it may pose risks to patient safety:

> *"There was a time when a nurse kept muting the ventilator alarms and in another circumstance, the night nurse set the alarm triggers to the lowest possible level to prevent it from sounding. In the morning, the ABG showed a decline in patients' oxygenation status and both patients deteriorated. These incidents were committed by younger nurses!" [Azima, PBRN]*

It seemed that Azima expressed the inappropriate utilisation of the mental model that led to the misconceptions and errors in interpreting a patient's condition (Stanton, Chamber, and Piggott, 2001). She surmised that the inadequate level of experience played a part in leading to the misconception.

6.2.2.1 Feeling in control

Another theme that emerged from participants' accounts that was related to the practicality of technology in the context of patient safety was "feeling in control". As Maria indicated:

> *"We usually detect abnormalities of the patient's condition from the monitor. A monitor is much more important (laughs). We have a look at the monitor then only check the patients physically." [Maria, PBRN]*

Maria and several participants mentioned that the availability of technology and machines in the ICU could make the nurses felt like they were in control. This was because the

machines enabled the nurses to be aware of what was happening with the bodily functions of the patients. Hence, a nurse would feel more in control because she or he knew what was going on with the patient. Stayt et al. (2015) was looking from a positivist view of technology on exploring the nurse-technology-patient relationship suggests a relationship between technology and the human body in which the application of a certain technology will produce measurable physiological effects towards patients. Within the positivist paradigm, he addressed that the way nurses behave toward technology seemed to explain that they viewed technology as an external phenomenon that is separate from the patient's body, at the same time it is viewed as a representation of the patient through the screen.

Therefore, he addressed technology as an objective entity that is detached from the social context within which they occur. This is similar with what was mentioned by Dean (1998) about the technological objectification when he reviewed Foucault's (1998) insight on the aspect of power contributed by technologies. With regard to that, Foucault (1988) pointed out that technologies of power, which influence the actions of people and force them to conform to predetermined goals or dominance structures. This objectification is manifested by the increasing deviation to an image-based reality. In technological objectification, the patient is not seen as a corporeal person in the bed, but rather the hyperreal representation of that patient on the screen (Barnard and Sandelowski, 2001). Foucault's idea complemented the positivist view of technology which suggested that the main aim of technology revolves around the intervention and manipulation of the functions of the body. This seems alluring to many as technology can facilitate their action or decision and ultimately bring the pleasure of control (Rettberg, 2014).

"... I use the machines to give benefits to the patients in terms of treating them. So what we detect is beneficial for the patients. Based on the detection, we will try to trace abnormalities to inform doctors. Detection and treatment become efficient… for example, the ECG monitor. It provides me with visual indicators. So it helps me to detect any changes of the rhythm, whether a patient has VT, AF, or SVT. So it steers me in my decision making. I will tell the doctors and the doctor will attend and give immediate treatments. So indirectly, technology helps patients." [Anne, WPBRN]

As technology can be manipulated and adjusted, some participants described that they had more control over the patient's needs. The following excerpt shows an example of the situation in which technology gave autonomy to the nurses in carrying out nursing care without interferences:

"I think what I like is only ventilators ((laughs). If patients are not on ventilators, it's hard for me to handle because they tend to be restless and whatnot. It does affect my mood negatively at times. Patients who are on ventilators tend to keep quiet ((laughs)). They make it easier for me to do my work. Conscious patients don't even want to be bathed. It's difficult for me. They don't want to be disturbed." [Diana, PBRN]

The acknowledgement that technology helps nurses to be in control of the situation is very apparent in the above statement. In addition, the complexity of the patient's condition in the ICU made the nurses to be more appreciative of the technology as it allowed the nurses to provide more proactive care to patients. Take Izat for example:

"For an unconscious patient, we look at his vital signs. We check his breathing, oxygen, we check the machines, we check if the ventilator setting is okay or not, then we review his results. If his results are not okay, like his haemoglobin is low, we check if there are symptoms, such as blood in his excrement. We have to look at all that to make decisions on what to do. If he is unstable, his BP would drop, his BP would drop if he is experiencing bleeding. If his BP is dropping, we would inform the doctor and decide whether to run fluids at the first instance or give medications straight away. We evaluate based on the monitor we attach to the patient.". [Izat, PBRN]

Izat illustrated that the goal of nursing care was to save the patient's life and nurses utilised technology as a means to achieve this goal. Hence, technology is associated with decision-making skills that involve knowledge to decipher the data. The role of technology in decision-making as discussed here resemble what Timmermans and Almeling (2009) indicated the tendency of nurses towards viewing patient as parts of organs, fluids, and bodily states whereby the body becomes an object of vigilance and control, which prompted them to do surveillance rather than caring. The vigilance towards technology was also evident throughout my data which seemed to me that it has been incorporated as a natural phenomenon in the practise of nursing care in the ICU. In the previous section, participants perceived the alarms and warning lights from the monitor, along with the relevant characteristics of technology as important elements in the care of critically ill patients as they could initiate awareness in the critical clinical situation. Endsley (2013) called this as situational awareness. He defined situational awareness from the context of individual's ability to perceive the attributes of technology and the dynamics of technological elements within the care environment. He also suggested that to support the needs of this situational

awareness, the information display on the technology needs to be able to convey clinical information of the patients. Undoubtedly, this aspect of technology that most of the participants embraced as they could get an indication of what was actually going on with the patients. Sharon explained this in detail:

> *"One of the benefits is that it makes nursing care easier. Like ventilators, they do not only provide support for patients but are also equipped with monitor. When the ventilator alarm beeps, it means that you need to go and check the mode, pressure support, and tidal volume, whether it is enough or not. In terms of infusion pumps, they help us to give medications to patients with inotropes. They make our jobs easier, and there is an indicator of how much medication is left and how much the medication is infused per shift, per hour or per day. If the infusion alarm beeps, it will alert us to check the tube whether it is blocked, or the medications are nearly finished." [Sharon, PBRN]*

Sharon described how technology helped to form a holistic picture of the patient's situation and assisted the nurse to make clinical judgement of the situation. For example, upon hearing the alarms that indicate a potential problem in a patient's condition, the nurse must quickly determine the severity of the problem in terms of the immediate nursing action needed and the worthiness of the attention and combine this with their underlying knowledge in the form of a mental model. Sharon's statement emphasised the priority of safety in the utilisation of technology by stating the need to interpret not just the visible parts of the technology, but also to comprehend what goes on behind the data. This is parallel to what Delaney (2010) indicated as a 'mental model' when he discussed how the anaesthetists comprehended technology. The mental models based on Sharon's statement represented what was true at

the expense of what was false. This is the type of generalisation made when individuals interact with technology to enable them to make sense of these interactions (Dankenbring, 2014).

Therefore, the mental model serves as an illustration of the phenomenon to allow people to generate inferences and predictions about it (Dankenbring, 2014; Franco and Colinvaux, 2000; Greca and Moreira, 2000). For example, one newly graduated nurse explained:

> *"It was like when the alarm went off, I thought something had gone wrong. "Is there something wrong with the patient?" I also wondered, "Eh, might be because the patient did not get enough oxygen or whatnot?" So, I called the seniors to come and check what (was going on*)." *[Amira, WPBRN]*

Individuals will either use knowledge of other similar devices that they have encountered before to construct mental models when first interacting with new objects (Wright and Fallacaro, 2011). Alternatively, they will also construct mental models by observing others doing so. This is the indication of how situational awareness can be augmented within the ICU nurses.

6.2.3 The perceived meaning of holistic caring

According to the participants, caring was fundamental in nursing and represents one of the core values of nursing regardless of the practise settings. Interestingly that participants used the term holistic care many times during the interview sessions, especially when describing the ideal concept of caring. I found this phenomenon to be thought-provoking. I

kept hearing about it during the interviews. When I listened to the participants' accounts, I realised that the term "holistic" was often mentioned, thus it made me think about what it meant to be "holistic". From the analysis of the data, it seemed that participants defined "holistic" as "addressing patients from head to toe". Such a point of view suggested that the ideal caring from the perspective of nurses merely concerned with the patients' physical body.

During the interviews, technology was associated with many of the participants' descriptions of nursing care. Hence, this could explain why the definition of holistic care in this study was distinct from the general definition of holistic care. Holistic nursing is defined by the American Holistic Nurses Association as the healing process provide by the nurse so that so that the individual become complete (American Holistic Nurses Association, 1998). This idea of caring extends to the entire person including their physical, mental, emotional, and spiritual beings, not just their physical body (Tjale and Bruce, 2007). Based on the context of the participants' definition of holistic, technology was inextricably interwoven with that of 'the whole-person'. Participants often portrayed the patient as a person attached to the machines and intravenous lines and the patient care was visibly related to the technologies that they were attached to. Quotations such as "the ventilator would support the patient's respiratory system" and "the intravenous lines would provide nutrition and medication" in the participants' description of nursing care implied that the technologies surrounding the patient's physical body have evolved into the principle of holistic care. In a similar context, participants also frequently mentioned about interventions such as "use of inotropes" or "transfusion" because the criteria for these interventions often relied on common physiological data including heart rate, blood pressure, oxygen saturation, and laboratory values. In addition, these data might vary according to the individuals' age,

physiological reserve, and baseline health status. All these data were relevant to everyone involved in the care of patients, especially the nurses, as they can predict the patient's progress and outcomes. However, specialised skills were necessary to decipher these data that were the direct products of technology use in the ICU.

Conversely, the intensity of technology use in the ICU could also make the family members anxious about the prognosis of the patients. Hence, some participants commented on the increasing pressure for them to repeatedly measure and assess the patient's prognosis and care outcome because of the data that appeared on the monitor screen. Hence, the notion of holistic was of something esoteric when used by the participants as it was defined under an umbrella term over all forms of care that they intended to do. In addition, the nurses also perceived altruism and closeness as the main aspects of the incorporation of human elements within technological care. These criteria were determined to be the fundamental components of providing care in the field of nursing. In the absence of the human factor, registered nurses would not be engaging in the practise of professional nursing but rather performing the duties of technologists or skilled workers within the context of the predominating domain of medical science. (Watson, 2007). Based on my experience as an ICU nurse, technology in the ICU is responsible for the improved survival of critically ill patients and it has become a symbol and characteristic of the ICU as a specialised unit. To me, technology is essential in the practise of ICU nurses. An ICU nurse must embrace and adapt to technology in view of the relevance and influence of technology in caring for patients. Moreover, technological-driven care is essentially a symbol of contemporary nursing. Having said that, even though the practise in the ICU is a mixture of caring and technological activities, I still regard caring as an important element in nursing care. Furthermore, the caring activities in the ICU encompass much more than attending to the physical and emotional needs of the patients.

On top of all that, a nurse also needs to care of the machinery involved in the provision of critical case. All these duties have become part and parcel of their daily routine as a critical care nurse in the ICU.

The major concern voiced out by the participants with regard to the high technological environment in ICU was the fact that they could never predict with absolute certainty what might happen under different clinical scenarios. The feeling of uncertainty was underlined by the fact that the study site had yet to complete the implementation of fully integrated technology. The participants declared that caring was always at their hearts and that their intentions were to provide holistic care to patients. However, some of the obstacles they faced in respect to unexpected situations in the ICU sometimes led them to perform certain nursing actions that deviated from their intentions. As a result, they felt dissatisfied or even guilty. It is worth to insert a note from my observation on Amira during the day when the system shut down. The field note would provide a better understanding of her abovementioned statement.

> I observed Amira who was taking care of a patient. I noticed that she was becoming disorganised and a few times, she was seen disregarding the alarm sounds. This was not the normal caring behaviour that I observed in her before. From my previous fieldwork, I observed Amira taking care of two patients simultaneously during her shift. She seemed attentive, calm, and composed and was seen communicating with the patient's family a few times during her shift. Today she looked discontented. During the visiting hours, a patient's family gazed at Amira from the bedside and waved his hand as if he wanted to ask for help, but Amira did not notice it. Eventually, another nurse who was taking care of another two patients at the same

cubicle attended to him. Her presence alerted Amira and Amira was heard saying to her "Sorry, I was not aware that he called me for help." In several circumstances, Amira complained to me about the system failure that occurred without warning. During the interview session, she said "I wanted to do a good job" before she added, "Sometimes I ended my shifts in tears because I couldn't provide the care that I wanted to."

[Excerpt from fieldwork, 8th January 2015]

What could be seen here was the way Amira performed her role during unexpected situations did not reflect her true practise or caring intention. Arguably, technological failure and shortage of nursing staff were identified by participants as the main obstacles in forming a holistic relationship with the patients and families. These two obstacles were evident during my fieldwork observations.

However, I became aware that when facing those obstacles, some of the ICU nurses would become more aware of the need to form a caring relationship with the patients. On that account, nurses tended to focus on the caring aspect that they should prioritised based on the primary responsibility of a nurse. Furthermore, during my fieldwork observations, when facing the abovementioned situations, many of the participants confided their guilt for not being able to give due attention to patients and families.

"I am incredibly exhausted working in this kind of situation, so mentally and physically exhausted. Some days, I think of everything I did that day and I feel like, 'I could've done this for this patient if I'd just had the time to get to it.' And I have

to convince myself that I did my best to prioritise the most important things for each patient because I couldn't get to everybody" [Shida, PBRN]

As explained by Watson (2007) in order for caring to be holistic, there should be little disparity between what a nurse intended to do and the actions she took as a result. Any meaning ascribed to the action itself should derive from the intention rather than a mediating circumstance. After reading through several participants' narratives on this issue, it was clear that caring by nurses was being facilitated through both caring behaviours and technological care. The first aspect of holistic care that emerged from the participants' account was that they perceived caring as an intentional act. The following section gives an in-depth description of some of the aspects of intention to care in the context of this study.

> I interviewed Janet, a novice nurse in the ICU. She perceived the goal of her caring action was as both self- and patient-focused because she treated her patients as if she was their parents and that she needed to meet their physical needs and keep them safe. As she developed more technical competence after she gained more professional experience, she felt that her caring actions were more patient-focused now. She tried to consider all aspects of her patient, including their psychological and spiritual needs. She also tried to anticipate her patient's needs and to reassure the patient's family that she would be there for the patient so that the family would feel safe. She provided this reassurance by performing both scheduled and unscheduled checks on the patient's vital signs during her work shift and evaluating her nursing care as necessary.
>
> *[Excerpt from fieldwork, 24th November 2014]*

The caring behaviour illustrated in the above quotation could explain that caring was generated by the nurses' intention to care. Traditionally, the term intentional action referred to any action that was intended and it implied a connection between the action and the intention to act (Watson, 2002b). Therefore, a nurse's intention to care would then generate his or her behaviour of caring. Subsequently, the theme "altruism" emerged at the start of the data analysis because the participants mentioned frequently about "helping the patients" and "doing things for the sake of patients". The key point in the participants' explanation about this aspect showed that what mattered was not how long they spent interacting with a patient, but rather how they used the time they had with patients:

> *"Caring means we know our roles as nurses. As widely known, nurses' roles are treating patients. Other than that, we have to what you call that, love our patients like our family members. We take care of them from head to toe. We give medication to them, we do sponge for them, we do positioning for them, and we care for them. That means we do the caring activity." [Ruby, PBRN]*

While listening to participants, I became aware that it was incumbent on nurses to concentrate on whatever aspects as long as they were for the patient's sake. As mentioned by Watson (2007), caring could be manifested in the form of intentional actions. It was not merely an increased expression of that caring activity, but rather a direct and intentional process in which specific therapeutics were performed to show the caring activities by the nurse. The intentional actions in this study included nursing therapeutics such as physical care modalities and technological care that reflected how care could be given through relationships based on help and empathy. When discussing the anthology of caring, (Chinn, 1991) described that this intentional action could be acquired through education and

professional practise. Furthermore, the action can stimulate and assist the nurses to initiate professional caring.

According to the participants, patients admitted to the ICU needed intense support to control their body functions because they were in a very vulnerable state of health. The statement of "patient cannot breathe on her or his own effort" that was emphasised by many participants could well reflect the main goal of care in the ICU. When elaborating on this, the participants emphasised that technology could assist the nurses to provide care befitting those who could not care for themselves. When participants indicated that they were more concerned about improving patient's survival and limiting the progress of the illness, they would also mention about the meticulous attention given to life-sustaining strategies such as mechanical ventilation, administration of inotropic or vasoactive medications, blood transfusions, and dialysis. All these therapies required utilisation of technological tools. Hence, this circumstance contributed to what the participants defined as altruism. Holistic caring became more conspicuous when both intentional and altruistic caring elements were tied together. By combining both elements in the provision of care, it could serve as an ethical philosophical foundation in the dimension of caring for the relevant parties (Watson, 2007).

The use of technological tools requires close observation and monitoring. Therefore, this came across as one aspect of the human dimension of caring that was illustrated by the participants. In this regard, technology appeared to contribute to the ways of knowing the patients as explained in clearer details below. When asked to describe their technological activities in the ICU, endotracheal intubation was mentioned by the most participants. Most participants regarded it as one of the important elements in extending the domain of nursing

care from basic to complex. This could be because endotracheal intubation must be operated under multiple medical technologies depending on the condition and the life-support needs of the patient. For example, an intubated patient must be attached to the ventilation machine, pulse oximeter, telemetry, intravenous infuser, etc. Thus, the presence of abundant technologies contributed to the complex care environment:

> *"If we look at the basics of nursing care, general care, they are the same right? Like the techniques of turning patients, preventing bedsore, providing mouth toilet care, and preventing oral thrush." [Anne]*

The statement above fits into the concept of "knowing" in Locsin's (2005) theory of technological competency as an impression of caring. This underscored the practise of using nursing technologies for the purpose of knowing persons. It also redefined nursing as the continuous knowing of persons through the competent use of technology. In nursing, the term "knowing" refers to a specific kind of personal knowledge that is constructed on the basis of the individual's interaction with the interface between their objective knowledge and the subjective perspective of their own personal experience (Bonis, 2009). Therefore, knowing is a dynamic process perpetuated by personal reflection and awareness that happens as the nurses interact with technology (Bonis, 2009). Eventually, it will contribute to the nurses' understanding of the patient. In short, the ultimate demonstration of intentional and authentic nursing care requires nurses to be competent with technology.

In explicating the ways of knowing from Locsin's perspective, Anne seemed to place endotracheal intubation as the centre of nursing care. When Anne regarded endotracheal tubes as a way of knowing, her attention was focused on technological skills and competency. In order to deliver safe practise, Anne might need to restrict the definition of

person to "patient with endotracheal tube" and the definition of wellbeing to "avoidance of complications." In this perspective, the concept of knowing was grounded in the knowledge of technology, related techniques, and the fact that the presence of endotracheal tube oriented the activity of caring to be more vigilant. This standpoint was also reflected in the prevention of complications, one of the main ICU outcome measures. With vigilance in mind, the participants recognised that the competent use of technology was an integral part of the safe caring of patients in the ICU. In other words, the high dependence on technology showcased a significant distinction between the nursing practise in ICU and other clinical settings.

> *"For an unconscious patient, we look at his vital signs. We check his breathing, oxygen, we check the machines, and we check if the ventilator setting is okay or not. Then, we review his results. If his results are not okay, for example, if his haemoglobin is low, we check if there are symptoms such as blood in his excrement. We have to look at all that to make decisions on what to do. If he was unstable, his blood pressure would drop; his blood pressure would drop if he was experiencing bleeding. If blood pressure dropped, we would inform and decide whether to run fluid in the first instance or give medications straight away. We evaluate based on the monitor attached to the patient." (Izat, PBRN,)*

Izat's statement demonstrated what 'knowing person' meant, in which she ought to know the issues that mattered most to the patients that she must respond to first. This could also be a way for her to know the patient fully as a person. Thus, 'knowing person' in this way

provided the opportunity for the nurses to selectively deliver the care believed to be most meaningful, beneficial, and important (Barnard and Locsin, 2007).

In the process of seeking to appreciate the patient as a whole person, sometimes only a limited insight was gained based only on the technological parts of care. This issue was highlighted by participants in this study. In the appreciation of whole persons, previous studies also described the way of 'knowing a person' as reflective of 'pieces' and whole as reflective of moments (Barnard and Locsin, 2007; Schultz and Cobb-Stevens, 2004). The understanding was that a 'whole' cannot exist without its part. This served as a constant reminder that technology must be treated as an integral part of the understanding of persons 'at the particular moment'(Barnard & Locsin, 2007) As illustrated by one participant, technologies in the ICU is of value for patients, especially in assisting the patients who unable to perform normally.

> "*human beings who need help because they can't function normally due to their illnesses*" [Fuad, WPBRN]

Fuad's idea emphasised that "wholeness" can be appreciated as a momentary condition. Due to the illness, patients are seen as incomplete at that moment. That said, technology assisting the patient to be complete at the moment. Nevertheless, the concept of wholeness may lie in the nature of technology. From the data, it came across that the participants valued medical technology in ICU for its function in saving the patient's life. This could be the substantive evidence of technological 'can-do' taking over certain decisions. In relation to this, Shona commented:

> *"Patients in the ICU can't speak because of the tube, so technology is of much help for us to detect vital signs such as hypotension, palpitation. Patients can't speak!*

Technology helps us to understand patients' conditions. The same thing goes for patients who are fully sedated, we look at machines to treat them." [Shona, PBRN]

The statement regarding the benefit of technology brought up by participants explained how technologies were used to inform decision-making and how this benefit stood out as important for them. When discussing this, the nuances in their care routines were highlighted. For example, during activities such as bed bath, the participants could delegate the responsibility of assessing patients to technology, thus giving technology a secondary role.

"The monitor is helpful in the sense that it provides information on the patient's condition. For example, when you are turning him, there may be problems that go unnoticed. The proximity will minimise that, but you need to keep your eyes to see whether the patient is okay." [Hariz, PBRN]

Hariz's statement could fuel the debate of technological determinism across the spectrum between those who viewed technology as objectifying the nurse-patient relationship (Donchin and Seagull, 2002) and those who believed that machines could help the subjective inter-relations between nurses and their charges (Barnard, 2002; Verhulst, 2008). Either way, in any contact with patients that required technological care, the devices would be turned into a natural part of nursing care as the nurses would be expected to deal with the technical modalities frequently (Rafael Celestino da Silva et al., 2015). However, if nurses delegated certain elements of caring to technology, then caring for the patient would become part of, rather than the central theme of this equation. It was evident throughout the study that the use of electronic medical records had taken away direct observation and face-to-face interaction, thus making it harder for the nurses to establish closeness with patients. This

was despite the fact the participants perceived that they knew the patients very well. The reason why they felt this way could be because they knew the patients from the data from the electronic monitor screen and laboratory findings:

The high reliance on technology created a further gap in the relationship between nurses and patients. Similarly, several participants stated that some ICU nurses lacked patient-connectedness. According to several participants, technology provided them with a new option in which they did not have to leave the nurse's station to check the patient's status. For example, a nurse can just assess the patient on the computer screen. Once the nurses felt more familiar and comfortable with the technology, their reliance on technology became higher and this, in turn, reduced the control they had over their work.

However, several participants disagreed with this statement. For them, technology should not be used as an excuse to explain the lack of compassion and caring behaviour. They opined that one of the benefits from the use of these technologies was the reduction of time needed for nurses to deliver nursing care. In turn, this should enable the nurses to spend more quality time with the patients. Based on my experience, caring for one patient per shift could increase the level of attentiveness towards the patient. At the same time, I realised that the more technologies were attached to the patient, the more my focus was directed more towards technologies. In a way, I became an observer of the technology, rather than the patient. For example, patients who required breathing support would be ventilated and silenced. This somehow removed my important sense of listening and my duty was reduced to physical care and data review from the machines and laboratory results. These care activities would never provide me with the same level of information as listening to a patient's story and feeling compassionate about the story. Perhaps that was why I became

so comfortable with working in the ICU. I had learned not to listen and instead preferred a silenced patient who would not distract me at work. Standing by the patient's bed during this study, the ICU seemed like a foreign place and almost an obstacle to performing caring activities. Technology seemed to be taking away the remaining closeness that was possible in the ICU. Intravenous infusions had been replaced by electronic machines that could control every drop of fluid and medication that entered the patient's veins. The system of smart beds was able to continuously report the body weight and caloric requirement of the patient. The monitors that could only reveal cardiac rhythm before were now capable of reporting vital signs, producing electrocardiograms, and even measuring the oxygen in the bloodstream all at once. Furthermore, the ventilator had become more of a computer that could calculate various respiratory parameters at the push of a button compared to the simple breathing machine that was used during my nursing practise. With all this advanced technology, nurses could be more efficient in providing proper and accurate care. However, technology could not provide human touch or a knowing presence as commented by Shona:

> *"There is no or less personal touch because we have the technology and it does all that. So maybe our personal touch will be less because our relationship with patients would be replaced by technology." [Shona, PBRN]*

Fridh, Forsberg, and Bergbom (2009) conducted a study about caring for dying patients in the ICU. They found that the time gained from not having to perform medical tasks that were taken over by technology had enabled nurses to better concentrate on caring for the patients. The only time that nurses did not have to perform medical technical tasks was when a decision had been made to stop life-sustaining treatment on a patient is dying in the ICU. A similar concern was highlighted by Jarrar, Rahman, and Shamsudin (2015) in which the

degree of patient-connectedness in Malaysian hospitals was found to be decreasing since the introduction of Total Hospital Information System (THIS) in 2009. The implementation process of THIS still required improvisation in terms of the technology hardware and the adoption by the workforce. A recent review showed that the uptake of technology was still not very promising among Malaysian healthcare workers (Lee et al., 2012). Under certain circumstances when nurses must improvise their level of technology adoption, it could affect their caring behaviour. In this study, the participants generally acknowledged that nurses were expected to be caring, compassionate, and communicative. However, from the participants' descriptions of caring in this context, communication with patients in the ICU was described as contingent to the patients' neurologic status and trustworthiness. The participants often described how they felt challenged to establish an interpersonal relationship with the patient because of the heavy reliance of technology in the ICU that was focused on saving patients' life. As a result, the participants felt that they must prioritise the care involving life-sustaining technology. Nevertheless, it did not mean that they disregarded the element of communication in caring, perhaps they just communicated with patients and families when necessary, rather than based on the natural tendency. That being said, there was no compassionate element in the communicative aspect. Anne explained this:

> *"Patients who came here are usually unconscious, so we rarely need to talk about the technology around them, except when we want to touch them like when we want to do suction, we still have to tell them even if they are unconscious! It's like a custom, for example, we say something like "uncle, I want to inject you" automatically even if the patient is unconscious. We never talk about the machines or explain how to comply with the machines. What I mean is that we hardly tell them about technologies that we use on them. Usually, if they are conscious, we talk about*

their wellbeing and our plans to help them heal, something like "uncle, we want to do suction for you", we rarely discuss something like "uncle, today you need to use this monitor", we never talk about that, I mean with patients."[Anne, WPBRN]

Technology was viewed by participants as 'treatment interference' as it could contribute to positive and negative outcomes of the treatment. Several participants brought up the disastrous effects caused by the ineffectiveness of technological devices. For example, the unintentional removal of a life-sustaining technology such as ventilator tubing could have dire consequences. (Happ, 2000) indicated treatment interference as one of the variables that could affect caring behaviour. When listening to interviews, I realised that the participants often linked the management of technology with the management of unconscious patients as evidenced by phrases such as "it is easy to manage technology because patient is unconscious", "we are caring for unconscious patients", and "patients in the ICU are all unconscious". The fact is, not all patients in the ICU are unconscious. Thus, it made me think about the reasons why participants often associated caring in the ICU with caring for unconscious patients. In the context of treatment interference, several participants mentioned their responsibility in making sure the devices on patients were not dislodged. They claimed that it is harder to protect the devices in conscious patients compared to unconscious patients. Hence, they felt obliged to employ approaches that could safeguard technology. This was one of the reasons patients who required life-sustaining technologies were often sedated.

Therefore, it falls on the ICU nurses to ensure that life-sustaining devices such as mechanical ventilators would not be affected by other factors. Some of the participants would try to minimise interactions with the patients in the hope of not affecting the

effectiveness of the devices. From the participants' point of view, a realistic and practical caring environment was needed to ensure the safety of the patients connected to the technological devices.

In general, the concept of treatment interference was found to directly influence the professional caring behaviours of ICU nurses (Barnard and Locsin, 2007). Under this concept, maintaining and ensuring the effectiveness of the technological devices was one of the caring behaviours. Hence, as discussed in the previous chapter, the participants perceived that their inherent responsibility was to ensure the safety of the patients connected to the technology devices. When performing roles beyond the conventional scope of nursing practise, nurses must make sense of the caring situation so that they would not neglect traditional care.

More specifically, in the context of this study, the nurses must restructure their relationships with the relevant technological devices so that the practise can be appropriately performed within the context. It is plausible that new technologies may push the boundaries of a profession or practise to the point that it becomes difficult to tell whether one is still working within an established domain of practise or is practicing something different (Lanzara, 2016). This makes the encounter with technology in nursing care a complex event because the interaction between technology and the practise modality may be conceptually different from the fundamental ways of caring. Nevertheless, it is important to note that the difference is only a dimension of the practise and not the entire essence of it.

Very often, technology was quoted by the nurses as an obstacle for them to establish privacy in a caring environment. The participants felt that the physical environment of the ICU cast a major impact on their ability to establish a relationship with the patients and their family

members. For example, the greatest obstacle was the lack of private rooms. Based on the participants' responses, privacy was very important because the family members might feel uncomfortable with the intensive use of technology if patients were cared for in an open space setting. This exposure added an extra burden on the nurses because now they had to focus on the demands of the family on top of the wellbeing of patients:

> *"They are more interested to know what is on the monitor ((laughs)). If the monitor beeps, they would ask, "Nurse, why is this beeping? It's getting low, getting low!" They are interested in that! I have been here for so long, the visitors really pay attention to the monitor. They rarely sit close to the patients and monitor the patients' physical conditions. Not many of them would say, "Oh, he can get up today, he can open his eyes" or something else. If the monitor shows everything is okay ((laughs)), then only they will be close with the patients. They are not well-versed in terms of treatment in the ICU. It's different from the normal wards. There's no monitor in the wards so all they can pay attention to is the patients." [Sara, PBRN]*

With regard to this issue, nurses often had to make an effort to create privacy for the family. *"We can only cover with curtains. That's about it."* Sara added. In general, people are fascinated by the use of technology in patient care, be it in the ICU or general wards. In my experience, I have been asked several times by families if the use of technology such as ventilators and cardiac monitors meant that the patient was deteriorating. They felt anxious with the sounds of alarm and started asking if it indicated that the patient's life was in danger and if they should ask other relatives to come to visit the patient for the last time. Some would also ask how much longer the patient has and whether the patient would live until the end of the week. These questions arise because the use of technology often reflected the

uncertainties in life. While the questions were difficult, it was essential to answer them. The participants felt that it was something vital to make patients and families understand better about the technology that was used.

> *"We never prompt discussion and conversation about technology. Commonly we inform them something like "Ok, now you are in the ICU, you have a tube in your mouth and the machine will support your breathing." [uh hurm] That's it. We tell the family the same thing. "Now the machine will either take over his/her breathing function completely or just assist him/her in breathing." [Anne, PBRN]*

Anne's statement gave the impression that she was aware of the need to communicate with the families as they might have more to say or ask about the patient's condition. However, she felt that the value of technology was the primary aspect that she needed to highlight to the family members so that they would be more cooperative in the care of the patient. Another participant, Azima, suggested that she was reluctant to provide more information about technology because she felt that the patients would not understand:

> *"We feel like 'what would they say if we keep asking them questions', 'if only they understand what I'm talking about'." [Azima, PBRN]*

Azima's comment suggested to me that participants would sometimes deliberately withheld the information about technology from the patients. The participants would only reveal relevant information and not provide detailed information about the technology used in case it made it difficult for them to deliver care. Some of them opined that the patients would still see technology unfavourably even after their explanation. Thus, they felt that it was necessary to provide the information as brief as possible. From a different perspective, the participants also felt relieved when they could avoid dealing with queries from the patients

or families about technology. Otherwise, they felt that the queries arose from the scrutiny by the patients and families. In certain circumstances, when the patients viewed technology with apprehension, they were likely to view nurses in undesirable ways. This was evident in Rika's statement:

> *"When I attend and try to sort out what happened to the device, I get nasty looks from the patient's family and comments like "let's call the doctor". If it's a non-emergent situation, I feel like I shouldn't even be involved." [Rika, WPBRN]*

Amira, on the other hand, suggested that when working in a clinical situation where the likelihood of false alarms was high, the only realistic approach was to refrain from communicating with patients. In her situation, she had been desensitised to alarms. She knew that those alarms were not compromising patient safety as they were merely false alarms:

> *"Sometimes monitors beep for no reason. Nothing serious, for example, maybe just that SpO2 needs fixing. We, as nurses in the ICU, we are used to it. It won't give a major impact on patients like making them unable to breathe or what not…but their family members don't understand this. They keep asking "why is this beeping?" We just ignored them by avoiding to get close to them because we already know that the beeps were not important." [Amira, WPBRN]*

The meaning of false here was from the perspective of failing or not able to provide any valuable information about the patient. Nonetheless, Amira claimed that even though she knew that the false alarms were merely reflecting incorrect settings of the devices, she could not simply disable the alarms because it could potentially compromise the safety of the patient. Hence, she found that it was difficult to give relevant information to the families. Barsteiner and Disch (2012) indicated that a false alarm could lead to the cry wolf effect

whereby nurses might ignore or respond slowly to recurring alarms. Several participants acknowledged that there might sometimes be useful information from the false alarms. Therefore, some participants' greatest concerns on this issue centred on the aspects that could be detrimental to patient care, such as the inhibition of the sense of urgency especially among junior nurses.

In addition, another concern revolved around the management and maintenance of the devices. For the nurses, they felt that even if they were capable of managing technological devices, they might not be able to do it comprehensively because they did not have the authority to do that. As indicated by Anne:

> *"..that practise stemmed from a policy set by our authority. Nurses' role is to deliver nursing care and MAs are in charge of technology. I have no say in that matter because all hospitals practise that.*" [Anne, WPBRN]

In addition, some participants also mentioned that they were reluctant to give commitment due to fear of being held accountable if any unpleasant results occurred.

> *"We are not even good at using technology. It is usually medical assistant who will do all the troubleshooting…Yes we can handle them (pause) but because that is MAs job, so if we do, we are afraid of doing things wrong because they [the MAs] didn't train us." [Maria, PBRN]*

In general, there was a great reliance on medical assistant in anything related with the troubleshooting of technology. As a result, some of the participants felt weary and overwhelmed when they had to answer the same questions repeatedly. While the nurses might view technology as something dissociated from emotional expression, the opposite

could be said for the family members who had to see their loved ones connected to numerous technology devices at the bedside. As a result, the family members could only depend on the nurses to provide care and information. This view was supported by (Kean, 2007) who stated that the high level of uncertainty and an immediate need for information could be due to the onset of critical illness and often linked to the family's ability to cope with and manage uncertainty. Very often, the relatives were anxious and demanding for information and attention from the nurses because of their feeling of frustration and apprehension about the ill patient (Barnard and Locsin, 2007).

Sometimes, the ringing of alarms can create a contagious atmosphere, resulting in higher level of anxiety among patient and family (Fridh et al., 2009). In contrast, the common belief expressed by participants in this study was that 'technology is all in their mind' or 'the family member should just get over it'. Many studies have found that even though technology was seen as a natural element for nurses, it was frequently viewed as unnatural element from the perspectives of the patients and family members (Coyer, Wheeler, Wetzig, and Couchman, 2007; Fridh et al., 2009; Stayt et al., 2015). Technology anxiety is one of the elements that contributed to the needs of patients and families to acquire accurate information from nurses (Kongsuwan and Locsin, 2011). However, in many circumstances in this study, technology anxiety was side lined by the participants in the issues related to caring because they felt that the families should be able overcome the anxiety in the same way as the nurses. Such opinions led to a minimisation or disregard for the family (Chiang, 2011). Several participants recalled their experience when they could finally apprehend technology and eliminate the feeling of anxiety towards technology. Apparently, it took quite some time for them to come to that stage. Therefore, it was

impossible for them to make the patient and family obtain the same level of understanding in a short period of time.

Other participants mentioned about the level of scrutiny that nurses received from the public. In this context, technologies contributed to the situation where the performance of nurses was exposed to constant public scrutiny due to the "transparency" of the data displayed on the technological devices. Therefore, this could be among the factors why nurses tried to avoid close proximity with the patients and families. According to some participants, when technology was in the picture, the relationship between nurse-patient in the ICU could result in misunderstanding that were distressing for the nurses. Sharon claimed *"We have received complaints from relatives about the care we delivered here."* For nurses who cared for technology-dependent patient, the stress would originate from the need to handle various medical care procedure and equipment, as well as a lack of understanding from the patients and families with respect to their needs and constraints (Barnard and Locsin, 2007). *"As if we were not giving full attention to patients,"* Janet expressed. Such comments highlighted that people's misunderstanding of nurses' situation could result in detachment of nurse-client relationship. On the other hand, the environment of the ICU could also lead to the nurses disregarding family members in the delivery of care.

> *"From another angle, I think the environment here is rather good because there are not many visitors. We have a restricted number of visitors, so I think it is okay. When we do our work, we can do our work without interruptions from visitors." [Sara, PBRN]*

6.2.4 Nursing care practise

Nursing practise in the ICU is different to the general wards. In the ICU, the intensive use of technology cast a significant impact on nursing care. Many participants emphasised that technology was substantive, pervasive, and prevalent in the ICU. Patients in the ICU are commonly treated with many interventions, especially endotracheal intubation and invasive ventilation. Hence, technology has become one of the most important elements to focus on when organising nursing care. The orientation of nursing care to a focus on technology managed to enhance the safety aspects of patient care. The following excerpt best reflected the idea that technology could ensure safety practises:

> *In normal wards, we still have to do bagging instead of putting patients on a ventilator! Patients would not be well-oxygenated with bagging. In the ICU, we can connect with the new technology, so we can make it easy for patients, we can reduce the possibility of infections, so I think it's good to have the latest technology around. [Shona, PBRN]*

Care of patients in general wards is distinct from treatment of patients in the ICU. In the above excerpt, it was apparent that the patient represented the primary context of Shona's statement in comparing the characteristics of the ICU and the normal ward, especially in terms of increased use of technology. The severity of illness among ICU patients meant that technology had a pervasive role in preserving a patient's life (Stayt et al., 2015). This was the norm in the ICU and thus the implications from this study would extend beyond basic nursing care in the ICU. For instance, in the following excerpt, Fuad perceived that many

basic cares had become increasingly complex when the nurses needed to juggle with the technologies in addition to caring for the patient as a person:

> *…as you enter the ICU, you see all the machines and equipment, the monitors with the alarm sounds keep beeping, the data on the monitor is blinking. And you make reports about the patient you take care of that day; there are lists of care that involve technical tasks, for example, endotracheal suctioning. Sometimes you might even have some qualms about the tasks that you found unchallenging before this, such as positioning the patient. This is because when you want to position the patient in the ICU, you need to manipulate and adjust all the tubes and the ventilator alarms are often beeping. You need to make sure the endotracheal tube is in place. [Fuad, WPBRN]*

The account from Fuad revealed that the degree of critical illness determined the level of nurses' interaction with technology. Caring for critically ill patients is not the same as caring for the normal patient population as it is more complex with a heavy reliance on technology. Hence, ICU nurses need to familiarise themselves with the latest technological advancement to provide the best technology-integrated care to the patients. Studies that investigated the caring behaviours of critical care nurses showed how these caring behaviours were aimed at providing the best individualised holistic care while minimising the negative effects of technology such as dehumanised critical care environment and depersonalised patient care (Wilkin, 2004).

In another survey on the impact of technology in the ICU, one study claimed that nurses became complacent because they were relying too much on machines and put high trust on technology which could jeopardise patient safety (Browne & Cook, 2011) . On the

contrary, the participants in this study perceived otherwise. Many participants voiced concern about patient safety, saying that higher reliance on technology could made them more attentive towards patient safety. In this study, the cautious delivery of nursing care to patients who were attached to various medical technologies was evident in many of their statements. For example, Shida explained that the use of medical technology might place patients at risk of developing adverse effects. Thus, this shifted the goal of nursing care towards the prevention of potential adverse effects:

> *We have to take care of patients with critical conditions. We have to provide nursing care based on the context. For ventilated patients, we need to make sure that they have no bedsores, we have to constantly monitor the inotropes, we have to provide care in all aspects related to technology, including oral care, because patients were intubated. [Shida, PBRN]*

Shida explained that patient care was given with a focus on the safety of the technology. She emphasised that the nurses' provision of nursing care was done following the "risk assessment" of technology. Shida mentioned this in the context of technology that was directly involved in patient care. She indicated her cautiousness in handling technology that could contribute to adverse effects and compromise patient safety. Her concern was valid as several studies had reported associations between medical technology and a higher prevalence of infections (Apostolopoulou et al., 2013; Funk, 2011). The application of mechanical ventilation increased the mortality risk almost five-fold while the administration of inotropes was associated with derangement in physiological parameters (Apostolopoulou et al., 2013). By identifying the technology that can put patients at risk, nurses will be more vigilant in nursing care and strive to prevent risks such as ventilator related pneumonia from

developing. Most of the participants in this study voiced out similar concern as Shida. However, a few participants claimed that the need to provide safe practise in a highly technological environment led them to compromise the element of empathy:

> *Caring means we need to have empathy for patients. What happened here is that many nurses are lacking in empathy. When working in a technological environment like this, you can see it in nurses, especially the younger ones. They disregard those aspects. Sometimes they didn't even attend to patients who called. Their eyes are always stuck to the monitor screen. [Shida, PBRN]*

It was apparent from the statement above and from other participants that they were aware of the limitations of technology from the perspective of humane care. When talking about caring, most participants recognised the importance of empathy in critical care nursing. They readily acknowledged the emotional aspect of caring as an important element in the delivery of effective nursing care. For example, Sara told me: *"Caring means we know our roles as nurses. As is widely known, nurses' roles are treating patients. We take care of them from head to toe. We give medication to them, we do sponge them, we do position them, and we care for them. That means we do the caring activity. Other than that, we have to, what you call, love our patients like our family members."*

Shida explained: *"Nursing care means to care for patients from top to toe. Patients here are ventilated, right? So, nursing care should be more detailed, meaning that we need to have more empathy towards our patients."* Participants viewed the context of caring for critically ill patients as a situation that required the nurses to be empathetic. In my opinion, what participants meant was that nurses should take a more compassionate role when looking after vulnerable people, rather than just viewing it as a task-oriented role. Sharon provided

an excellent explanation about the factors that could possibly trigger the compassionate role of the nurse. She explained:

> *I feel like I have the opportunity to be closer with my patients. Because in normal wards, they (nurses) are not really close with patients, they don't have the opportunity to really understand their patients. Because patients are conscious and there are family members and relatives taking care of them, they just carry out whatever asked by doctors. It is different in the ICU; we are there 24 hours with our patients, and we know when they tend to feel pain and many other things. [Sharon, PBRN]*

In a previous research that assessed nurses' experiences of caring in the critical care setting, one-to-one nurse: patient ratio was identified as the main driving factor of the formation of nurse-patient relationships (Wilkin, 2004). However, Connell and Landers (2008) argued that factors such as the patient's responsiveness and the nurse's level of experience could also influence these relationships. (Beeby, 2000) explained that only when nurses became knowledgeable and confident in the use of technology then would they be able to perform emotional caring. This explanation demonstrated the important role of knowledge and experience in eliciting the compassionate aspect of caring. From the data, although participants addressed the idea that nurses should embrace values such as compassion and empathy in nursing care, it was apparent that time constraints prevent them from exhibiting those emotions. Sara provided a detailed explanation of the factors that led nurses to omit the compassionate aspect of care from their daily work:

> *Compassion is the one element that all nurses must have. But working here sometimes, you cannot always give consideration to that aspect. Frankly speaking,*

not everything can be done in the ICU! Our priority is on providing physical nursing care, and we leave the rest, like emotional support behind. Family members and relatives are the ones who provide emotional support for the patients. Sometimes we don't have time to provide emotional support. Because we need to be quick in providing our physical nursing care, we don't really have time to be friendly with patients. [Sara, PBRN]

The above statement from Sara addressed the importance of prioritising physical nursing care in view of time constraints. By leaving out the emotional support, nursing care could be completed faster. Sara's statement seemed to suggest that even though it was important to focus on the technical aspects of nursing when providing thee basic care, nurses should not forget or neglect to reinforce compassionate values in a technology-mediated environment. It is generally agreeable that priority must be given to nursing actions that rely on technology to maintain the physiological stability to optimise the patient's chances of recovery (Beeby, 2000; Wilkin, 2004). However, Connell and Landers (2008) assumed that once physiological crises in critical care nursing had been addressed, the more traditional forms of caring which is transpersonal caring would become evident.

I witnessed a patient at the back cubicle just now, he was on a nebuliser and BIPAP at the same time. He was calling for a nurse because of shortness of breath, but the staff nurses assigned to the cubicle were busy attending another patient who was scheduled for nursing care procedure. I'm not blaming them because the procedure required a lot of energy, so they needed to leave their own patients to help others.

[Excerpt from fieldnote, 15 October 2015]

Having to care for multiple patients under a tight schedule could sometimes require nurses to leave their own patients to provide assistance to other colleagues, for example, to help turning the patient during observation. In the above-mentioned situation, I felt uncomfortable at the time but because I was a non-participant observer, I could not assist the patient. I did call a nurse who was working that evening to attend to the patient. It turned out the patient was unable to breathe due to the high mist from the nebuliser. I spoke with Anne regarding this situation during our interview, although it was not her who left the patient. Anne, shaking her head and with a low tone of voice, said the following:

> *"Okay, (pause) to be honest, frankly speaking (pause), I'm not fully satisfied with the care that I give to patients. Actually, I want to do more for my patients, I want to see my patients look good, well-tidied up before the doctors come to check my patients, (pause) I want my patients to be seen as well-handled with the nursing care I provide, how I do my positioning, how I do sponging, how I do mouth toileting. But because of a lack of time … how do I put this into words? Sometimes due to having to take care of two patients at a time, with one requiring multi-disciplinary attention, I could not catch up with everything, you know. So, I have to ignore some of the important aspects of nursing care, like empathy, interacting with patient family, and compassion, due to reasons like these. Treating two patients! With one requiring extra attention, so I tend to ignore those aspects. [Anne, WPBRN]*

The excerpt showed that Anne paid attention to patients' details prior to nursing the patients. However, she was not able to deliver the care that she wanted. She decided to ignore compassionate care due to time pressures and the heavy demand to care for two patients simultaneously. Thus, this was the reason for Anne's "feeling of inadequacy". She admitted

to being dissatisfied because of the inadequate time for her to pay more attention to the nursing care she provided. During the study period, there was a critical staff shortage in the hospital. As a consequence, Anne did not have extra time to emotionally connect with the patient. Compassion is a feeling of deep sympathy or a desire to understand another's experience, accompanied by a desire to relieve suffering (Sinclair et al., 2017). Empathy is an educated compassion or an intellectual understanding of the emotional state of another person (Watson, 2002b). The lack of these elements underscores a task-oriented care attitude rather than person-centred care (Haslam, 2015). Reflecting on my experience as a nurse in the ICU, I perceived that it is important for the ICU nurses to prioritise their work based on the demands required of them. This is important because nurses have to manage their time efficiently to free up extra time for urgent situations. The following quote from Anne explained certain urgent situations that might happen in the ICU:

> *"It is difficult to expect how patients in the ICU are going to respond to treatment. We continue the same treatment if a patient is stable at night. But if suddenly he or she gets AF, SVT in the morning? We have to do everything at the same time, take the emergency trolley with us, KIV cardiovert, KIV vasopressin standby, KIV adenosine standby. We have to take care of all those, so we are wasting time there. Then at the same time technology is not helping! The infusion pump needs fixing, for example. All those things in the environment distract us from doing our job. Then a doctor doesn't want this ventilator, for example. Depends on the patient's lung. We need to use a different one. We need to call the technician. We have to do bagging at the same time. So, our time is filled up with unexpected stuff. We can't carry out what we planned earlier. We can only carry out our plan for stable patients." [Anne, WPBRN]*

The above excerpt illustrated how nurses performed nursing care during unpredictable situations. Anne highlighted the frequent interruptions in the nurses' activities that led to an immediate change or worse still, a delay in their ongoing tasks. For many, technology is commonly understood as a manifestation of its application in the ICU, especially in perceiving the patient's degree of illness (Locsin, 2005). In particular, technology provides nurses with real-time information so that they can carry out the most appropriate action based on the information. However, some argued that this has paved the way for the emergence of complex and task-oriented nursing care in which nurses tend to overlook the authentic presence of the patients (Watson, 2002a). To overcome this, there is a need to transform the practise of nursing (Powell-cope, Nelson, and Patterson, 2008) into one that fits the nurses' perspectives of working in a complex environment to replace the conventional practise that centred around the concept of person, which many nursing researchers have supported. Benner, Hooper-Kyriakidis, and Stannard (1999) suggested that the nurse-patient relationship is a dynamic system where good nursing conduct is the product of the relationship between an individual with the patient. It involves patient engagement that is performed with a sense of membership in the nursing profession where professional conduct is socially embedded and embodied in their practises, ways of being, and responses to clinical situations. Because of that, clinical and ethical judgement are often inseparable. In the context of nursing practise, a nurse's way of being with patients is the pattern or form of the nurse's care (including clinical judgment). On the other hand, how this way of being or care is expressed and perceived is a reflection of the interior and exterior environments that the nurse and the patient are in (Jarrín, 2012). This could be a reasonable explanation as to why task-related nursing care is more desirable to ICU nurses because it can satisfy the

needs of both the critically-ill patient and the nurse. This was evident from the statements of many participants. For example, Henry explained in detail here:

> *"I never liked the term patient-centred care because to me, it can't be applied to the care situation in the ICU (...) For conscious patients, I couldn't communicate with them due to the lack of time (long pause) because I have to attend to the needs of other patients who are unconscious and intubated. We are understaffed. The ratio is two nurses to four patients. It is difficult because the work environment in the ICU is different from that of normal wards. Patients are critical here, and our approach is different. We are dealing with patients who can literally be considered as life-threatening." [Henry, WPBRN]*

The excerpt above by Henry demonstrated the nursing care provided realistically to patients whose needs cannot be met through normal ward care. Chan, Jones and Wong (2013) claimed that the encounter between nurses and patients is mainly task-related. Thus, when patients are mechanically intubated, the care is delivered in a largely impersonal manner and nursing professionals might not attend to their every single need. Personal limitations and constraints in ICU technology resources formed the basis for Henry's opinions. Henry's decision to prioritise patients who were unconscious and intubated would mirror other nurses who also sought to provide the best chance of survival for the critically-ill patients. Nevertheless, his viewpoint has its pro and cons. For instance, it could compel a nurse to complete his tasks faster, thus compromising the provision of personalised care according to the patient's needs (Mcgrath, 2008) and subsequently resulting in the nurses treating the patients in a detached or even dehumanised way (Barnard and Sandelowski, 2001; Mcgrath, 2008a). The nurses might be believing that an increasing use of technology would likely

achieve the goal of care, which is to preserve life. As a result, this might lead to de-escalation in the nurse's ability to be empathetic in their daily duties (Reuben and Tinetti, 2014).

Many research studies discussed the tension between humane care and technology, especially pertaining to the paradigm of relation and the paradigm of control (Gadow, 1984). The complexity of the care environment was one of the factors contributing to the increasing gap between these two paradigms because technology and touch contributed to the dual paradigms in caring (Barnard, 2002). Evidently, many nursing scholars in the field of complex systems asserted that technology has a natural tendency to make the nursing care environment more complex (Hopkinson and Wiegand, 2017; Valverde, 2016; Vardaman, Cornell and Clancy, 2012) and this has certain implications on nurse workflow processes. With the extensive use of technology in the ICU, nurses need to learn to work in a 'complex adaptive system' in which they adapt their behaviours based on what they consider as appropriate and act accordingly in their daily work (Vardaman et al., 2012). Many participants spoke about the challenges they faced due to the shortages of nurses, especially in terms of time constraints. Ruby provided clarification on how the workload burden limited her capacity to provide better nursing care:

> *"Actually, we are understaffed in the ICU. It is supposed to be one nurse to one patient. If we could stick to this, we could provide all the nursing care that we needed to provide, like two-hour turning. When we are busy because we are understaffed, we only provide the most important nursing care. For example, when a patient needs to be resuscitated or he or she needs to be weaned off the ventilator. It would be easy if there was only one patient in a cubicle. Then we could pay more attention to him or her. We could still cover. If we could not do two-hour turning, we could still do*

four-hour turning. That's for turning. For ventilated patients, we have to monitor their airways and do suction. Not only doing suction through the tube but we also have to do oral suctioning. We also have to do a mouth toilet. We have to do all these because one of the reasons why patients get infections is due to the inadequate provision of nursing care." [Ruby, PBRN]

Ruby insisted that she would be able to give greater attention to patients if the patient-to-nurse ratio is more favourable in the ICU. Otherwise, this constraint meant that she could only attend to the nursing task that she could complete in the shortest time. At the time of this study, Malaysia was experiencing a nursing shortage because of a low number of nursing graduates due to governmental budget cuts in the education sector, including nursing education (Yunus, Idris, Rahman, and Lai, 2017). Addressing the shortage, Sara commented:

"We are of nurses here because few nurses went for study leave, maternity leave. Not to mention there are staff nurses who will or need to take sick leave. Therefore, the number of staff nurses here although on paper it looks sufficient but in reality, we are still short staffing. This created extra demands for us. Most of the time we have to work overtime and sometimes we did double shift, we worked morning and evening shift in a day. That's why you can see nurses seemed inattentive. This situation put patients in peril." [Sara, PBRN]

From a safety perspective, a study by (Rogers, Hwang, Scott, Aiken, and Dinges, 2004) found that an extended shift length was associated with lower safety practises by nurses and a higher number of incident reporting regarding patient safety. The authors also associated extended shifts with a greater risk of error. Under the Malaysian legislation, the minimum

nurse-to-patient ratio in a critical care unit must be 1:1 or at certain times, 1:2 (Sowtali, 2018). However, it is left to the discretion of the individual institution to determine the most appropriate staffing ratio within certain limitations. Many studies associated a low nurse-to-patient ratio with poor quality of care (Aiken et al., 2012; Dimick, Pronovost, Heitmiller, and Lipsett, 2001; Nantsupawat, Nantsupawat, Kulnaviktikul, and Mchugh, 2015). A study conducted in one of the public hospitals in Malaysia found that a high patient-to-nurse ratio was negatively associated with patient safety (Jarrar et al., 2015). For example, Diana indicated that potential mistakes could occur if nurses have an excessive workload. Therefore, nurses must prioritise patient safety in their efforts to fulfil the need for humane care. She stated:

> *"Of course, I am concerned about the lack of that aspect (compassion). But I have no option. The ICU nurse is supposed to take care of one patient per nurse, but here we need to take care of two patients simultaneously. Normally I would ask someone (another nurse) to keep an eye on my patient. In this situation, technology seems helpful because the alarms will sound if something happens to my patient. At the same time, I frequently sneak a peek at the patient's vital sign data from* here.*" [Diana, PBRN]*

Regardless of the complexity involved in ICU care, many participants mentioned that technology was beneficial for patient safety. This was apparent in the following statement when Maria said; "Regardless of whether care is oriented to technology, as long as nursing care is safe, it is appropriate."

6.2.5 Provision of recursive interaction

In addition to safe practise, another dimension of technology perceived by ICU nurses was its contribution to the provision of recursive information. This section describes how nurses use technology to “share information”, “increase the visibility of nursing care”, “facilitate information flows”, and “ease information delivery”.

6.2.5.1 Share information

Record keeping is one of the important elements to facilitate the continuity of care and to promote quality care. Participants indicated that technology could assist effective record keeping in ensuring better delivery of nursing care and to implement future care plans. In this sense, participants lauded the benefit of electronic patient records as they can easily share information about the patient’s care history. As one participant pointed out:

> *“… in this hospital, if we wanted to perform nursing care we had to record in the computer record everything. It would be advantageous because we could check previous records, the progress, improvisations. In the past, we needed to write down every single thing and we needed to find the records in piles of files.” [Maria, PBRN]*

As evident in the above excerpt, Maria was able to find information easily about a patient’s previous episodes of care. Besides, she could obtain all integrated information about a patient in a single place. For this reason, (Thede, 2003) asserted that electronic information systems could contribute to more effective communication and systematic collection of patient information, thus resulting in more effective patient care.

6.2.5.2 Visibility of nursing care

Electronic information systems in the ICU could also be used as an indicator of nursing care. This was evident when participants proposed that electronic information systems could increase the visibility of nursing care because nurses could obtain comprehensive patient information related to their past episodes of illness without having to verbally communicate with the clinicians:

> *"...we use IT to record notes and write reports. I mean, doctors key in the time and date so when we need to review, we can just click on the date and time, but we don't have to click on date and time to review notes. We can even check the notes from previous years. It's easy! Then when we manage our patients, we would firstly manage our patients, doctors will place orders through the computer. We check the order and we provide nursing care to patients. Technology is not a hindrance to caring activity." [Ruby, PBRN]*

The above information showed that electronic information systems created more opportunities for the nurses to assess the information about the patient before they decide on the most appropriate nursing care. This is highly beneficial because they can tailor a care plan that is agreed to by all members involved in the care of the patient. Furthermore, the use of electronic system recording could enhance the visibility of nursing care in the electronic system so that the information they put in could aid in the physician's decision making. (Bouwman, van den Hooff, van de Wijngaert, and van Dijk, 2005), in looking at communication technology, stated that member participation is typically unequal during group decision making in which the status of members will dictate who dominates the discussion. With the advancement in computing technology, it enables people to pay

attention to different things and to have interactions with different people. In the healthcare system, the dynamic nature of technology innovation facilitated the virtual interaction of nurses with other healthcare practitioners and this produced an impact on the pattern of organisational group decision making.

> *"I usually use the department's WhatsApp group to communicate about things related to our patients. If there is any information that needs to be spread, I would use the 'WhatsApp group' so that everyone knows. But if we are really busy, we don't have the time to even have a glance at our mobile phone. We just use our mobile phones when we have the time." [Izat, WPBRN]*

The above excerpt revealed that nurses preferred to use smartphones to disseminate information as it would facilitate instantaneous connections among the team members. This echoed (Bouwman et al., 2005) who mentioned that advanced technology might contribute to second-level effects of communication in which the indirect effects were caused by behaviours that stemmed from the technology and how people used the available options. A number of participants described the use of electronic systems as increasing nurses' control over their job. For instance, Shona emphasised how clinical decision-making involving nursing assessment is influenced by technology:

> *I can see the difference between doing jobs using computerised system and doing jobs manually. If we do things manually, we have to refer to the doctors all the time and it makes the workflow slow. [Shona, PBRN]*

It should be noted that Shona made the above statement after one specific incident.

> The nurse, Shona, began reviewing the treatment instructions. She was reviewing Mr. A's (her patient) discharge instructions when staff at the main counter called her to answer a call from the pharmacy. She rushed out and explained to the pharmacist that she needed to get a proper order from Mr. A's physician, Dr. Ray (pseudonym). Shona returned to the patient's bedside several minutes later. I asked her, "Is there a problem?" Shona replied, "It turns out Dr. Ray is on leave. The order was wrong. I have a call Dr. Sam (pseudonym), another physician-in-charge of the ICU to see if he can help." While waiting for the physician to come, Shona completed the discharge instructions. The physician did not reply for the next 30 minutes. "I'll call him again," Shona said, leaving the patient. Another 60 minutes passed. Mr. A family became exasperated with the delay and kept asking the staff about when her father could be discharged from the ICU. Shona approached her and apologised for the delay. 30 minutes later, Dr. Sam entered and Shona clarified the discrepancy between the medication instructions from Dr. Ray and the list provided by Shona. Dr. Sam later prescribed a new list of medications and apologised to the patient and his family for the delay.
>
> [Excerpt from field notes, 2nd October 2014]

Taking this incident as an example, Shona perceived that electronic information systems could help to combat the communication problem between nurses and physicians. Previous research has shown that positive physician-nurse dialogue could promote a strong rapport between the two parties whereas poor communication could lead to hostility and mutual distrust between them (Taran, 2010). This could lead to the nurses refraining from asking physicians certain questions that they presumed as potentially obvious or unimportant.

However, with the establishment of the electronic information system, nurses would strive to establish themselves as active members in the working environment. This could increase their motivation and job satisfaction. On the contrary, another study showed that poor communication between physicians and nurses often stemmed from physicians' reliance on written orders to convey their instructions to nurses (Sutcliffe, Lewton, and Rosenthal, 2004). The study also reported that physicians routinely recorded crucial instructions for nurses in the patients' medical files, such as when to administer particular treatments to patients. If nurses missed out on this information in the medical files, they would not be able to perform the important instructions ordered by the physicians.

6.2.5.3 Facilitate information flow

From this study, another key advantage of technology in the ICU was how it would facilitate better information flow across different care settings. This, in turn, expedited decision-making and produced better health outcomes for patients.

> *…with the older version of machines, it is harder to do reports, we need to use papers. But in the ICU, we just click on the computer and we can see everything like blood investigation results. So, it's easy for us to detect any abnormalities in patients. In the absence of the latest technology, we have to wait for the results to come out on paper. It's such a disadvantage." [Sharon, PBRN]*

The participants appreciated how the information system fostered improvement in the delivery of care to patients. With regard to this, the participants consistently reported that they managed to achieve more improvements in nursing care when using technology to

deliver care to patients than without this technology. On a similar note, they surmised that the manual way of doing their jobs would distract their workflow as it would involve extra steps as compared to using the technology-driven system:

> *"... if we have to do things manually, all the processes and procedures would be slow. For example, the process of sending specimens for testing and the process of getting the result would take a very long time. That is the drawback. I think by using the system everything becomes faster and easier... Our jobs can be completed faster." (Shona, specialty nurse)*

(Keenan, Yakel, Tschannen, and Mandeville, 2008) affirmed that the use of electronic information systems to support nursing documentation and record-keeping played a vital role in ensuring the continuity and quality of care across the multiple handovers by the different clinicians involved in the care of the same patient. The system made it more convenient for nurses to retrieve information about patients so that appropriate care plans can be made. In addition to the health information systems, the participants added that the use of mobile telephones was also helpful for them to retrieve medical information:

> *"Doctors always use their smartphones when relatives are around because they want to check the notes they saved in their smartphones. For example, they captured photos of their patients' x-rays and wounds, so they need to use their smartphones even at the bedside…" [Azima, PBRN]*

In today's world, the advancement in technology has elevated the function of smartphones far beyond telephonic communication into the realms of information and knowledge management (Moore and Jayewardene, 2014). Similarly, (Nasi, Cucciniello, and Guerrazzi,

2015) studied the roles of smartphone technologies in today's in clinical environment. They reported that healthcare systems are gradually moving towards a new model of integrated care processes shared by different caregivers to provide continuous care and mobile technologies play an important role in this scenario. Therefore, clinical considerations should be given to how healthcare providers engage with smartphones and not the other way around. Nevertheless, a few issues need to be taken into account for nursing staff to be able to use their personal smartphones for work-related purposes. For example, the gadgets should not interfere with the functions of medical equipment and there should be no nuisance arising from mobile phone-related noise. More importantly, the use of smartphones must not encroach the patient's privacy and dignity.

6.2.5.4 Ease the delivery of information

On different occasions, the participants indicated that it might be feasible to use a mobile telephone camera to submit images to a clinician to guide them on their care decisions, especially when it comes to emergencies:

> *"…we needed to take a photo if a doctor asked us to when we informed him or her that a patient was experiencing bleeding when we were doing sponging for him or her…" [Rika, WPBRN]*

Based on the above statement, smartphones could be used in a number of ways to improve communication between clinicians and nurses. This would ensure the safety and efficiency of nursing care delivery via coordinated and continuous care. The sharing of patient information is important for safe and effective care, but at the same time patients should be

aware of how their personal information is being recorded, stored and possibly being shared. This is mainly because the patient-related information used in any of these media is unlikely to be protected. The fact is, not all smartphone users have a password or personal identification number to prevent unauthorised access (Clarke and Furnell, 2005). Additionally, smartphones are unlikely to feature built-in encryption. If this security measure isn't in place, any patient-identifiable information included in the phone's videos, texts, or photo messages might be seen by an unauthorised third party in the event of the phone's loss, theft, loan, or sale. Therefore, any information or photos relating to a patient that are included in an email, text message, or voice message on a mobile phone should be deemed to be a part of the patient records and should be considered as confidential.

However, all the participants expressed their disagreement with this suggestion. Unfortunately, there is no regulation on data protection in Malaysian healthcare services, except that camera is prohibited in the clinical areas. Hence, this might be the reason as to why some nurses insisted that patient's privacy would not be an issue if the smartphone camera was used for patient care purposes. Take Rika's perspective for example:

> *"Once the photo is seen by the doctor, we would delete it immediately. We didn't have the time to ask for permission." [Rika, WPBRN]*

On the other hand, another participant had a different view in which he stated that patients should be consulted if the nurses need to use the smartphone in the ICU:

> *"I admit that patients' privacy is at risk, but we can explain to them why we use our mobile phones to avoid any negative thoughts from them." [Fuad, WPBRN]*

Furthermore, the possibility of invoking negative judgement from the family members if the nurses were found to be using mobile phones within the ICU setting was elaborated by another participant:

> *I just check on my mobile phone to refer to things related to illnesses and medications used for my patients. Quite frequent. But I don't really use, use my mobile phone during visiting hours. You know, we use it for the right reasons, but people tend to look at us negatively when we hold a mobile phone." [Izat, WPBRN]*

Gill, Kamath, and Gill (2012) in their assessment of smartphone usage in healthcare work settings, reported that pervasive use of mobile phones contributed to many negative perceptions in professional settings, including health care settings. In addition, negative outcomes of smartphone usage included interruptions and discordance between what physicians and nurses considered as urgent. This could lead to mistakes and omissions in the healthcare work settings that could become a threat to patient safety. More significantly, the use of mobile phones could present privacy and security risks, apart from being a source of distraction in the decision-making for work-related tasks. Thus, it is plausible that the use of mobile phones in the workplace often seen as unappealing to patients and relatives. Consequently, although the participants might be uncomfortable with the use of mobile phone as it could potentially interfere with patient's dignity and privacy, they believed that all possible measures have been taken to preserve patient rights.

> *"For me, if the purpose was for a reference, it won't affect patients' privacy. But if it was spread around not for a valid reason like this, it would affect patients' privacy. For me, when I capture a photo to be shown to a doctor or a specialist, I would delete the photo immediately once the photo is shown. There is no use in keeping the*

photo on my phone anyway. If a photo was to be used for a long period for some reason, like for a specialist's use, I would send the photo to him or her then I would delete the photo immediately. At least he or she has received the photo and the photo is not with me. Meaning that my responsibility stops there." [Rika, WPBRN]

From the above information, Rika argued that using mobile phone to facilitate better information delivery could raise certain ethical issues. Having said that, she believed that when a mobile phone was used with honest intentions, it would not affect the patients' privacy and dignity. Furthermore, the participants perceived that some patients might not understand the implications of using technology in the ICU. As Fuad stated:

"It's hard for me to explain about privacy because this is an era in which technology is widely used. Patients who don't really care about technology, especially the elderly, they won't really care because they don't really know how technology can affect their lives." [Fuad, WPBRN]

Patients' perspectives on the use of smart phones for care-related purposes had been overlooked particularly from the aspect of respecting the patients' privacy (Berle, 2008). In fact, Salhani and Coulter (2009) who analysed the health systems and policy on behalf of the European Observatory on Health Systems and Policies indicated that the most common cause of patient dissatisfaction toward health systems was the feeling of not being properly informed about (and involved in) their treatment. In view of this, shared decision making that includes patients as active partners of the clinician in the selection of treatment option should be performed. While not all patients want to play an active role in choosing a treatment – because of age and cultural differences – most want the clinicians to inform them and take their preferences into account. Notwithstanding this, in referring to Sikka et al.,

(2012) study about the use of mobile phones for acute wound care from the patients' perspective, most of the patients were not hesitant about having a picture of their wounds being sent via a mobile phone to a physician for diagnosis and treatment despite the concerns regarding privacy and security. They believed that this approach could be more cost-effective and convenient as well as helping the nurses to make better decisions at the point of care.

6.2.6 Nursing care practise

In the context of nursing practise in the ICU, the participants perceived that managing care with the use of technological devices led to the establishment of nursing care styles in the ICU. In the delivery of care, technology was found to contribute to the element of specialisation. In this sense, the emphasis was on the skill and ability of the nurses to execute the task. It was evident from the data that their ability to execute a task involved mastering the 'technique'. For many of them, the technique was related to 'the ability to perform procedures' as mentioned by Shona, Maria, Ruby, Fuad, and Elia. Others including Anissa and Anne defined it as 'the ability to optimise the use of technology'. Anne further described it as:

> *"If we look at the basics of nursing care, general care, they are the same right? Like techniques of turning patients, techniques of preventing bedsore, techniques of providing mouth toilet care, and techniques to prevent oral thrush. So in the ICU, the difference for me is that patients in the ICU have an endotracheal tube! Different from patients in general wards. So nurses in the ICU have to take care of the*

endotracheal tube and prevent it from dislodging or accidentally deflating it. So, we have to take care of that. So, nursing care here has to be even more detailed and nurses have to be careful. That is the major difference for me." [Anne, WPBRN]

The perspective of Anne on the nursing care practise in the ICU incorporated the elements of complex care. This could be due to the predominant use of therapeutic instruments (she gave the example of endotracheal tubes) that required a high level of skills and techniques. This echoed a formal definition of technology as a "manner of accomplishing a task" that involved the underlying cultural behaviours and the human interactions with tools and products associated with human arts, crafts, and skills (Isman, 2012). This was evident by the example of endotracheal intubation given by Anne when describing basic nursing care. If endotracheal intubation is involved, then everything about basic nursing care becomes technical. As a result, all their concerns would be directed to technological care. Thus, it was not surprising when some of the participants reported an affinity for technology. Take Elia for example:

"For an unconscious patient, we look at his vital signs. We check his breathing, oxygen level. We also check the machines; we check if the ventilator setting is okay or not then we review his results. If his results are not okay, like his Hb is low, we check if there are symptoms, such as whether there is blood in his excrement. We have to look at all that to make decisions on what to do. If he is unstable, his BP would drop, his BP would drop if he is experiencing bleeding. Ha… If his BP is dropping, we would inform, we would decide whether to run fluid at the first instance or give medications straight away. We evaluate based on the monitor we attach to the patient." [Elia, WPBN]

It is evident from her comment that nurses recognised that the competent use of technology as an integral part of caring in the ICU, it also appeared that technological care has become routine work for her as a nurse in the ICU. The dependence on technology created a significant distinction in the practise of ICU nursing compared to other disciplines. As such, in their contacts with patients who required frequent technological care, the use of devices has transformed into a natural part of nursing care (Rafael Celestino da Silva et al., 2015). It was evident in a comment from one participant:

> *"One of the benefits is that it makes nursing care easier, like ventilators, they can provide support for patients. Ah ha, like ventilators with monitors, we can be aware of patients' tidal volume, whether it is enough or not. In terms of infusion pumps, they help us to give medications to patients with inotropes, they make our jobs easier." [Sharon, PBRN]*

Thus, the participants indicated that the use of technological devices facilitated care in the context of prevention and longevity, both of which were perceived to be important goals of treatment in the ICU. As Diana pointed out:

> *"Caring, ah like… (long pause). There are many things to be learned regarding patients with different diseases and complications. Therefore, nurses need to know about equipment, medication, diseases, patients' conditions, pathophysiology, and then in terms of abnormalities like vital signs and lab investigation results." [Diana, PBRN]*

This concept of care was parallel with the Biomedical Model suggested by (A. Singh, 2010) in which the focus of care provision was on the identification of biological factors and

control of the disease. This echoed Fuad's view that critically-ill patients were 'human beings who need help because they can't function normally due to their illnesses'. Thus, the practise within this model very much relied on the technological development that could provide a mechanical view of illness and the body in which the illness occurs. Nevertheless, the trajectory of medical knowledge and practise often extended from the laboratory to the bedside (Marcum, 2008). As mentioned by Shona:

> *"Patients in the ICU can't speak because of the tube, so technology is of much help for us to detect vital signs such as hypotension, palpitation. Patients can't speak! Technology helps us to understand patients' conditions. The same thing goes to patients who are fully sedated, we look at machines used to treat them." [Shona, PBRN]*

In addition, the type of knowledge obtained in this model also depended on the quantifiable data such as laboratory results. The participants often emphasised on their ability to interpret or respond to laboratory results as a standard of practise. Fuad reflected on this:

> *"In terms of the maintenance of ventilators, I would ensure that the setting is right. I would also ensure that the ABG is up to date. If there was any abnormality, I would inform the doctor in charge." [Fuad, WPBRN]*

From the above excerpt, the concept of illness was viewed in a combined picture of machine-body in which machine continued to be regarded as something that functioned autonomously whereas the body was a more intricate machine that required regular "tuned-up". In another word, the illness reciprocated the function of the machine and thus, the information obtained from the machine provided subjective emotional and intuitional resources on top of the

quantifiable data (Marcum, 2008). Consequently, the treatment methods derived from these diagnostic concepts were likely to be equally mechanistic and exclusive of non-material or psychological factors (Zigmond, 2011). In order to achieve this objective, technology paradigms will need to be included into the treatment plan in such a way that medical practitioners will be able to define, evaluate, and anticipate the results of patient care based on empirical data (Mazzotta, 2016).

6.2.6.1 Task-oriented performance

The second aspect of practise transformation was in terms of the role performance of ICU nurses also emerged from my data. When commenting on the most effective strategy of working in a technology-rich environment, the participants uniformly supported the importance of task-oriented performance as well as within and between team communications. For example, Amira illustrated:

> *"When I start working in the morning, I do oral toilet to patients, I check their hygiene, such as check bedsheets and change whichever (necessary), then I make sure my patients are clean, check their lines, then I assess their conditions. Then I give medications, we give medications to patients at eight in the morning. Then around ten, we provide nursing care! We do suction follow doctors for rounds, take their prescriptions, and do whatever they ask us to do like take blood samples…" [Amira, WPBRN]*

The previous section discussed technology as an element of skills and competencies that represented the image of ICU nurses that stemmed from the use of technology. This could

justify the participants' view that the functionality of technology elevated their status. Thus, most of the participants placed more values on technical activities compared to other fundamental nursing care. Anne best described this context:

> *"In the ICU I had to learn a lot about treating intubated patients, how to treat them properly with ventilators, unlike in the burns unit. Ventilating patients in the burn's unit was very general, just general ventilators. I didn't learn properly about treating ventilated patients" [Anne, WPBRN]*

It was apparent from Anne's comments that there was a greater appreciation for the high-priority technical care required in the management of mechanically ventilated patients. On a similar note, Isman (2012) commented that many people focused only on the utilisation of technological hardware without further consideration for the relevant cognitive or behavioural techniques or relevant cultural patterns. "This simplistic view of technology as hardware may stem from the fact that as the functions and devices of technology increase in complexity, their internal operation becomes a marvel in itself and somehow separates from their original use and socio-cultural context" (Isman, 2012, p. 209). Taking mechanical ventilators as an example, several participants commented that it was important to master the available technology to properly care for patients. As Janet pointed out:

> *"If we don't master the available technology, we can't utilise that to help us in the provision of treatments and care to our patients." [Janet, WPBRN]*

Janet's comment provided a link between the patient and the machine. For many, the apparent nursing role in the ICU was to focus on technical functions besides developing the necessary skills and knowledge that were perceived to be the sole domain of medicine

(Coombs, 2003). In the context of skills and knowledge, the following excerpts best summarised the idea that the mastering of technologies could result in a sense of enthusiasm, confidence, and pride.

> *"I have a 5-year experience of working here. I can see the difference because my technical skills have improved. Even the sister-in-charge praised me for my improvement…I can even beat the doctor (laughs). I mean I am now a senior and I can even remind doctors of this and that." [Janet, WPBRN]*

While Amira reiterated:

> *"I give you an example, some of my friends here have been transferred to other hospitals that don't have this system, this technology. They told me that they couldn't adapt to the new situation they couldn't manage their works because they were familiar with this system (technology) before." [Amira, non-specialty ICU nurse]*

In this regard, the status of ICU nurses was regarded from the context of technological proficiency. For example, caring for patients in a technology-rich environment has evolved from being patient-oriented to become performance-based. With the need to acquire more technical skills, nurses developed a preference for scheduled tasks. Besides, they also began to view such tasks as indicative of their performance levels. Herschbach et al., (1992) provided a framework for technology and competency in which he described several characteristics that distinguished technical instructions in the context of proficiency. When performing a task, an individual's primary goal was to acquire skills and understanding whereas the side goal involved the boosting of ego via the exhibition of superior ability (Butler, 2016). By having these goals in mind, the individuals would speed up the process

of mastering the task. Once the individual felt that he or she had put in enough effort into this process, he or she would remain more motivated in the process of self-development (Nuutila et al., 2020). The participants also acknowledged the fact that technology helped nurses to perform tasks more effectively. In this sense, Shona emphasised efficiency and control while Maria and Azima mentioned a reduction in the time needed to perform tasks and the use of technology as a means towards achieving goals. This was also evident in the following comment, where Ruby expressed her satisfaction for being able to provide care in a timely, consistent manner:

> *"I've given the best* i*n terms of providing service to patients…I mean giving medications, sponging, positioning to avoid bedsore, everything related to nursing care! The first thing in the morning I will do is all the doctors' orders, pass all the reports, check with patients what they need, then pass reports to patients, meaning that I provide nursing care to patients. I give medication, check ETT, do suction, make patients comfortable, and make sure they have enough medications, then only I check the system." [Ruby, PBRN]*

In the context of Ruby's situation, it could be said that Ruby organised and executed her nursing care duties to attain the desired level of performance. A notable point in reference to Ruby's justification that she had 'given the best she can' was the belief that her ability to face challenges competently would contribute to her sense of satisfaction. Judge, Erez, Bono and Thoresen (2002) related this to the concept of locus control, in which individuals perform self-evaluation via the prediction of job performance. Anne, in describing her goal, indicated that the satisfaction that ensued from the outcome of care denoted the quality of nursing care:

> *"To me, the definition of quality nursing care starts from the nurse's satisfaction. This refers to the satisfaction about how my patients look; they must look healthy or at least well cared for. By this, I have already achieved my nursing plan target. My patients look pretty and clean with beautiful teeth and well-combed hair. Even those on ETT must look good! That's my target. Second is their progress. For example, if we follow the correct mouth toilet care procedures, there will be no infection the next day! Another one is if we do position so that they won't get bedsore after being discharged from the ICU. That's satisfaction for me." [Anne, WPBRN]*

When Anne assessed her job performance, she placed a great emphasis on the patients' physical appearance as a primary goal of nursing care. She opined that when the patient looked clean and nice, it would project the impression that the nurse had taken care of the personal needs of that particular patient. This also represented a sense of attainment for the nurses. As Lunenburg (2011) pointed out, a goal is what the individual consciously tries to do. Similar to Ruby, the way Anne appraised her job performance also demonstrated a desire to do things in a way that was consistent with her values. By having this aim, the nurses would persistently direct their intentions and actions towards performing nursing care at the required level to achieve the goal. Anne emphasised that the patient's physical appearance would show that they were well-taken care by the nurses and this, in turn, provided a sense of satisfaction. This was consistent with Lunenburg's suggestions. He observed that the accomplishment of the goal can lead to satisfaction and further motivation. Nevertheless, despite acknowledging the role performance shaped by technology and their responsibility to provide good quality of care, participants also expressed that certain constraints they faced might limit their ability to fully provide holistic care to the patients. In reality, nurses often

face a wide range of issues that hindered them from providing the best quality of care they would like. This feeling was shared by all the participants in this study. Elia, Maria, and Liza described their fatigue from shift work and the inability to rest through the entire period of breaks. Anne felt that the time pressure tested their ability to do their job well while Fuad and Henry felt that heavy workload and staff shortage limited their ability to spend more time with patients. Henry summed up it nicely:

> *"The number of staff to patient ratio is important I would say. If we are understaffed, we can't do proper positioning, for example. Pressure sore will ensue, so our objective is not met. Technology can't help with everything-for positioning, it can only help with regular propping up. If we want to do lateral positioning, we need manpower." [Henry, WPBRN]*

When talking about workflow constraint, Henry explained to me during the interview that even when he drew up plan as a strategy to cope, he could not focus on what he planned when he was overburdened. For this reason, he felt frustrated and hopeless when he had little control over the situation. Nuutila et al., (2020) in discussing the mastering of task and role performance, lack of ability or shortcomings in certain individuals might predispose them to withdraw from form-challenging situations. In the event of a nursing shortage, technology can help to meet the need for the provision of nursing care. In this study, many participants perceived technology as helping them in saving time and effort when providing care to patients. Ultimately, this can help in the organisation of care as mentioned by Shida:

> *"The only thing is that we are now using simpler care. For example, mouth toilet. In the past, we have to find gauze, spatula, wrapped the gauze, and taped it. But now, with the availability of disposable suction toothbrush, you simply connect it to the*

hose of the suction system. Unlike in the past where you need to position the patient to one side, it takes time, and you need to spend a lot of time with one patient. With the latest technology, it doesn't take much of your time." [Shida, PBRN]

Thus, the participants' expressions of their role performance in this study could be explained by the Theory of Cognitive Dissonance developed by Leon Festinger. According to him, the feeling of tension or unease might occur when an individual becomes aware of any contradictory cognitions (attitudes, opinions, beliefs) that existed or a contradiction happened between cognition and behaviour (Aronson and Festinger, 1997). That said, participants searched for adequate justification for their cognitions in order to fulfil their caring behaviour. Gibson (2002) from an interactionist view of affordance (possible actions) and ability in an activity, provided a concept that focused on interactions between the agent and the situation. He argued that the individuals' ability to deal with a situation depended on how well they could adapt to constraints. Thus, the failure of the nurses to deal with the constraints might make them avoiding to spend time with the patients and subsequently result in a detachment from the fundamentals of patient care. This could explain why many participants cited over-reliance on technology as a cause of complacency among ICU nurses. For example, Shona's description about this situation suggested that the convenience provided by technology came at the expense of nursing care, as she witnessed how nurses had become complacent due to over-reliance on technology:

"I think the latest technology could make some staff lazier. Yes, some of them are lazy, but staff with a good attitude use the time saved to pay more attention to patients. Okay, one factor in my experience when they feel like less concern and they

don't care! …when everything is done by machines, they just sit down and chat with each other" [Shona, PBRN]

Shona addressed about the latest technology partly due to the fact that the improvement in innovation have produce highly reliable technology which could decrease mental workload (Parasuraman, Sheridan, and Wickens, 2008). The same condition as in Bailey and Scerbo (2007) study that assessed the impact of trust on system reliability and automation-induced complacency established the idea that the confidence may be erroneous or misplaced among workers who believed that their job was risky and their working environment was hostile while simultaneously having high confidence in the design and the quality of the technology. In contrast, those familiar with the complexity of the working environment were more likely to adapt to the technological culture and adhere to the discipline of technology in action. They exhibited a real understanding of the complex technological environment and believed in their responsibility to maintain a safe and protective workplace.

6.2.6.2 Transdisciplinary efforts

The previous section discussed the contribution of technology in the distribution of roles and functions among nurses in the ICU. This contribution is seen as a medium to facilitate a collaborative environment. Based on my fieldwork observations and the participants' accounts, communication in the ICU occurred in three ways between nurses and their colleagues, including physicians and medical assistants. A high level of satisfaction with the use of technology, especially information and communication technology were also related to the adjustment of roles of healthcare workers. The technology played a part in

how role identities were defined, asserted, and changed in the activities that involved mutual communication. In the context of communication in the ICU, the participants placed the most emphasis on the communication between nurse and physician, especially at critical points such as during the morning medical assessment of the patient, during the ward rounds, and when nurses assisted physicians performing procedures.

> At the beginning of the shift, the night-duty nurse handed over the patients' progress and condition to the morning-duty nurse. In the morning, one of the doctors assessed the patients and documented the plan for action for the day. During the ward round, decisions about the patients were finalised. Sometimes amendments were made to the planned action after the ward round. This seemed like a routine pattern of interaction between nurses and physicians in the context of care delivery.
>
> *[Excerpt from field notes 20th November 2015]*

The participants also emphasised in the interviews that the communication between ICU nurses and physicians often revolved around technical matters. This view also expressed an implicit perception that in the communication between ICU nurses and physicians, nurses were subordinate to physicians. This was evident in Maria's answer to my question regarding nursing care:

> *"Nursing care? Sponging, dressing, give medications, that's all. In the ICU, nurses just help doctors perform procedures. That's it."*

Sharon reiterated:

"One more reason is that we need to obey the doctors. If they ask us to assist in procedures like bronchoscopy or CT scan, we have to give priority to that before we can get back to our task of providing nursing care ((laughs))." [Sharon, PBRN]

The statement above showed that the caring activities in the ICU operated within an explicit hierarchy. The nurses must perform the work to the satisfaction of the physicians. The statement also highlighted that certain medical-related tasks could only be performed by nurses within the limits set by the physicians. Moreover, as mentioned in the previous section, medical practise in a technology-rich environment that followed the Biomedical Model placed physicians as the ultimate authority in the decision-making process. However, Paynton (2009) argued this sentiment was not only contributed by the superior credential of the physicians. Generally, physicians often work under the expectation that other healthcare professionals must be submissive to their directives. This was described by Paynton (2009) as formal power that is influenced by the position or hierarchy and personal power within the context of professional roles. She added that the formal power of nurses is often assumed to be less than that of the physicians' despite them spending a long time in direct contact with the patients and having a greater say in the health outcomes of the patients.

From a different perspective, Matthewman (2011) theorised that "the increased scale and interdependence of technologies were conceptualised as the reason behind the rise of socio-technical systems" (Matthewman, 2011, p. 20). While technology can boost efficiency and improve patient safety, it also can change the interaction between the healthcare providers in the ICU, particularly if the technology was viewed as a notion of expertise. Concerning expertise, Thrift (2004) believed that the ongoing encounter of complex technologies might alter the technical substrates among the group. Nevertheless, both authors agreed that

technology could modify what people already knew and were doing. Furthermore, as the tools and techniques evolved, they gradually became part of the accumulated human knowledge. Given the ubiquity of technology, it is therefore important to be mindful of what Thrift (2004, p. 139) called the 'hybrid human-object network' that highlighted the interactivity and convergence of between humans and technology that will fosters knowledge revolution. In the context of interactivity, several participants emphasised that electronic health records served as a medium of communication between various healthcare providers in the ICU such as intensivists, consultants from other disciplines, pharmacists, and nutritionists. The following excerpt showed that the participants pointed out the usefulness of keeping patient records electronically as it allowed them to gather as much information as possible about the process of care:

> *"… in this hospital, if we wanted to perform nursing care, we must record everything on the computer. But if we recorded on the computer, for sure it would be advantageous because we could check previous records, progress, and improvisations. In the past, we needed to write down every single thing and we needed to find the records in piles of files." [Maria, PBRN]*

In this sense, the participants acknowledged that technology bridged the gap in nurse-physician communication. Given that it could lead to a streamlined workflow, it was not surprising that many of the participants' comments depicted a state of 'being informed'. As Ruby pointed out:

> *"…we use IT to record notes and write reports. I mean, doctors have keyed in the time and date, so when we need to review, we can just click on the date and time to review notes. We can even check the notes from previous years. It's easy! Then, when*

we manage our patients, we would firstly manage our patients and then doctors will place orders through the computer. We check the order and we provide nursing care to patients. Technology is not a hindrance to caring activity." (Ruby, specialty nurse)

In addition to streamlining the workflow, Ruby pointed out that the information system also provided an opportunity for nurses to project themselves in the forefront of patient management so that effective collaboration can be made possible. Previously, nurses' contribution in patient management was often sidelined and their roles went unrecognised by other healthcare providers. Concerning this, technology proximate nurses and other healthcare professionals that involved in patient care in the ICU, in which they are more likely to collaborate and easily communicate with one another (Omobhude and Chen, 2019). Hence, this interactions among healthcare professionals could improve understanding of dynamic patient care management. In addition, such interaction would make it possible for the nurses to receive the acknowledgment they deserved over their care practises. This is what could be regarded as an ideal communication, whereby all information would be shared with the whole members in organisation, regardless of rank or responsibilities, through a culture of knowledge sharing. Otherwise, the communication within an organisation became dysfunctional when the organisation limited or restricted the sharing of information (Parsons and Urbanski, 2012). With the concern about their rank at the back of their minds, a few participants felt that the electronic system served as a convenient way to reduce the pressure from communicating with physicians:

"I can see the difference between doing jobs using computerised system and doing jobs manually. If we do things manually, we have to refer doctors all the time, it will slow down the workflow." [Shona, PBRN]

The above situation suggested that technology helps to instil the transdisciplinary efforts within the ICU environment. Transdisciplinary effort involves multiple disciplines sharing together their knowledge and skills across traditional disciplinary boundaries in accomplishing tasks or goals (Alberto and Herth, 2009). Shona's statement claimed that any adverse relationships between nurses and physicians could affect the process of care negatively. This could address what the marginalised position that Coombs (2003) believe nurses often experienced in their working relationship. The sense of autonomy in this context refers to the degree to which nurses are capable of executing their role with substantial freedom and independence, as well as the ability of them to conduct the documentation of the nursing process and tasks (Weston, 2008). As compared to the era before heath information technology, where nurses had to documented or write the nursing reports in the patient's bed head.

Furthermore, Coombs, (2003) maintained her idea that nursing and medicine are two different cultures with contradicting visions. Medicine emphasises the status of authority within the hierarchical organisation of health. As a result, many commented that the nursing profession had to sacrifice some of its best attributes. Salvage and Smith (2000, pg 1019) commented: "Nursing, for all its new independence and expertise, is still dancing around the medical maypole". In this study, the power struggle between them was seen to arise from technology, as shown in my fieldwork observation:

> When I was at the patient's bedside, a physician came to review the patient and spent almost ten minutes looking at the computer and his mobile phone without communicating with Izat, the nurse in charge of the patient. At the same time, a physiotherapist came to the patient's bedside and asked Izat to help him with

respiratory physiotherapy for the patient. While Izat was doing suctioning, the physiotherapist performed chest percussions on the patient. After a few minutes, the physician came by the patient's bedside and told Izat, "Nurse, please read my order, I need it to be done immediately." Without hesitation, Izat left the procedure immediately and went to the computer. I asked, "Is there any urgent procedure to be done?" Izat replied, "He asked for a bronchoscopy, ((sighs)) if he had told me just now, I would have let the medical assistant (MA) know earlier. Now he (the MA) went to OT and the procedure cannot be done without him to prepare the machine." Izat left the bedside and went to the ICU's main counter, and I noticed that she spent a few minutes making a call to the MA."

[Excerpt from field notes 02nd January 2016]

From the above fieldnotes, it appears that the transdisciplinary efforts relied on the effective communications and collegiality to ensure quality patient care. The notable point made by Izat and Shona was that technology could facilitate collaboration. Northouse (2016) proposed that physicians often inferred their position power and personal power from technology. Undeniably, technology can contribute to shared responsibility in the planning, decision-making, and coordination of care (Morley and Cashell, 2017). However, the imbalance of power between healthcare providers could offset any beneficial outcomes from the use of technology. In view of this, Coombs, (2003) reported that nurses must become more assertive to address this fundamental hierarchical problem between nursing and medicine. As evident in one of the situations I observed, a senior nurse pointed out to the physician that the patient was too frail to sustain a significant reduction of ventilator support. Instead, she suggested changing from controlled ventilation to assisted ventilation because

she noticed that the patient was able to cough and take deep breaths. Thus, she felt that the patient was stable and ready for further weaning. The doctor concurred and added that the patient might be able to tolerate a trial of spontaneous breathing. Both of them listened to each other and agreed to act on the best interest of the patient. Nevertheless, there was also a scenario whereby the interaction between a nurse and physician resulted in disagreement:

> There was a situation where a senior nurse explained to the physician that significantly reducing the positive pressure settings on the ventilator would not benefit the patient, since the patient had an increased amount of secretions. The physician disagreed with the suggestion without explaining and insisted on reducing the PEEP to 5cmH20.
>
> *[Excerpt from field note 15th December 2015].*

These two situations highlighted the two extreme ends of how physicians considered nurses' input in clinical decision-making. It seemed to me that in both cases, the key decisions on the ventilation support and ICU progress were made with certain level of communication. In the first situation, despite the domination of physicians in the decision-making, the nurse managed to exert her autonomy by being assertive and communicating clearly. However, it was less so in the second situation. Upon reflection, it was clear that the technical and social elements were closely associated in the clinical workplace (Weiner and Biondich, 2006). This relationship-centred care not only included the nurse-physician relationship but also to the relationship between nurses and other healthcare providers, for example, medical assistants. To care for a ventilated patient in the ICU, the nurses must work closely with the medical assistants who are more of an expert in its use and also responsible for the maintenance of the equipment:

"The tools, equipment, and technology are also taken care of by medical assistants. They take care of those things in terms of asset management and inventory. So, sisters and nurses just use them. If there is anything, we just refer to our medical assistants. Give feedback to them. If there is anything that they think should be added to our list of tools or equipment or technology, they will discuss it with the sisters. Latest needs, anything to be added, anything goes broken, we will meet to discuss. With regard to inventory, we also help them because it is us who use the items, primarily. Monitors, beds, ventilators, we supervise them. It is only when the equipment is broken, we will give feedback to the medical assistants so that they can be sent for repair or to get a replacement. It works like that." [Azima, PBRN]

In this context, social relationships and roles are internalised by self-reflection of discourse and also through communication (Gillespie, 2007). This internalisation process enabled people to achieve mutually-desired identities (Jung and Hecht, 2004). As Maria explained:

"All the technology belongs to medical assistant. They have the proper training to handle technology. We have no proper training like them." [Maria, PBRN]

In the above excerpt, Maria asserted her agreement on the autonomy of medical assistants in the technical decision-making. It seems to me that many participants had highlighted that technology elicits the boundary between the nurses and other healthcare professionals in the ICU. This boundary captures the relational and dynamic nature of the transdisciplinary efforts in delivering care in the ICU. In the context of nurses' experience, the boundary is created as a protection from breaching of work roles (Trotter, 2019) especially when some participants described working in the ICU has imposed them to perform multiple roles.

With regards to managing technology, Anne described the boundary in a way that heightening the group differences as a strategy to ensure the nurses focus on nursing care.

> *"I don't know if medical assistants can do our work. They usually take care of machines, right? Actually, it is the same in all departments. In this hospital, medical assistants are only responsible for machines and they have nothing to do with the nursing care plan. Even if there are male nurses, they won't be trusted to be in charge of technology. I think that stereotype stemmed from a role policy that was set by our authority. Nurses' role is to deliver nursing care and the medical assistants' role is to be in charge of technology. I have no say in that matter because all hospitals practise that." (Anne, non-specialty nurse)*

Such stereotypes resulted in quick assumption and affected the behaviour toward members of social groups (Schneider, 2003). This was evident from what Hans, a senior medical assistant in the ICU, mentioned when he presented his argument regarding nurses' roles in the ICU:

> *"Medical assistants are given the responsibility to look after medical equipment and technology in all medical facilities. Okay, that is one issue. Technology has advanced, but in terms of nursing care, the touch itself is very lacking I have to say. Very sad. For example, when writing notes, nurses just wait for notes from doctors in front of the computer. For me, they have to take the responsibility to provide holistic nursing care, including touching. They need to always look after their patients. It is very sad seeing nurses who are more focused on technology instead of on patients. For medical assistants to look after technology, it is their responsibility.*

It is because the director of any hospital would give their trust to medical assistants to take care of assets, development, and others." [Hans, Medical Assistant]

Hans's comment elucidated that the role of nurses as care providers and the role of medical assistants as technicians were congruent with the organisation's mandates. This echoed the discussion by Grube and Piliavin (2015) on role identity whereby they asserted that a mutual understanding of the organisational values and member values could foster a clear identification of the roles among the members. In this case, values that were important to the medical assistants are seen as congruent with those of the organisation and thus, this increased the perceived organisational legitimacy (Bitektine, Hill, Song, and Vandenberghe, 2020) and the legitimacy of the medical assistants' role. Speaking about legitimacy, several participants raised their concerns on legal responsibility. Most participants stated that they did not want to be liable for tasks that belonged to the scope of other healthcare practitioners. Although nurses and medical assistants largely shared the same understanding of the technical aspects of their roles, there was still some dissonance in relation to the non-technical issues of authority:

"That is medical assistant's job, so if we do, we are afraid of doing things wrong because they (the medical assistants) didn't train us. But when it comes to simple ones, we do ourselves. We do! Because medical assistants in the ICU have to go to the operation theatre, go down to do this and that, even if there are many of them. So, if suddenly the machines need troubleshooting, those who are closest to the patients and the instruments are all staff nurses. Meaning that staff nurses are supposed to be trained on how to troubleshoot so that we can be efficient [ah ha] in treating our patients." [Maria, ICU PBRN]

Based on the above comments, it is plausible to say that although the basic role of nurses is to provide nursing care, they still need to collaborate with other members within the organisation. To a certain extent, their performance conformed to workplace flexibility. Therefore, I adopted useful concepts from the Theory of Socialisation from Kelman (1958) to analyse what happened to nurses during the resocialisation from their basic role to a technical role. During the first phase of resocialisation, which Kelman (1958) referred to as compliance and Thornton and Nardi (1975) called role acquisition, nurses were postulated as individuals who did not commit to a role change but rather modify their behaviours as a way to become comfortable on the job. Based on the participants' comments, majority of them seemed to address effective communication as an important element to cope with the dynamic and complex ICU environment. Nevertheless, the participants added that with technology advancement, the communication in the ICU has also become more complex. To simplify things, they prefer technology that would improve the communication among healthcare team members in the ICU. This is to improve patient care coordination. From this aspect, Fuad, Rika, Izat, and Azima discussed regarding mobile phone technology. Take Fuad's account for example:

> *"For me, the use of smartphones during working hours is necessary. Having a smartphone is handy during working hours, especially in a situation when a patient is having massive bleeding but there is no doctor around. I would attend the patient with the skills I have and I would snap photos to enable the doctor in-charge to see the bleeding by himself. I would inform the patient before taking photos. I would also delete the photos once they are sent to the doctor in charge. For me, mobile phones*

can be of help in that kind of situation. It can improve the efficiency of our work."[Fuad, WPBRN]

Fuad's statement on the use of mobile phone depicted an effort by the nurses to enhance the remote collaboration between nurses and physicians. The statement by Fuad's view was supported by (Ribes, Jackson, Geiger, Burton, and Finholt, 2013) in which the authors acknowledged that distance could cast negative effects on the organisation, including reduced awareness of co-workers, diminished trust, and delay in performing tasks. Furthermore, the work nature of various health care professionals that involved in patient care in the ICU is different. For example, the physicians are always on the move, which contributed to inadequacy of communication and posed challenges for effective communication. Thus, virtual communication could become an alternative to hold an organisational structure together, take for example the following situation:

"…we needed to take a photo if a doctor asked us to when we informed him or her that a patient was experiencing bleeding when we were doing sponging…" [Rika, WPBRN]

As indicated above, Rika proposed that it was feasible to use a mobile telephone camera to submit images to a clinician to guide their care decisions, especially in emergencies. Based on the above statement, most of the participants emphasised that mobile telephone was practical to contact people who are not there at that moment. The mobile phone is the best depiction of how technology transformed the way physicians and nurses interact to enhance the communication flow. In such instances, technology functions as props to support the social functions and restore the essential social ties that bind individuals and groups within organisational structures (Ribes et al., 2013).

CHAPTER 7

The experience of the ICU nurses in delivering nursing care: The sense of powerlessness

7.1 Working on the nursing shortage condition

Several nurses in this study recognised the shortage of nursing staff as one of the factors that add to the layer of complexity in the ICU.

> *"As you can see, today we are working in understaffed conditions and being expected to work harder to pick up the slack, with no support or acknowledgment for doing so. Instead, the physicians expended their energy undermining our efforts and complaining about us." [Ruby, PBRN]*

Some nurses reiterated that the issue affected their ability to provide a desirable level of nursing care to patients. It was apparent during my fieldwork that one ICU nurse often had to care for three to four patients per cubicle. Based on this context, several participants mentioned that the number of ICU nurses was at a suboptimal level to meet the needs of these patients. As expressed by Anne:

> *"….to be honest, frankly speaking, I'm not fully satisfied with the care that I give to patients. Actually, I want to do more for my patients! I want to see my patients look good, well-tidied up before the doctors come to check my patients. I want my patients to be seen as well-handled with the nursing care I provide, how I do my positioning, how I do sponge, how I do mouth toileting. But because of a lack of time, I have to ignore some of the important aspects in nursing care, like empathy, interacting with patient family and compassion, due to reasons like these." [Anne, PBRN]*

It can be challenging for nurses working in an understaffed clinical situation. This condition may cause them to have difficulty in prioritising nursing care, especially when their ultimate goal is to meet the patient's needs. It was evident throughout the data that nurses frequently expressed their concerns regarding the risk of working in situations where they have to spend more time on technology. At the same time nurses had to cope with other issues like insufficient staffing, which led to disruption of workflow and increased workload. Consequently, fundamental care is occasionally delivered inadequately. Richards and Borglin (2019) view that nurses have the potential to neglect basic care to patients when the ward is understaffed or when the situation is busy, causing them to have to prioritize critical tasks that result in poor quality of care provided for patients. Antinaho et al., (2015) point out the reasons that nurses reduce the amount of time they spend on compassionate care is because it is the most time-consuming. One participant in this study remarked:

> *'The nursing care that requires compassionate engagement with the patient is often time consuming and disrupts workflow; thus, I feel the interaction becomes forced and unnatural." [Amira, (credentials)]*

The above statement by Amira shows that some nurses prefers to refrain from engaging with the compassionate nursing care because they are afraid of not completing required tasks. Another participant pointed out:

> *"...in a constrained working situation, your interaction with the patient's relatives will not be natural because you tried to weigh each word while your mind was wandering." [Henry, WPBRN]*

Modern healthcare systems have caused nurses to have more responsibility and commitments in other non-human aspects of nursing tasks, making it difficult to prioritise

patients. This phenomenon prompted nurses to diminish humanistic practices to compensate for the amount of time required for additional responsibilities (Hasandoost et al., 2020). It was evident from the interviews that more demand placed by the institution on technology caused some nurses to express their feelings of disempowerment because they discerned that their delivery of nursing care did not meet the patients' needs. Especially when they had to compensate the time, they should spend on nursing care with carrying out the physicians' endless orders. This conflict made them feel guilty because they regard the primary core value of their profession is to fulfil patient's needs. Shida expressed this sentiment:

> *"Regretfully, the focus of nursing has shifted to computer skills rather than the needs of the patient. The art of nursing has been lost to robotic care in the name of efficiency and protecting the backside of the institution. Pity the patients who have to endure this severe loss of genuine quality of care." [Shida, PBRN]*

In the above statement, amid Shida's awareness of the impact of the focus shifting from technology to patients, it was apparent that she verbalized her solicitude more towards the lack of concern by the management. In my interview with another participant, she pointed out that implementing a paperless system challenged prioritising nursing care, resulting in her guilt. Meanwhile, an interview with another participant exuded exasperation when she told how nursing shortages were overlooked. The sense of powerlessness emanated from the interviewee from the context that the nurse could not prioritise her tasks. Notably, in the earlier discussion regarding the strategy that nurses use to cope with the unpredictable workflow was to prioritise their tasks, yet it is that same unpredictability that make prioritisation difficult because unforeseen instances occur often in the ICU, making emergent situations difficult to assess. Significantly, when nurses experience an escalation

in workload, it may cause the feeling of helplessness as divulged by Diana and Shida. Traynor, and Buus (2016) contended that these experiences may produce a sense of vulnerability in nurses, especially when faced with constraints beyond their control. The sense of vulnerability forms the basic foundation of the emancipatory practice for them to release themselves from the strain. The feeling of powerlessness is precipitated when the nurse found it difficult to follow best practices and autonomous decision-making in the context of nursing care. This feeling becomes more perceptual when the nurse begins experiencing guilt. A possible explanation is that the motivation to deliver best performance was encapsulated by the guilt emotion when the expectation is not achieved (Bohns & Flynn, 2013). Conversely, nurses who feel guilty are more likely to identify the exact maladaptive behaviours that led to poor performance outcomes than to blame stable circumstances, despite being unfavourable. (Bohns & Flynn, 2013). As reflected by Diana in the following quote:

> *"Technology is not something to be blamed. The tension is felt because of the organisation's heavy focus on technology. In this regard, some aspects that could burden the nurses were overlooked. As a consequence, we tried to cope by prioritising the activities that are technology related." [Diana, PBRN]*

Diana considered that putting a high focus on technological activities became the main factor that would minimise the feeling of guilt. This was evident in my interview with Henry, who indicated that the technical tasks took precedence over nursing care. The nursing care started only after the nurses completed all the sessions involving the machines to which the patient is attached. The same dilemma also surfaced in my interviews with other nurses who indicated that one cause of feeling overwhelmed at work was having to deprioritise nursing

care and expedite the process of nursing care implementation, all in order to have time to duplicate documents within the period of system disruption. Shona explained:

> *"Documentation is important, and indeed it must be timely. However, it should not be at the cost of professional caring and bedside care. For too long we have followed the idea that the chart drives how nursing works. It is time to take back that driver's seat and let the patient decide. There must be a middle ground for the bedside nurse to be able to give the care that is needed and desired and still complete the paperwork needed." [Shona, PBRN]*

Sara provided a detailed explanation of the factors that led nurses to omit the compassionate aspect of care:

> *"Compassion is the one element that all nurses must have. But working here, sometimes you cannot always give consideration to that aspect. Frankly speaking, not everything can be done in the ICU! Our priority is on providing physical nursing care, and we leave the rest, like emotional support, behind. Family members and relatives are the ones who provide emotional support for the patients. Sometimes we don't have time to provide emotional support. Because we need to be quick in providing our physical nursing care, we don't really have time to be friendly with patients". [Sara, PBRN]*

The above statement from Sara addresses concerns over the importance of giving priority to physical nursing care within strict time constraints. By leaving the emotional support behind, nursing care can be implemented faster. Sara's statement seems to suggest that although it is possible to focus on the technical aspects of nursing at the same time as basic care, nevertheless it is crucial to have compassionate values reinforced in a technology-mediated

care environment. Priority is given to nursing actions that use technology to maintain physiological stability and optimise the patient's chances of recovery. The following fieldnote illustrates a situation that occurred whilst the nurses prioritised their nursing action:

> *I witnessed a patient at the back cubicle just now, he was on a nebulizer and on BIPAP at the same time. He was calling for a nurse because of shortness of breath, but the staff nurses assigned to the cubicle were busy attending another patient who was on screen for nursing care procedure. I'm not blaming them because the procedure requires a lot of energy, so they really needed to leave their own patients.*
>
> *[Excerpt from fieldnote, 22 October 2014]*

Having to take care of multiple patients under tight time constraints can force nurses to leave their patients to provide assistance to other colleagues with necessary tasks. I felt uncomfortable at the time, but because I was a non-participant observer, I could not assist the patient. I did call a nurse who was working that evening to assist the patient. It turned out the patient called the nurse because she was not able to breathe due to high mist from the nebulizer.

Previous research shows that the time pressure experienced by nurses often causes them to feel physically and emotionally exhausted, which can potentially endanger patient safety (Govasli & Solvoll, 2020). Especially working in the ICU where nurses are required to be vigilant due to the dynamic clinical environment. I spoke with Anne regarding this situation during our interview, although it was not Anne who left the patient. Anne, shaking her head and speaking in a low tone of voice, explained the urgent patient situations nurses should consider when providing care within the ICU:

"It is difficult to expect how patients in the ICU are going to respond to treatments. We continue the same treatment if a patient is stable at night. But if he or she suddenly gets AF, SVT in the morning? We have to do everything at the same time, take the emergency trolley with us, KIV his or her cardiovert, KIV vasopressin standby, KIV, adenosine standby. We have to take care of all those, so we are wasting time there. Then at the same time technology is not helping! Infusion pump needs fixing, for example. All those things in the environment distract us from doing our job. Then a doctor doesn't want this ventilator, for example. Depends on the patient's lung. We need to use a different one. We need to call the technician. We have to do bagging at the same time. So, our time is full of unexpected stuff. We can't carry out what we planned earlier. We can only carry out our plan for patients who are stable. [Anne, WPBRN)]

The above examples illustrate the way in which the nurse performs nursing care during unpredictable situations. Anne highlights the frequent interruptions of a nurse's activities that require immediate changes in a task or resulted in a delay in completing the original task. Here, technology is commonly understood to be a manifestation of the orientation towards its application in the ICU, especially in perceiving the patient's degree of illness (Pepito & Locsin, 2019). In particular, technology provides the nurse with information in real time, and the nurse carries out actions that best fit the information she receives from the technology. This has paved the way for the emergence of complex, task-oriented nursing care in which nurses tend to overlook the aspect of authentic presence as proposed by Watson (2020). This sheds light on the need for a transformation in the practice of nursing that fits nurses' perspectives of working in a complex environment, instead of the theoretical concept of 'person,' which supported by Starfield (2011). In this context of nursing practice,

a nurse's way of being with patients is the pattern or form of the nurse's care (including clinical judgment). How this way of care is expressed and received is a reflection of the interior and exterior environments of both the nurse and the patient (Jarrín, 2012). This argument could be a reasonable explanation as to why task-related nursing care became desirable to ICU nurses because it satisfies the needs of both the critically ill patient and the nurse. This was evident from many participants, and Henry explained in detail here:

> *"I never liked the term patient-centred care because to me it can't be applied to the care situation in the ICU (...) For conscious patients, I couldn't communicate with them due to the lack of time (long pause) because I have to attend to the needs of other patients who are unconscious and intubated. We are understaffed. The ratio is two nurses to four patients. It is difficult because the work environment in the ICU is different from that of normal wards. Patients are critical here, and our approach is different. We are dealing with patients who can literally be considered as life-threatening." [Henry,WPBRN]*

Stayt, Seers, and Tutton (2015) claim that the encounter between nurses and patients is mainly task-related and is delivered in a largely 'impersonal manner' when patients have received mechanical nursing care and nursing professionals have not attended to their needs. Arguably, the excerpt from Henry demonstrates that the way nursing care is carried out is relative to the condition of patients whose needs cannot be met through normal ward care. Personal limitations and technology resources in the ICU environment form the basis for Henry's opinions. Henry's decision to prioritize patients who are unconscious and intubated in some instances is plausible for nurses who seek to provide a high chance of survival for critically ill patients. Nevertheless, his viewpoint has its pros and cons. It can compel a nurse

to complete his or her tasks faster rather than providing care specifically personalised to the patient's needs

Some researchers argue that this orientation leads nurses to treat patients in a detached or even dehumanized way (Stayt et al., 2015). This is because it can lead to a de-escalation in the nurse's ability to be empathetic to leverage technologies with the belief that they are most likely to achieve the goal of care, which is to preserve life (Reuben & Tinetti, 2014). The complexity of the care environment is one of the factors contributing to expanding the gap between these two paradigms, because technology and touch contribute to dual paradigms in care (Barnard, 2002). Arguably, nursing scholars who study in the field of complex systems assert that technology has a natural tendency to make the nursing care environment increasingly more complex and has implications on nurse workflow processes (Krel et al., 2022). Hence, nurses need to work in a 'complex adaptive system' where they adapt their behaviours based on what they consider appropriate and act in discrete, parallel fashion in their day-to-day work (Hopkinson & Wiegand, 2017). Participants spoke about the challenges they face in confronting the shortage of nurses. This is evident when some participants in the study specified time constraints. Ruby provided clarification regarding the workload burdens that limit her capacity to provide better nursing care to patients:

> *"Actually, we are understaffed here in the ICU. It is supposed to be one nurse to one patient. If we could stick to this, we could provide all the nursing care that we needed to provide, like two-hour turning. When we are busy because we are understaffed, we only provide the most important nursing care. For example, when a patient needs to be resuscitated or he or she needs to be weaned. It would be easy if there was only one patient in a cubicle. Then we could pay more attention to him*

or her. We could still cover. If we could not do two-hour turning, we could still do four-hour turning. That's for turning. For ventilated patients, we have to monitor their airways and do suctioning. Not only doing suction through the tube but we also have to do oral suctioning. We also have to do mouth toilet. We have to do all these because one of the reasons why patients get infections is through the provision of nursing care." [Ruby, PBRN]

Ruby insisted that she would be able to give greater attention to patients if the care environment has more favourable patient-to-nurse ratios. Otherwise, this constraint has tied more of her attention to the taking the approach of which nursing task she can complete faster. At the time this study was conducted, Malaysia was experiencing a shortage in its nursing workforce within the healthcare system. The shortage, caused by the low number of nursing candidates due to budget cuts by the government in education, including nursing education (Nkosi, Asah, & Pillay, 2011). Addressing the shortage, Sara commented:

"We are lacking critical care nurses because nurses with specialisation in the country prefer to work in other countries like Singapore or Saudi Arabia. This contributes to increases in the number of 'not well-prepared' nurses practicing in the ICU. This imposes extra demands to senior nurses like me because we need to supervise them, at the same time practicing our role in caring for patients." [Sara, PBRN]

From a safety perspective, a study by found that extended shift length was associated with lower safety practice by nurses and higher odds of reporting incidents pertaining to patient safety and associate extended shifts with a greater risk of error (Ball et al., 2014). Malaysian legislation has legally defined the required minimum nurse-to-patient ratio in a critical care

unit, which must be 1:1 or at certain times 1:2 (Malaysian Ministry of Health, 2013). However, it is up to the institution to determine how to ensure that staffing is appropriate within certain limitations. Many studies associate low nurse-to-patient ratio with poor quality of care (Amin, 2011). A study conducted in one of the public hospitals in Malaysia found that high patient-to-nurse ratio was negatively associated with patient safety (Jarrar et al., 2015). For example, Diana indicated that a potential mistake could occur if nurses have an excessive workload. Therefore, nurses must prioritise the aspect of patient safety to feed the aspect of human care. She stated:

> *"Of course, I am concerned about lack of that aspect (compassion). But I have no option. The ICU nurse is supposed to take care of one patient per nurse, but here we need to take care of two patients simultaneously. Normally I would ask someone (another nurse) to keep an eye on my patient. In this situation, technology seems helpful because the alarms will sound if something happens to my patient. At the same time, I frequently sneak a peek at the patient's vital sign data from here." [Diana, PBRN]*

Because of the complexity involved in ICU care, participants mentioned that they project satisfaction towards patient safety. This was apparent in a statement from Maria;

> *"regardless of whether care is oriented to technology, as long as nursing care is safe, it is appropriate." [Maria, PBRN]*

The following account provided an overview of the repercussion of nursing workload on nursing performance.

"The bottom line is, in situations like these when we cannot finish charting during the shift, we continue it because if you get caught skipping the charting...((smile)), the administration will always give the same old song, saying you have poor time management and trouble in prioritising. Sure, you can protest, you can give specific facts, but it is just a losing battle. For those of us who don't cut corners in delivering care and strive to be the best nurses we can, we just need to endure the painstaking working conditions." [Diana, PBRN].

7.2 Navigating nursing in the technology -centred clinical environment

In listening to the participants, the concept of powerlessness was established through statements related to the emphasis on the use of technology that led to the abrupt transformation of nursing practice. I noted the participants imputing their experience to the 'transition period' where they had to work in a changing working environment. Undoubtedly, healthcare transformation is gaining momentum in all aspects of services in Malaysia in recent years, including nursing care delivery (Tobi, Masrom, & Mohammed, 2018). Hence, the dramatic integration of new machines and computers added another layer to the dynamic workflow in the ICU. In addition, the study site was selected as a pilot project in the health sector's efforts to introduce a paperless healthcare system and the use of technology comprehensively in every health institution in Malaysia. This situation provided a reasonable context to the statements from the participants in this study, who viewed this situation as a pressure on them to adapt to the drastic shift in nursing practice. Arisa explains:

"*When it comes to technology, nurses said that it is actually painstaking. It is painstaking for them to key in information in the system and whatnot. We used to do things manually and the nurses said it was easier and faster doing things manually. But here, things are supposed to be paperless, but we still use a lot of papers despite using the system. It is better to be put only in the system. But nurses prefer hardcopy documentation. The new format is that everything must be keyed in in the system. It becomes a hassle for them to balance things out between putting everything in the system and keeping hardcopy documentation for themselves." [Arisa, ICU nursing manager]*

It was evident from the nurse's statements, that the high-technological care environment presents a double-edged sword effect on nursing practice. Several factors render whether technology becomes an advantage or disadvantage to each nurse. For example, Sharon illustrates the key advantage of technology in the ICU is that it facilitates better information flow across care settings, which in turn speeds decision making and creates better health outcomes for patients.

"…with older version of machines, it is harder to do reports, we need to use papers. But, in the ICU, we just click on the computer we can see everything there, like blood investigation results, so it's easy for us to detect any abnormalities in patients. In the absence of the latest technology, we have to wait for the results to come out on papers. It's such a disadvantage" [Sharon, PBRN]

7.3 Cognitive burden

Meanwhile, Anne described the additional pressure imposed on her, cognitively, when navigating the nursing practice in the ICU due to the intensity of technologies in use.

> *"In the ICU, I had to learn a lot on treating intubated patients, how to treat them properly with ventilators unlike in the Burn Unit. Ventilating patients in the Burn Unit was very general, just general ventilators. I didn't learn properly how to treat ventilated patients." [Anne, WPBRN]*

It is apparent from Anne's comments that there was a greater emphasis given to the aspect of safety that imposed cognitive demand on her. Robinson, Vytal, Cornwell, and Grillon (2013) defines cognition as either "information processing," "conceptualizing," "to know," or "to recognize." In the context of participants' stories, cognition is described as processing information from technology and determining how to use that information to increase nursing performance, or to form the basis of adaptive strength. In analysing the data, I realised many participants in this study were putting more emphasis on cognitive demand when they narrated on therapeutic technologies, most notably, endotracheal intubation and invasive ventilation. Nursing practice in the ICU greatly differs from nursing practice in general wards, and the intensive use of technology has a significant impact on nursing care. The nursing care orientation focus on technology was underscored by the fact that majority aspects of patient care are dependent on technology. The following excerpt details the appealing aspects of technology because it makes patient care more effective (or efficient, either is applicable):

> *"In normal wards, we still have to do bagging instead of putting patients on a ventilator. Patients would not be well-oxygenated with bagging. In the ICU, we can*

connect with new technology, so we can make it easy for patients. We can reduce the possibility of infections, so I think it's good to have the latest technology around. [Shona, PBRN]

Care of patients in general wards is distinct from treatment of patients in the ICU. It is apparent that the patient is the primary context of Shona's statement when comparing the characteristics of the ICU and its variations from the normal ward because of the increased use of technology. It is the degree of illness in ICU patients that requires technology to play a pervasive role in preserving a patient's life (Stayt, 2015). That is the norm in the ICU, therefore this study has implications that extend beyond basic nursing care for nurses working in the ICU. For instance, in the following excerpt, Fuad perceived basic care has increased in complexity when concerns are placed on the technologies in addition to the patient as a person:

"...As you enter the ICU, you see that all the machines, equipment, the monitors with the alarm sounds keep beeping, the data on the monitor is blinking. And as you make reports about the patient, you'll take care of that day there are lists of care that involve technical tasks, for example, endotracheal suctioning. Even you will have some qualms about the task that you found unchallenging before this, such as positioning the patient. This is because when you want to position the patient in the ICU, you need to manipulate and adjust all the tubes, the ventilator alarms are often beeping, and you need to make sure the endotracheal tube is in place. [Fuad, WPBRN]

The statements from Shona and Fuad are substantial because they provide the context for the concept of trustworthiness of technology in patient care. It also provides context to the

theme of helplessness that arises from the need for reliance on technology to determine the form of their nursing practice. Participants across this study acknowledged that they were motivated by how technology helped them perform tasks more effectively. As apparent in Shona's statements, the integration of technology in nursing care seems to be promising because of its reliability in providing better care to the patients. Consequently, she felt more secure and in control. Meanwhile, Fuad cited technical aspects that make nursing practice in the ICU more challenging. Fuad's statement suggests that technology can add a layer of complexity in nursing care, which is fundamental to why nurses emphasise technical competence in this study. Ruby stated:

> *"A machine is only a tool. Humans need to be responsible in handling them to make sure they are safe for specific functionality. This is because technology is only capable of extracting data and is mechanistic in nature. So, it is in the hands of the nurse to make it safe for the patient or not." [Ruby, PBRN]*

Ruby's statement indicates that technology can contribute to either be useful for nurses or be a pitfall for nurses and patients. Apparently, nurses across this study are aware of the necessity for nurses to have competency in using and handling technology. It was evident during my observation that they conspicuously learnt how to use technology and sought the meaning of the data from their colleagues. As Janet described during an interview:

> *"I like to ask the seniors with post-basic education because they have wider knowledge about the ICU (pause) as compared to those with no such education. I can see the difference in terms of their theoretical knowledge. Knowledge in terms of providing treatments in the ICU like setting the ventilators and reading ECG, they can tell me everything about that, like intensivists." [Janet, (credentials)]*

From the analysis, there is evidence that shows the participants acknowledged the two sides of technology in which it is capable of both doing and undoing damage. On the one hand, technology has the potential to optimize the delivery of nursing care by easing previously time-consuming tasks and reducing physical burden through assistive devices such as electronic beds, transfer devices and feeding pumps. In other respects, the use of technology exposes nurses to unwanted risks that can have the potential to become a threat to patient safety. In this respect, most participants did not directly specify technology as the sole threat to patient safety. However, they asserted the need to work in circumstances that jeopardise patient safety such as working in an understaffed environment. Izwan explained:

> *"When the situation is not busy, of course, I have time to make sure whether the patient's condition is deteriorating or the machine is faulty. I'm sure all the nurses here will act the same. I never encountered a situation where nurses were unconcerned when the alarm goes off when the ward was not busy. At least we went to look at electronic monitoring." [Izwan, PBRN]*

Izwan figured that the time constraint hindered him from being attentive to the patient. Izwan's statement implies that the increased complexity of the environment influences how much information he can process at any given point in time. The direct impact on nursing workload is that it increased the cognitive work of nursing, which influence the coping mechanism of nurses in how the respond to the cognitive loads (Vasel, 2016).

7.4 Value conflicts between humanistic care and technological care and the emergence of emancipatory practice

While nurses argue that working in a high technology environment prevented them from providing more humanistic nursing care, they also recognised that they are powerless in changing existing constraints. Similarly, some nurses see this constraint as a barrier to performing their core function as a nurse, which is to perform nursing care. This view is at odds with the nurse's early perceptions of technology, which were positive. They believed it could help shorten their time performing tasks, reduce uncertainty, provide a sense of security to patients, and shield them from being blamed by those considered superior in the hierarchy.

The most obvious example was when I interviewed Ruby and Anne. They share the same opinion that nurses should prioritise humanistic care, whether busy or not. Anne talked of her difficulty in tailoring the implementation plan to the patients, and how her goals of nursing care were not met. She recounted her experience of caring for her own family members admitted to the ICU, she learned the patient's family also experiences feelings of confusion, stress, and uncertainty.

> *"To be on the side of the patient's bed, I had to cross the tangled wires and stand between the intravenous drip stand, the infusion pump stand, and the ventilation machine. The feeling of caring for one's own family in the ICU is different from caring for a patient in the ICU. Maybe emotions play a role. Nevertheless, after experiencing the situation myself, I became more concerned about patients and their family members. I want to make sure the patient's experience of care and the process*

of recovery is as holistic as possible, not just orient them to treatment and technology options." [Anne, credentials]

Families are also disengaged from their everyday social context and placed in a strange environment. They stay in the crowded visitor room with other people, nott knowing whom they could ask questions, or how to get information, or how to behave while at the bedside where the patient that is surrounded by machines and health providers. When pointing out that the patient ‘suffers more than me,' Anne stressed that she felt conflicted about prioritising tasks involving technology that prevented her from forming therapeutic relationships with patients. After her experience caring for her own family members admitted to the ICU, she had more empathy for other patients. This shared situation triggered the ability to be aware of constraints through situations. The value conflict began when Anne was unable to express her empathy for a patient due to the increased workload from the paperless system implementation. This conflict emerged because the new paperless systems remove her from the bedside, making her feel distant from the patients. The motivation to instil the humanistic element in technology was evident from the phrase, *"I want to make sure the patient's experience of care and the process of recovery as holistic as possible, not just oriented them to treatment and technology options."*

Nursing care constraints resulting from documentation woes significantly impact nurses and patients because such technology distances them from patients. This was evident when Azima dealt with an ethical dilemma. The nursing profession's value is embedded in meaningful relationships with patients, which Azima identified as an essential professional value that distinguishes nurses from other occupations. Nevertheless, the organisational desire to boast a technologically advanced hospital environment took precedence over any

further consideration, which led to her spend more time focused on technology related activities and reduced her capacity to develop meaningful relationships with the patients. This has prompted her to re-evaluate the principal value that is considered the essence of nursing, namely humanistic nursing. Ruby explains the value conflict by comparing nurses' work before and after the ICU transformation. She has worked for many years and realises that working in a constrained environment makes her feel stressed as she cannot perform her core function as a nurse. She adheres to the true essence of nursing, that a nurse must be caring sensitive to patient needs.

> *"Before the ICU is upgraded with vast technologies, I always spent time, I mean I being with the patients for the majority of the time, reassured their family members, especially patients in the ICU are critically ill patient, end of life care is essential, but now I just was not able to do all that, like used to." [Ruby, PBRN]*

Because there were two different generations of nurses in the ICU, namely those who worked pre-transformation and those who worked post- transformation, there were differing views around the essence of nursing. From their statements, the older nurses emphasised humanistic nursing values. In contrast, younger nurses like Amira, Janet, and Henry are more focused on their efficiency in handling technology. Thus, Ruby feels a responsibility to make sure she always reminds young nurses to pay attention to the actual value of nursing. A nurse needs to have a caring attitude and view patients as human beings in need, no different than other human beings. At the same time, she understands that the constraints they experience limit their chances of manifesting that caring attitude into daily work.

> *"As a senior nurse, I always advise the group of young nurses to spend more time and effort to provide quality nursing care to the patient. Nevertheless, deep down, I*

did not blame them because working under intense technologies makes me feel like walking on a tightrope…because of all these, the alarms, the devices need fixing, the machines need calibration." [Ruby, PBRN]

Awareness of these conflicting values prompted them to make a solution by reconciling the conflicts. Senior nurses remind younger nurses to emphasise the humane aspects of nursing, and young nurses share their competencies in using technology with the older nurses. Through this value adaptive process, they try to make technology more humane. The documentation constrains and increased reliance on technology caused them to get further away from the patients, but the dependence on technology also enabled them to cope with a changing work environment that restricts them from performing the core function of their profession in a way that preserves their self-image in an oppressive situation.

CHAPTER 8: CORE CATEGORY

The emancipatory practice of nurses working in the high technological environment

8.1 Introduction

The previous chapter discussed the categories that emerged from the experience of nurses working in the highly technological environment of the intensive care unit. This chapter focuses on the core category of the study that was established based on the emergent categories and relationships between the concepts identified in the previous chapter. The emancipatory practice emerged as core category that reflects the basic social process in response to the impact of technology on ICU nurses. This core-category supervenes the emergent stages discussed in Chapter 8, which are experiencing sense of powerlessness and constructing professional identity. The discussion of this present chapter is based on the following conceptual model:

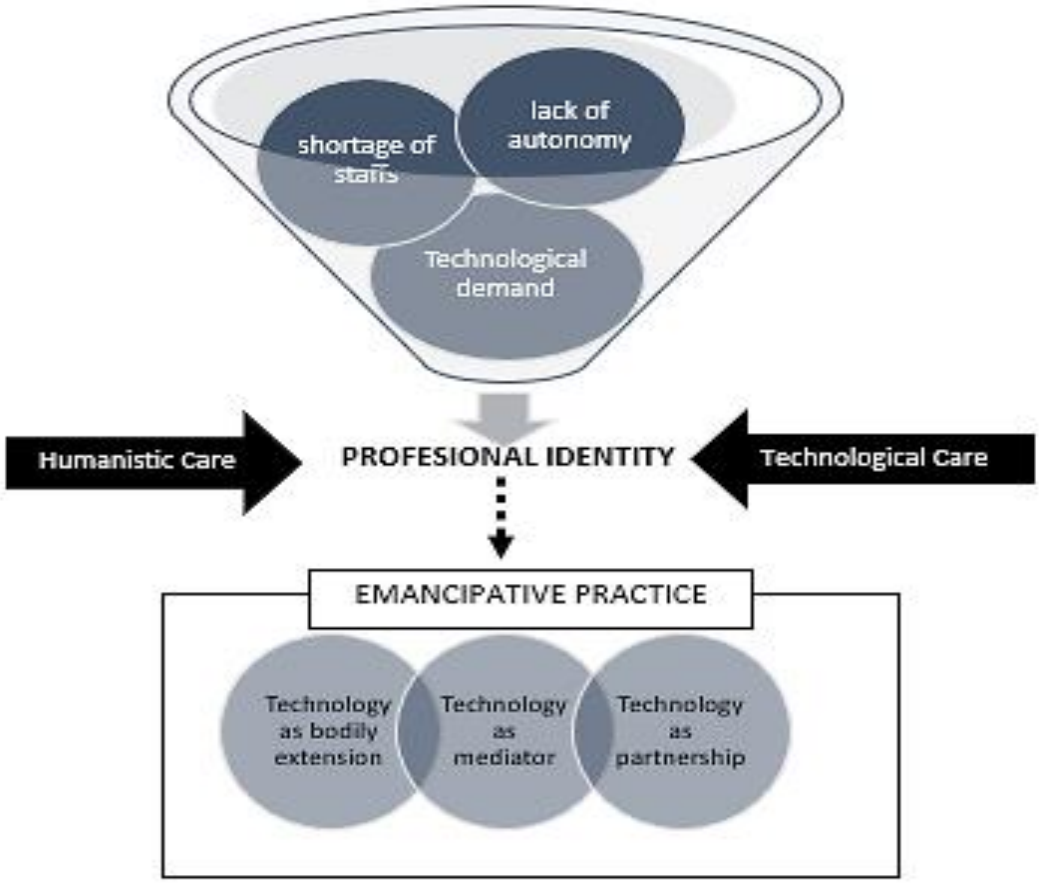


Figure 2: Conceptual model of the emancipatory practice of the nurses working in the high technological environment

8.2 Reconciliating value conflicts

The theme of 'reconciliating value conflicts' describes nurses reconsidering their professional values to suit their work activities. This reconciliation is made so that nurses can build an identity they perceive as relevant, valuable, and practical (Alvesson and Willmott, 2002). However, this identity was often threatened, due to lack of autonomy, it

was fragile due to unstable technological functions, and insecure due to increased workload caused by the nursing shortage. As an example, Ruby asserted that professional values are the driving force behind professional behaviour, and that the consequences of acting in a way that is contrary to professional values may help decide future undesirable professional behaviour. Ruby, reflecting on her career, said:

> *"...I still ask questions to my colleagues, particularly to younger nurses, like how to do this and that. Junior nurses are well-versed in utilising technology, unlike us senior nurses. We did not have enough exposure to technologies back then." [Ruby, PBRN]*

Ruby argued that the implementation of high technology into the ICU landscape and making the current generation acclimatise with the contemporary practice forced them to disregard the prescribed professional value of the earlier generation that views the human connection like a professional purity. In other interviews with Shona and Sara, they had a similar idea about younger nurses. They seemed concerned about the lack of empathy and sensitivity from younger nurses towards patients' needs. When I interviewed a few young nurses like Amira, Janet, and Henry, their statements reflected their attraction to technology. Amira, for instance, claims to be very proficient with modern technology. As a result, she enjoyed technology research to learn more about its benefits and applications. On the other hand, Janet enjoyed the constant reassurance she received from nurses outside of the intensive care unit that she and her colleagues were icons of nursing excellence due to their specialised knowledge. Henry, for his part, has said that he appreciates the ICU's mentorship structure since it gives him a chance to show off his skills to his fellow nurses:

".... I can undoubtedly learn from more experienced nurses, but sometimes they like to find fault, especially in nursing care. However, when in a technology situation, they started to panic. At that point, they are immediately being humble and asking for the young nurse's help (giggling). "[Henry, WPBRN]

A statement from Janet stressed that adhering to a top-down chain identity limits the autonomy of new nurses' practice. The older nurse's lack of acceptance of a work culture that adapts to high technology caused complexity in her work. Given that situation, Janet suggested that more senior nurses change their thinking and accept the current practices. Janet pointed out:

"Junior refers to senior! Juniors usually ask seniors before performing the procedure because doctors trust seniors more than juniors. It is like a crab teaching other crabs to walk straight." [Janet, WPBRN]

Contrasting with Janet's point of view, Amira stated that she would only pay attention to patients if electronic monitoring indicated her to do so. Amira believed working in this way helped her cope with the workload. When she stood at the patient's bedside to deliver nursing care, sometimes she found it difficult to get in and out quickly. She had to cater to the patient's family, who had inquiries and wishes regarding patient care. This situation made her delay documentation tasks until later in her shift. She stated:

"...this happened in the initial period the paperless system was introduced here. At that time, I gave priority to nursing care and spent most of my work shift with the patient. I got caught a few times for late entry documentations. There was one incident, I got caught by the anaesthetist for late entry documentation of haemodialysis input and output of my patient. She complained to the sister (ICU's

head nurse) later. After that, I changed my work orientation. I give more priority in ensuring that I do proper documentation." [Amira, WPBRN]

The above evidence shows how nurses in the ICU try to establish their ideal professional identity by combining humane and technological values in the care of their patients. However, as discussed in the theme 'navigating through complexity,' nurses had to face situations that caused them to provide more humane patient care. Nevertheless, based on the theory of self-affirmation that was originally developed by Steele (1988), an individual is more motivated to maintain self-integrity when exposed to situations that threaten said self-integrity. They feel such a situation will create stress and self-defence that hinder performance and growth (Porras, 2011).Thus, they focus on the aspects that can highlight their competence in technology. For example, Sharon stated that she has competence in interpreting alarms, yet there was an incident where her interpretation was wrong. However, her statements elucidated her technological competence level were more self-affirmation. Cohen and Sherman (2014) suggest that an individual is more aware of his or her unstable identity when exposed to situations that threaten their self-integrity. They feel such a situation will create stress and self-defence that can hinder performance and professional image. Take Ruby's statement as an example:

" Because of technological advancements, we now have instantaneous access to information from anywhere in the globe, allowing us to more efficiently provide for our customers' needs. So, our practice is under scrutiny because patients' families can seek input from the internet. So, they tend to assess our knowledge by asking questions. On this condition, nurses should be able to answer their questions

precisely. That could be one of the reasons that sometimes I prefer not to go near the bedside." [Ruby, PBRN]

In Ruby's situation, taking self-defence approach will prevent her from being involved in an environment that threatens her professional identity. Self-affirmation intervention usually requires someone to assess the core values they have held over the years and allow individuals to evaluate them using a broader view of themselves and the environment that restrains them from following the values they hold. In this way, they could undermine the implications of the threat to their identity (Cohen & Sherman, 2014).

In reconciling with value conflicts, nurses consider two values to shape their identity as ICU nurses, namely, (1) human values in nursing care and (2) competence in technology. Their identity as a nurse in the ICU requires speed and accuracy. As discussed earlier, these criteria are essential to cope with the knowledge-intensive environment of the ICU and unpredictable workflows. In this study, nurses were aware that the deterioration of humanistic nursing care would bring a bad image of themselves. However, some participants felt it was challenging to deliver humanistic nursing care to patients due to their constraints. In addition, it made nurses feel that their job was incomplete and therefore did not t provide genuine satisfaction. As Diana expressed:

"... I should have done more to the patient.... yet, I felt that I had already given my best to the patients." [Diana, PBRN]

Another quote came from Anne, who expressed that she could not deliver the care she wanted. As a result, she decided to ignore compassionate care due to time pressures and the heavy demand to care for two patients simultaneously, thus causing Anne's feelings of inadequacy.

... I am not completely happy with the level of care that I provide to my patients. I want to do more for my patients…I could not catch up with everything, you know. So, I have to ignore some of the important aspects of nursing care, like empathy, interacting with patient family, and compassion…" [Anne, WPBRN]

She admitted to being dissatisfied because time constraints prevented her from paying more attention to the nursing care she provided. Incidentally, at the time of data collection, there was an issue about the lack of nurses in the study setting. Due to the shortage of nurses, ICU nurses had to take care of patients beyond the quota set by the organization. During observations conducted on Anne, I watched as she cared for two critically ill patients on one shift. The result was that Anne was unable to focus on nursing care. Anne prioritised observations, documentation and procedures required to manage the nursing station, like answering calls from the laboratory and radiology, or managing lab specimens for patients. The most compelling statement about this magnitude of values constraint was from Sara. She agreed that humanistic nursing provides the meaningful values of nursing practice and for the nurse's job satisfaction. She regarded humanistic nursing as a benchmark of the standard quality of nursing care, and she found it challenging to provide more humanistic nursing care regardless of working in a highly technological environment. She clarified,

"The ICU situation is currently unstable due to lack of nurses and an influx of new technologies. Balancing between work involving technology and humanistic nursing care is difficult because priority should be given to only one. For example, if priority is given to technological care, then nursing care will be disrupted." [Sara, PBRN]

Sara justified her reason to sacrifice humanistic nursing care to focus on technology care. From her statement, nursing care and technology care y are two opposite elements. Guided

by the "mediation approach" in the philosophy of technology, Verbeek (2015) argues that humans and technology should not be seen as two "poles" on which interaction exists; rather, they are the result of this interaction. In most cases, the relationship between humans and technology creates a link between the two worlds, in which technology plays an intermediary role in human's lives. Therefore, the increasing use of technology in nursing care is not something that requires a specific nursing approach because transformational practice occurs naturally, forming new practices and experiences (Verbeek, 2015). Now apply Sara's information to Henry, who sees communication with patients in the ICU as unconscious patients only through technology.

> *"I will communicate with awake patients and inquire how they are feeling. For the unconscious patients, communication happens in a one-way through my observation and my knowledge of interpreting data." [Henry, WPBRN]*

The above statement gives the impression that nurses sacrifice nursing care because it has no significant effect on their performance. In contrast to other professions, the nursing profession is more geared towards the context of human relationships (Rad, Mirhaghi, & Shomoossi, 2016). However, digitization blurs the line between physical, digital and biological spheres (Verbeek, 2015). Even though it is very important for the healthcare field to continue digital transformation, Rushkoff (2021) argues that when working with too much technology, a person's tendencies will usually be controlled by technology because they consider technology smarter than human beings. This causes people to go about their daily activities using the results of information processing,, which causes them to describe their worldview in terms of utility value. Grissinger (2019) stipulates the issue that is often overlooked is using technology to effectively delegate and outsource ethical and complex

decision-making to the technology. He believes that technology-guided problem solving requires not only accuracy in interpreting data, but also a high level of confidence in decision-making and problem-solving processes. These difficulties, along with the increasing use of new technologies and reliance on data access, make a person more likely to focus on technology than anything else. Other participants, such as Amira and Maria, stated that they were more concerned with technology than humanistic nursing care because technology in the ICU has significance in saving patients' lives. Because of that, they assumed that the way they practice nursing care could not be referred to as dehumanization because what was more important to them was the true intentions of a nurse. Shida best described this opinion:

> *"When I was working on a busy day, I made sure that the machines and devices were in good condition, working well, and ensured the screen did not get blocked by the bedside screen to see it from afar. It is also vital to ensure that the alarm system is functioning and not muted. I instil my authentic intention into technologies to know about patients and ensure safety. High-intensity technology and ICU nurse are inseparable. Being technologically competent is what distinguishes us from others." [Shida, PBRN]*

Shida's quote gives the impression that she assumes her authentic intention towards caring for a patient is more significant than her reliance on technology. She believes her motivation to maintain patients' safety and save their lives drove her to pay more attention to technology because the technology is an indispensable part of the ICU nursing practice. For Borges and Soares (2013), caring goes beyond the implementation aspects of nursing care and fulfilling protocols regarding patient care, it involves an accurate understanding of the patient's needs

and the formation of a relationship between the nurse and the patient. Nevertheless, according to Shida, changing the ideology of caring has helped her regain control over nursing care practice:

> *"I learned to carve my own identity from someone who obliged to the traditional view of nursing to someone who embraced the technology opportunities. I do not think that it makes care lack humanistic-oriented values." [Shida, PBRN]*

Shida imparts that a great deal of the sense of identity is seen in how she is able to distinguish the characteristics of the ICU nurses from the non-ICU nurses, co-creating the professional value of nursing by including technological care in tandem with the humanistic-oriented care as a core value and guiding principle. The participants in this study recognized the importance of technology use in the ICU, agreeing that ICU nursing and technology are inseparable. Although the high technological ICU environment posed challenges in caring for ICU patients, nurses felt that having competence in technology brings benefits in providing care to patients. This suggests that technological competence is worthy of significant philosophical reflection. This is the conceptual link between professional identity and value conflict, and why these two concepts became entwined through emancipatory practice. In the next section, data is presented where both professional identity and conflicting values are evident.

8.3 Using technology to emancipate nursing care practice

The nurses in this study underwent a change in nursing practice following the integration of large-scale technology, including increasingly sophisticated machines and paperless systems. Consequently, technology elicited apprehension and complexity in the working environment that was evident from Amira's and Shona's interviews. Both of them spoke about the pressure of working with technology and it became apparent that the emerging technologies resulted in a dual effect – (1) facilitating information-seeking, and (2) impeding nursing care. Shona pointed out that emerging technologies bring complexity to her nursing practice. Lack of knowledge in using and interpreting data from technology raised concerns for her because the technology used to care for critical patients is mainly life-saving technology that requires nurses to understand before making clinical judgments. She also details how the pressure of working in an intense technological climate engages her interest in technological knowledge and skills acquisition:

> *"Initially, I felt that technologies here were too complicated to learn, so this kind of thought held me back from learning them, not until I had to handle the machines on my own. At that time, I was unsure what to do when alarms kept going off, indicating that patient had atrial fibrillation. I called the anaethetist and the patient was resuscitated. After a few minutes of resuscitation, the patient's cardiac rhythm did not show any improvement and the head nurse asked me to call the medical assistant to check the monitor. He came and connected to new cardiac monitoring. Surprisingly, the cardiac rhythm appeared to be normal. I was panicking because I could not identify whether it was machine problems or patient's problems. I never expected that the technology would become such a nuisance. So, from that*

experience, I realised that I put too much trust in technology. Because technology could make error too and it made me aware the necessity of learning technology." [Shona, PBRN]

Although technology is developing and widely used in the ICU, it cannot function optimally without human involvement. This is because the information displayed on technology requires the knowledge and wisdom of the individual to understand the information, and to corroborate the data with observation to form the context (Pepito & Locsin, 2019). This is because technology is human-dependent, machines can only do what humans' program them to do. Even though artificial intelligence exists, it cannot independently form new contexts and have a diversity of knowledge like humans (Pepito & Locsin, 2019). Instead, a combination of human knowledge and artificial intelligence is needed to provide nursing care in the ICU's nursing practice. Verbeek (2015) indicates that the most common misconception is that the interactions between human beings and technology are typically indicated in terms of functionality and usability. In his Mediation Theory, Verbeek (2015) argued that advanced technology could not be characterized adequately as "use" relations because this conceptualisation contributes to more risks than benefits. As with Shona's case, technologies like electrodes attached to the patient's chest to record the electrocardiogram were used, but the configurations of technology by the users contributed to technology usability and functionality. Verbeek (2015) characterizes this interaction as immersion and fusion.

The duality effect of technology depends on the dichotomy of whether technology brings benefits to nursing practice by facilitating the work of nurses or technology keeps nurses away from patients. According to participants like Izwan, Fuad and Izat, technology

makes it easier for nurses to estimate a patient's condition and then indirectly makes them feel that they know the patient better, but Amira's story paints a different picture. Amira states that the use of high technology makes her hesitant to interact with patients and their families because every time she approached them, they only questioned information about what they saw on a screen. She perceived technology brought complexity to her interaction with the patients due to the abundant number of alarms, not to mention the challenges she faced with relatives of patients. Amira admitted that she was still not proficient at interpreting the data and felt unsure of giving an answer, reiterating the experience she had with a patient's family who showed mistrust in her after she could not answer their questions with confidence. Experiences like that one is why Amira resorted to expediting her nursing care to the patients.

Another justification for spending less time with patients was because patients in the ICU generally cannot speak because they are intubated and ventilated. As argued by Henry, mechanical ventilation impedes his communication with patients because they lose the ability to speak:

> *"Patients who use mechanical ventilation cannot speak, although I am aware among the values that nurses need to have is to understand the patient's needs, but how would I understand their needs if I could not communicate with them. So, it is just the data from technology that helps me understand patients' needs." [Henry, WPBRN]*

Anne argued a differing perspective. When taking care of patients who use mechanical ventilators, she frequently encounters patients' families who are frustrated because they

cannot communicate directly with patients. This causes them to continually question the patient's condition. Anne sees this as a factor that makes technology a perceived nuisance.

> *"Sometimes when they were standing at the patient's bedside, they would talk to the patient or the patient tended to talk to them, so the ventilator alarm goes off. Every time the mechanical ventilator went off, they would look at me anxiously. No matter how often I explained to them, they still looked at me as if I did not care because I did not take any action." [Anne, WPBRN]*

The intensive care unit is a facility that treats patients who are in critical condition; as a result, the nurses working in the ICU were more focused on duties that were directly tied to preserving the health of their patients, such as stabilising vital signs, than they were on communication. Participants were regularly placed in high-stress circumstances where they had to prioritise the needs of several patients, making it difficult to stop what they were doing to have a meaningful conversation with any one of them.

In the view of professional identity, technological advances were greeted with concern by the nurses in this study, rather than confidence. This was due to a significant shift in the nursing practice. It presented a new challenge in nursing where previously the development of nursing theory made progress in distinguishing the domain of nursing from the domain of medicine (Trotter, 2019); many of these theories categorize humanistic care as a holistic domain of nursing practice. The integration of advanced technology in the ICU, although it has improved the efficacy in healthcare delivery, worried nurses rather than promised positive implications to their profession. It was evident in this study that the organisation's focus on digital transformation overlooked the constraints faced by nurses, such as the shortage of staff, malfunction of the technology and feeling overburdened by the

demand for technical documentation. As highlighted by nurses in this study, paperless documentation systems caused them to spend too much time on technology rather than delivering nursing care to the patient.

The conflicting values between technological care and humanistic care became one of the most challenging aspects of the nursing care practice in this study. For example, Azima revealed that she felt burdened by having to deal with an ethical dilemma because a meaningful relationship with the patients is what should be embedded profession's value. She identified humanistic care as an essential professional value that distinguishes nurses from other occupations. Nevertheless, the organisational desire to make a high technologically patient care environment took precedence over any further consideration. This situation has led to her inevitably spending more time on technological care and reducing her capacity to deliver humanistic nursing care.

Although nurses in this study unanimously argued that their actions were contrary to the values of nursing that they desire to portray, they also indicated that technology could help them perform their duties effectively and safely. A compelling statement came from Shida when she recalled that changing the ideology of caring has helped her regain control over nursing care practice. She insisted that the feeling of not being good enough was a factor that motivated her to leverage technologies to put nursing care as central focus. Participants perceived that technology contributes to a more predictable environment, making them feel in control and safe despite whatever constraint they face. The only way to establish a 'predictable environment' in this setting is to become proficient in technology use and to have the technical skills to interpret the information received from technology and corroborate it with the patient's condition. Technology lets tacit knowledge be shared

through intergenerational sharing practices and contributes to a collective identity. According to design theory, the main characteristic of technology is it is designed to generate behavioural change and habit formation, most often without the user's knowledge or consent. As a consequence, people change their attitudes to suit their technological reliance behaviour (Rushkoff, 2021). This concept was reflected in this study when nurses changed their approach to caring to suit their need to rely on technology in the ICU. Rushkoff (2021) argues that people are reliant on machines to dictate their actions, even though, in certain cases, it makes people act against their own better judgment. As such, technology is optimizing people instead of people optimizing use of technology. Reflecting on the reconciliation of the values constraint that was illuminated in this study, it was evident that despite the participants conforming to the prescriptive, the most important value in nursing is caring. This value confers the true essence of a nurse. However, in Shida's story, the view changes:

> "*I learned to carve my own identity from someone who obliged to the traditional view of nursing to someone who embraced the technology opportunities. I do not think that it makes care less humanistic-oriented value. When I became more competent in technology, I could understand what the data indicated." [Shida, PBRN]*

The value of nursing as humanistic care typically narrows in scope and power within the technological working environment, whilst the technological care value becomes more meaningful, contributing to the efforts of classifying the existing nursing domain into a new domain to keep pace with the current ICU environment.

Practicing nursing during the growth of technology in the ICU, nurses wanted to expand their domain and knowledge so that duties are performed more effectively. However, the increasing integration of digital technologies further widened the gap between nurses and other professions in the ICU, where it inhibited professional collaboration. Nurses in the ICU constructed their professional identity according to the suitability of working in technology-intensive environmental situations. Nevertheless, the constraints they experienced became insulators that prevented their identities from being empowered. To empower identity, they relied more on technology because they appreciated the role it played in increasing their confidence in patient care. It also allowed them to feel less pressure and insecurity when they were overburdened with non-patient related activities. Moreover, technological competence was a self-defence strategy intended to increase their self-worth in situations that threaten their identity, and possessing technical competency enhanced their self-integrity (Harris et al., 2019).

The nurses in this study revealed that their main concern time constraint and that most of their energy and attention is directed toward fulfilling the requirement of strategy, which reduces their ability to show humanistic approaches in care. This is why Izat believes that the dehumanising effect of technology arises when a nurse loses a sense of independence to act on initiative.

The meaning of autonomy permeates this narrative. The difference between working in the past and working in the present environment is most evident when s nurse begins to lose autonomy to work independently. We define autonomy as the ability of the nurse to perform her work using self-directed guidance and to work free from other members outside her profession. Izat elaborates that she believes autonomy requires confidence, meaning that

a nurse must be accountable for their actions and responsible for the possible risks and complications. It is noted that her sense of accountability and responsibility arose after she attended an advanced ICU specialisation study. She believes that she is getting more respect and control of her work because other healthcare practitioners might perceive that nurses with advanced specialisation have more knowledge on technology. Izat clarifies:

> *"... the post basic (study) is a benchmark of the ICU nurse practice. Once I had the specialisation, I became more independent to make my decision, which improved my self-esteem and made me more confident in caring for patients with high technology." [Izat, PBRN]*

Izat's statement implies that nurse's self-esteem stems from other healthcare professionals and plays a vital role in nurses' autonomy. Nurses seek autonomy to use technology in a more humanistic way in their care of patients. This support enables nurses to promote their active engagement with technology and gives them a sense of volition which is elucidated in the following quote from Fuad:

> *"In one situation, the high-pressure alarms sounded from the ventilator continuously. It was peculiar because the patient's blood gases value indicated normal findings, so I suspected something was wrong with the ventilator. Therefore, I called the medical assistant (MA) to inspect it. He came and did something on the ventilator; however, suddenly, the alarms stopped. After a while, the patient's oxygen saturation dropped. The anaesthetist came and asked me, "who increased the sensitivity level?" I am stunned; of course, it was not me. I felt angry because when I take care of my patient, I felt responsible for anything that happened to my patient." [Fuad, WPBRN]*

I encountered a similar situation during my fieldwork, but a nurse muted the ventilator this time. These nurses did not practice in such a way that viewed this action as unethical and compromised patient safety. The nurse's action to mute the ventilator was entirely autonomous, and she could control her behaviour. These situations appear to be consistent with what Izat described in her interview: autonomy comes with accountability.

> *"When taking care of the patient in the ICU, a nurse must have the autonomy because technology is unpredictable. We cannot call the MA all the time, and therefore often, a nurse will self-manoeuvre it. A technologically competent nurse may never forget to include the counter-balance of accountability for the sake of patient safety." [Izat, credentials]*

Similarly, as organisational values demand extensive engagement with technologies, nurses must be technologically competent. In an effort to understand the magnitude of powerlessness from the point of view of a medical assistant, I interviewed Hans. Hans argued that experiences of powerlessness could arise in highly technological environments where values require nurses to demonstrate competency and skills associated with predominantly technological applications. Lacking knowledge and skill limit the ability of nurses to operate within advanced technological knowledge.

> *"Some of them would probably think we take these technologies to care, so they do not have to bother about them. I can guarantee that some nurses think like this. Some are willing to learn because they know there is only one medical assistant on-call. Nevertheless, some of them are too proud with their job scope." [Hans, Medical Assistant]*

In fact, Hans commented later that some nurses created boundaries because they view nursing and technology as separate entities. From a nursing perspective, Fuad said that if there were practice boundaries created by the nurses, it was because they worried that their practice would be "technologized' if they demonstrated commitment to technological competence needs. As Fuad indicates,

> *"I am afraid that if I begrudgingly managed the technologies by myself, I would be held personally responsible for taking care of the technologies and in the future, the responsibility of taking care of the technologies will be placed on the nurses. At the same time, I am worried that I would be blamed for any bad situation following that, such as technology failure or incorrect setting, which can have dire consequences for patients. Then the possible bad results could be pinned on me." [Fuad, WPBRN]*

The situation that faced by the ICU nurses is a double-edged sword. On the one hand, nurses embraced technology because the biotechnologies that are integrated with patients provide valuable insight into the patient's condition, making technology part of the holistic domain concept in nursing. On the other hand, nurses rejected technology as a domain concept simply because humanistic care is the heart of nursing. That is, it does not come forth from nursing, nor does it embody the philosophy of nursing. It was evident in Ruby, Sara, and Anne's stories that more attention given to technology could become a barrier to humanistic nursing care because it limits the direct interaction between nurse and patient. Khademi, Mohammadi, and Vanaki (2017) argue, regardless of the transformation in the health care system, humanism remains the primary foundation of nursing. However, the pursuit of technological progress and scientific and technical advances, bureaucratic and impersonal work environments present significant challenges to making healthcare practitioners aware

of the importance of humanism in their practice (Khademi et al., 2017). The thought of the nursing profession as a calling or a profession borne out of the altruistic concern for humanity is fast fading away, and it is being replaced with a “profession” that is more transactional (Asonye, 2020). In an effort to eschew inhumane nursing care from the ICU, nurses constructed a new paradigm that caters to the needs of human beings from the point of view of technology. In the next section, data is presented based on the analytic focus that revolves around how nurses situate technology within their practice.

8.4 Situating technology within nursing

8.4.1 Technology as bodily extension

Given that technology is commonly used in the management of ICU patients, it is not surprising that nurses saw technological competency as an important part of their role with patients. Patient care in a high technology environment is focused on many aspects, but the primary focus is given to technology, which is a primary factor influencing the nurses’ actions. This is because the technology used for patients with critical illness has life-saving features, leaving nurses with a huge responsibility for patient safety. Coleen argues:

> *"A patient in the ICU is contrary to a patient in a general ward. When patients are admitted to the ICU, they are critically ill with a minimal chance of surviving. Once you fix them to the technology or life-saving devices, the body begins to function again. In this sense, technology is part of the patient body." [Coleen, WPBRN]*

According to Heidegger (1977), technology was understood to be a means to an end as a human activity. It is considered fundamental to the technology’s life-saving characteristics

that every attempt to manipulate technology must be in the proper manner. Meaning that the utiliser need to bring human beings into right relation to technology (Marx, 2016).

When approaching human-technology relations in terms of bodily extensions, technologies appear primarily as tools or instruments (Verbeek, 2015). In this view, technologies are seen as neutral. As bodily extensions, they merely facilitate nursing practices and experiences rather than actively helping to shape their behaviour. The acknowledgement that technology helps nurses to be in control of the situation is very apparent in the nurses' statements. The biomedical substance in the technology helped the nurses aware of an abnormality within the patient's body, which also may not be understood without the help of technology. This element made the nurses more appreciative of technology as it allowed them to tailor high-acuity nursing care to patients. Take Izat for example:

> *"For an unconscious patient, we look at his vital signs. I check his breathing, oxygen, I check the machines, I check if the ventilator setting is okay or not, then I review his results. If his results are not okay, like his haemoglobin is low, we check if there are symptoms, such as blood in his excrement. I have to look at all that to make decisions on what to do. If he is unstable, his blood pressure will drop, for example, if he is experiencing bleeding. Hence, I would inform the doctor and decide whether to run fluids at the first instance or give medications straight away. I evaluate based on the monitor we attach to the patient." [Izat, PBRN]*

Izat illustrated the goal of nursing care is to save the patient's life, by deciphering the biomedical substance within technology. The biopsychosocial perspective has been recognised by Healy (2016) as a missing component in nursing. She argues that the

biopsychosocial perspective supports a move away from traditional nursing care in favour of an integrated approach to human need which recognises 'the inter-relationships between physical, psychological, and social functioning.' She argues that it is essential technology is included in the profession's approach as it aids the decision-making process. The benefit of deciphering the biomedical data from technology is elucidated in Izat's statement, where it helped her make appropriate decisions. The role of technology in decision-making, as discussed here, resembles what Timmermans and Almeling (2009) indicate as the tendency of nurses towards viewing patient as parts - organs, fluids, and bodily states - whereby the body becomes an object of vigilance and control, prompting them to do surveillance rather than caring. In this regard, embedded technology effectively provides tacit knowledge for decision-making, although it reduces the time with patients. For Izwan, the constrained working environment justified his approach to nursing.

> *"I do not want what to compromise the patient's need, but how do I know what patient's needs. In the general ward, spend with the patient, but here the patient is unconscious, and the sound of alarms interrupt communication. When working within a constrained environment, relying on technology is the most effective strategy. That is why having technology competency is important. The more I can utilise the tacit knowledge, the holistic nursing care that I can be achieved." [Izwan, PBRN]*

Being a nurse in an intensive care unit versus a general ward presents its own set of difficulties. Izwan is apprehensive about forming bonds with patients. In addition to the fact that patients are often unconscious, which makes it difficult for him to spend quality time with them, the constant sound of alarms exacerbates the problem. Focusing on technology

worked best because it allowed the nurse to better understand the patient's needs by using the latest in medical equipment and software. He places a high value on the acquisition of technological knowledge as a result of this.

8.4.2 Technology as a partnership in care

In many interviews, participants consistently highlighted the importance of teamwork in the ICU. The nurses believe they can rely on technology, that it can improve the safety and quality of nursing care delivery. In interviewing Rika, she specifies herself as a team member who possesses specialised knowledge and skills and often functions under high workloads. During constrained situations, the function of technology as a team is pivotal as it is the only team member that is with the patient at all times. When I compare Rika's interview statements to the earlier participants' statements about technology being a helper, it was elucidated that technology is helpful because it directs all of its attention to achieving pre-set goals. Participants regarded the certain characteristics of technology that could assist them in nursing care. The first characteristic of technology is that it it is close and supportive to the patient. During direct nursing care, participants expressed that technology helps them feel supported. Rika mentioned assistive devices such as a Rowalker or mechatronic (electric) bed that help patients and nurses. Rika suggests that technology can provide help to patients that she is unable to provide.

> *"I imagine the situation in the past when there was no technology like Rowalker and electronic bed, and it would take a lot of time and energy of nurses in carrying out nursing care. Technology now has human-like characteristics and reduces patient*

complications. Despite the emergence of new technology that burdens nurses to learn how to use but it actually gives a lot of benefits." [Rika, PBRN]

Meanwhile, Fuad highlighted life support technology like mechanical ventilators attached to patients. Similar with Rika, Fuad perceived the characteristic of technology that it is close and supportive to the patient. For Fuad, a key component in critical patient care is to save lives. The presence of life-support technology can ensure that the goal of care is achieved because it embodies the human virtues of caring as manifested in nursing practice. Even a patient's own family is more concerned with technology than anything else. Patients and families will be less anxious and more cooperative when nurses can provide assurances related to the role of technology in the healing process. In this regard, technology has an essential responsibility in saving the lives of critically ill patients, and deserves higher priority. This prioritization is because of technology's instrumental value in saving others. The closeness and supportive nature of technology mimic altruism and helpful behaviour (de Melo, Gratch, & Krueger, 2021), which form the basis for professional nursing practice that is believed to be helpful in providing patient care (Mohammadipour, Atashzadeh-Shoorideh, Parvizy, & Hosseini, 2017).

The second characteristic of technology appreciated by the nurses in this study is being remote and trustable. These traits were explicitly depicted in Coleen's statement where she emphasised the visual and auditory alarms built into patient equipment that helped her remain vigilant, particularly when focusing on administrative and documentation tasks. Hence, when the alarms from the machine or telemonitoring sounded, prompting her to check the patient. During my fieldwork, I encountered Henry, who cared for two patients in a cubicle. In the adjacent cubicle, another nurse was taking care of her patients. Henry

wanted to go to the pantry for breakfast, so he asked the nurse in the next cubicle to listen for his patient's alarm during his absence and call him immediately if anything happened. In that situation, technology befitted the similar nature of the team, and shared specific characteristics of the team that helped in decision making. This concept is in line with Fiore and Wiltshire's (2016) stipulation about technology as a teammate when examining the role of external cognition in support of cognitive processes. Based on this concept, attention should be given to external cognition, i.e., material artifacts or objects used in team cognition services, or technologies that support its development and use because they determine team effectiveness. As such, technology should be considered a team member in organisations that are made up of humans and technologies that shape cognition.

On the other hand, nurses throughout this study emphasised the function of alarms when they talked about technology. They seemed to appreciate the alarms embedded with technology because alarms provide a foundation for nurses to make good decisions. In a different context, nurses considered alarms a self-substitute when they are not at the bedside. In many cases, nurses claim that alarms embedded in technology make them feel less anxious when leaving the bed to do other tasks. In this sense, the alarm can attract the attention of other nurses to treat the patient. In addition, in interviewing Coleen, she described that the increase in workload led her to be more vigilant and put more reliance on alarms so that she would be aware of any situation that needed her immediate action.

> *"The nature of the work here requires me not to be in the patient's bed area. How do I want to be in the patient's bed area if I care for two patients simultaneously? So, while at the nursing counter, I would make sure I eavesdropped on the alarm. Likewise, I will make sure nothing obstructs my view of the screen monitor or*

machine. If the patient responds, for example, I will be able to find out from the waveform found on the machine; then I will go to the patient's bed and make sure whether the sedative is adequate or not." [Coleen, WPBRN]

Many participants in this study situated alarms within the context of nurturing patient safety culture in the ICU. Edworthy and Hellier (2006) pointed to the high workload in the critical safety environment as what drives technological changes and developments in medical equipment that make alarms a key element in technology. This development has led to an increasing and significant reliance on alarms in clinical settings as it not only increases situational awareness but also contributes to improved performance in tasks. The alluring characteristic of alarms in which they facilitate nursing action or decision and, ultimately, give nurses a modicum of control. This evident in the following statement from Anne:

"... I use the machines to give benefits to the patients in terms of treating them. So, what we detect is beneficial for the patients. Based on the detection, we will try to trace abnormalities to inform doctors. Detection and treatment become efficient, for example, the ECG monitor. It provides me with visual indicators. So, it helps me to detect any changes in the rhythm, whether a patient has an abnormal rhythm or not. So, it steers me in my decision-making." [Anne, WPBRN]

The acknowledgment that alarms help nurses stay in control of the situation is seen in Anne's statement. The nurses' appreciation towards alarms is apparentin many nurses' statements regarding patient safety. Caring for critically ill patients requires high-acuity nursing, which means the nurses must always be vigilant. Alarms are considered an important element in care situations initiates awareness in the critical clinical situation. Endsley (2013) called this situational awareness. He defined situational awareness from the context of an individual's

ability to perceive the attributes of technology and the dynamics of technological elements within the care environment. He also suggested that the information displayed on the technology needs to convey clinical information of the patients to support the needs of this situational awareness. Undoubtedly, this is the aspect of technology that most of the participants embraced because they can get an indication of what was actually happening with patients. Sharon explained this in detail:

> *"One of the benefits is that it makes nursing care easier. Like ventilators, they do not only provide support for patients but are also equipped with monitors. When the ventilator alarm beeps, it means that you need to go and check the mode, pressure support, and tidal volume, whether it is enough or not. In terms of infusion pumps, they help us to give medications to patients with inotropes. They make our jobs easier, and there is an indicator of how much medication is left and how much the medication is infused per shift, per hour or per day. If the infusion alarm beeps, it will alert us to check the tube whether it is blocked or the medications are nearly finished." [Sharon, WPBRN]*

Sharon described how technology helped and assisted her in making clinical judgments in high-acuity situations. For example, upon hearing the alarms that indicate a potential problem in a patient's condition, the nurse must quickly determine the severity of the problem. They must determine if immediate nursing action is needed, and if that attention, combined with their underlying knowledge, can form a mental model. Sharon's statement emphasised the priority of safety in the utilisation of technology by stating the need to interpret not just the visible parts of the technology, but also to comprehend what goes on behind the data. This is parallel to what Delaney (2010) indicated as a 'mental model' when

he discussed how the anaesthetists comprehended technology. The mental models based on Sharon's statement represent what was true at the expense of what was false. This is the type of generalisation is made when individuals use technology that enables them to make sense of these interactions (Dankenbring, 2014). Therefore, the mental model serves as an illustration of the phenomenon to allow people to generate inferences and predictions about it (Dankenbring, 2014; Franco and Colinvaux, 2000; Greca and Moreira, 2000). Individuals will either use knowledge of other similar devices that they have encountered before to construct mental models when first interacting with new objects (Wright and Fallacaro, 2011), or, they will construct mental models by observing others doing so. This is an indication of how situational awareness can be augmented within the ICU nurses.

8.5 Using technology as a strategy for emancipatory practice

Participants' perspective of the impact of technology on nursing care practice unravel the emancipatory practice among the ICU nurses. Emancipation is a process within which there can be restrictions placed on certain groups within society by other participants that must be overcome in that process (Lane, 2016). Emancipatory efforts in nursing history are often viewed from the feminist context, particularly during the feminist movement of the 1960s and 1970s where the history of the exploitation of and condescension toward nurses, led to misuse of nurses' skills (Snyder, 2014). Nursing profession lies structurally and epistemologically at the feet of medicine – its dominator and the professional face in healthcare of rational, technological and politico-legally enforced institutional power. Hence, nursing has become as a docile subject of the principal micro-power in the global context of healthcare (Fairbrother, Cashin, Mekki, Graham, & McKormick, 2017). In this

study, the emancipatory practice had its genesis from the sense of powerlessness that the ICU nurses experience which elicit their awareness of the aspects that hindered the construction of their professional identity. A critical concept of the model of emancipatory practice in this study is the idea that the nurses perceived technology as a strategy, a means to achieve emancipation for nurses within the multidisciplinary team.

In this regard, being technologically competent provided the nurses with a strategy to cope with the complexity of the ICU, such as nursing shortages and the lack of autonomy which alleviates nurses' workload and burdens. Constant exposure to the constraint was an impediment to the nurses to demonstrate the practices that signify their professional values. Over time, this experience generated the sense of powerlessness in nurses, which caused more trust to be placed in technology when taking care of the patient. The more they disengaged in direct patient care activities, the more they dissatisfied they were with their work (Spence Laschinger, Wilk, Cho, & Greco, 2009). Nurses postulated that technology, if used skilfully, offered them valuable tools for emancipation, facilitating their decision making and control over nursing practice. This can advance the professional knowledge base and facilitate professional identity (Nelson, 2012). The maxim that technical competency provided nurses with intuitive decision making was embraced by most of the nurses in this study. Emancipation is defined as "deconstructing power structures and developing ways of knowing to resist and challenge these structures" (Byrd and Chlup, 2012; p. 36). The definition of emancipatory that is mostly found in nursing literatures, however, is "to realize that things could be different, and to piece together complex elements of experience and context to change a situation as it is to a situation that improves people's lives" (Chinn and Kramer, 2011; p. 64). The emancipatory practice in this study implies the practice in which nurses can reflect to become aware of the importance of balancing between technological

care and humanistic nursing, which helps them construct a strong professional identity within the complexity of highly technological environment. This theory also offered the health care authority a realistic evaluation of the nursing workload to support the unfolding development of new cultures and processes that focus on technology and humanistic nursing simultaneously (Fairbrother et al., 2017).

CHAPTER 9: CONCLUSION, IMPLICATIONS AND LIMITATIONS

9.1 Conclusion

The purpose of this research was to explore the effect that technological advancements have had on nursing care practises in the ICU settings in Malaysia. Chapters 7 and 8 discussed the study's findings, which contribute to the substantive theory of ICU nurses' emancipatory practise in response to the use of technology in nursing care practise. In this final chapter, I will provide a summary of the most important aspects of the theory, including how the theory contributes in a unique way to the body of knowledge and how it is relevant on an international scale. This is then followed by the implications and recommendations that arise from this research for nursing practise, nursing education, and nursing policy, and the limitations are presented at the end of the chapter.

9.1.1 Discussion on the emergent theory and the contribution to the body of language

To understand a contextual situation within the use of technology in the ICU setting, this study used grounded theory methodology in data collection and analysis procedures discussed in Chapter 4. At its core, a phenomenon known as 'emancipation' emerged, which develops as a result of emergent social and perceptual frameworks, effectively capturing the situation within the research field. This phenomenon was explained by the core category of emancipatory practise, which made the theory dense by encapsulating the core phenomenon and explaining ongoing practises in the field of research. It emerged as a core category based on socially constructed ideas and viewpoints that linked the three peripheral concepts of

technology as a mediator, partnership, and bodily extension. According to Charmaz (2014), what distinguishes a "true" theory is the researcher's ability to answer what, how, and why it was possible to explain and construct the theory. In response to Charmaz's assertion, the current study's emergent theory contributes to what, how, and why through the interconnected concepts listed below:

I. Perceived powerlessness (addressing the question of why the perceptions were formed within the organization).
II. Professional identity formation (addressing the question of how those perceptions influence their actions).
III. The use of technology as a strategy for emancipation (addressing the question of what eventually emerges as a result of selective perception).

The theory was presented as a model with eight emergent propositions highlighting the core category and its associated concepts. Even though relevant literature was discussed in Chapter 8, this section expands the literature on emergent theory as a whole, providing greater explanatory power and creating an appropriate framework for formulating informed action. This thesis was situated against the background of an advanced technological environment. It was perceived and treated as a "dehumanising context," giving the impression of potentially negative connotations (Basile et al., 2021; da Silva and Ferreira, 2011; Rubeis, 2020). Nursing practise is challenged by the pervasiveness of technology in clinical environments, but the literature sees the ICU as an environment that could foster technological competency, which would contribute a strong advantage for patient care, but within certain considerations (Krel et al., 2022). The consideration was given to the inhibiting factors that could impact the 'human side' of healthcare (Buchanan et al., 2020).

Despite their openness to new technologies, more than half of the participants in a study done by Ebright (2010) reported that the organisation they worked for did not do a good job of assisting them in developing their digital skills. From a technological standpoint, the majority of the obstacles were relatively unremarkable due to the fact that information technology systems are now at the core of day-to-day clinical practise. Among these were issues with passwords, inadequate computers, a lack of support, and overly complicated systems (Ebright, 2010). A common theme among the comments made by participants was their dissatisfaction with the discrepancy between their expectations of how things should work and the reality they face on a daily basis (Golay et al., 2021). In addition, the nurses were frustrated with how much time they wasted each day waiting for computers to boot up, load emails, retrieve blood test results, etc (Agnew, 2022). There was also study reported that there were rarely enough computers to meet demand (Irinoye et al., 2013). According to a study done by Teng, Hsiao, and Chou (2010), the environment in which nurses work is a significant factor on how patients perceive the quality of their care In addition, the development of technology in the clinical setting may, over time, increase the complexity of nursing work and lead to an increase in workload. As a result of nurses devoting a significant amount of time to technology-related tasks, the emphasis on nursing care becomes unbalanced, affecting patient satisfaction (Teng et al., 2010). Kieft et al., (2014) argue that a healthy work environment is one in which nurses are able to both achieve organisational goals and derive personal satisfaction from their work because they can use their expertise, skills, and clinical knowledge to the fullest extent possible. When the nurse works in a healthy environment with limited time pressure, they are able to improve their time management and reduce their cognitive load. A nurse's humanistic approach to patient care may be impacted if they perceive the clinical environment as less stressful when their

cognitive load is reduced. In the meantime, they could utilise the technology in such a way that it can improve the nursing care delivery without being intrusive towards their relationship with the patient or their family. The less time pressure a person has, the more compassion they are able to instil, and this may influence how they perceive technology. If the nurses have less time to apply their compassion to patient care, this may influence the way in which they use technology. To provide comprehensive care in the ICU, a balance is needed between technical and humanistic aspects of care. Due to the challenges and deterrent of incorporating humanistic methods with technological solutions, the significance of this realm of critical care nursing is emphasised. There are numerous benefits that come from a humanistic approach to nursing, such as a boost to the nursing profession and a better working environment for all those involved in the intensive care unit, including patients and their families as well as the nurses themselves. Due to time constraints, heavy workloads, and a pressing need for technology, the humanistic aspects of caring may be overlooked or ignored. Integrating humanistic care practises into intensive care is a daunting task. In other words, the increased cognitive load, physical acuity of the patient, and technological challenges made nursing tasks more difficult (Mohamadi Asl, Khademi, & Mohammadi, 2022). As a result, staff may overlook the importance of developing humanistic relationships with patients. When patients are not treated as individuals, their dignity is diminished, they feel alienated, they lose their sense of self-worth, and their personal integrity is being invalidated (Maddock, 2019). Humanization has been regarded as an important aspect in the formation of nursing professional identities that reflect the core values of the nursing profession. In the process of constructing a nursing professional identity, one of the most important values is the cultivation of humanistic approaches (Samaniego & Cárcamo, 2013).

On the other hand, Bell and Khoury (2016) examines dehumanisation from the perspective of the care provider. He argues that the modern workplace can sometimes be experienced as an alienating and dehumanising environment in which the individual's purpose may seem more to further the organization's objectives than to satisfy personal goals. Humanization is regarded as one of the professional attitudes or 'professionalism' of nurses (Asl et al., 2022). It is regarded as a framework used by nursing professionals to identify their value commitments and self-concept within the context of their social role (De Oliveira and Vianna, 2013). The goal of humanization is to enhance the level of care that is given to patients, as well as the interactions that take place between nurses and patients, as well as between patients and their families. Through empathy and dedication, humanization contributes to a greater understanding of human beings in their own unique sense, whether it be on an individual, social, political, or any other aspect of life level.

Meanwhile, recent developments in patient care technology, along with growing concerns about the nursing workforce shortage, have led to an increase in the preference for technological competency. It has been argued that it is acceptable for nursing practise in the technological era to deemphasize the humanization aspect. Others have argued that the organization's demand for technological care causes tension among nurses because their professional value is being disregarded. Despite recognising the importance of acquiring technological competencies, the majority of nurses wished for organization to establish an equilibrium to prevent nursing practise from becoming overly centred in technology. There has been a concern that the overly emphasised on technology in nursing practice may lead to a greater likelihood that care will become depersonalised and dehumanised.

At this point, the emancipatory practise could most likely begin to serve its intended purpose. Emancipatory practise theory provides three notions; (1) powerlessness, (2)

professional identity; and (3) emancipation through technology. Each of which articulates an essential component of humanizing technology in relation to caring for patients. Each concept is expressed heuristically in the form of a continuum, beginning with the term that characterises the barrier and ending with the impact reflection of technology on nursing care practise. When the process of emancipatory practise occurs, it does not imply that one is using technology "in a humanising or dehumanising manner," but rather that these bipolar terms suggest possibilities along a spectrum that must be considered in context.

This theory does not emphasise the fact that each dimension expresses a domain of "ideal" options, nor does it indicate whether humanistic care or technological care is the absolute ideal value. This is due to the fact that, in order to provide patients with the highest level of care that is practically possible, it is possible that "dehumanising practises" will at times be required. In an intensive care setting, for example, where patients and their families fully accept the need for nursing professionals to focus exclusively on the technical definitions of their current bodily functioning at specific stages of their treatment. In spite of this, the theory does provide the touchstones for awareness when taking into consideration the difficulty of providing care in constrained circumstances.

Technology's strengths can be leveraged in a situation where an individual is working in a constrained environment. According to Abdellah (2016), when people are confronted with a situation that impedes their ability to excel, such a circumstance may encourage them to strengthen their ability to act as an integrated, aligned, high-performing unit over time, allowing them to respond swiftly to internal and external threats. Chitale, Mohanty, and Dubey (2012) support this argument by arguing that it is this reactive mechanism that can positively impact performance, develop a strong culture, and emphasise adaptability and flexibility. However, the literature agrees that the positive impact of

reaction can only be seen if the organisation implemented technology strategically (Abdellah, 2016).

9.3 International relevance of the findings

Nursing shortages, a lack of autonomy, and a burdensome documentation responsibility affect nurses worldwide, not just in specific countries or regions (Garrett & Craig, 2009; Han, Li, Chen, & Zhao, 2020; Jarrar et al., 2015; Rashid, 2011). Because of these problems, there is a greater risk of errors, as well as an increase in the morbidity and mortality rates (Elfering, Grebner, & Ebener, 2015). Patients in hospitals with high patient-to-nurse ratios had higher mortality and morbidity rates than those in facilities with lower patient-to-nurse ratios (Haddad, Annamaraju, & Toney-Butler, 2022). In spite of the fact that there is legislation that places limits on the number of patients that can be cared for by a single nurse, patient-to-nurse ratios still increase when there is a shortage of staff to meet the demand (You et al., 2013). To make matters worse, as a result of emerging technology, nurses must perform their duties in a dynamic environment which can also have an impact on a nurse's decision to remain in their current role (Goodare, 2017). In point of fact, some experienced registered nurses find the new technology difficult to work with, and as a result, they leave the field of nursing at an earlier age.

The ever-changing nature of technology has placed nurses in a position where they must continually adapt. Several studies indicate that the nursing transformation violated nurses' pre-existing expectations for their professional identities, inevitably resulting in the nurses having an identity that reflects their experience of "toughening up," "maturing through experience," and "learning practical norms" (Haddad et al., 2022; Sepasi et al.,

2016). Similarly, due to the omnipotent constraint that they faced, nurses in this study perceived that their identity work did not represent their standards for their own professional identities. Despite being technologically dependent, nurses may find satisfaction in caring and nurturing the caring intention through emancipatory practise. As a result, some nurses have been able to reclaim their valuable professional identity.

One example that help the nurses nurturing the caring intention through emancipatory practise is through the utilisation of the symbolism of technology to facilitate specific social interactions. In the chapter of the literature review, the semiological properties inherent to technology are discussed. According to Kockelman (2013) users can attempt to generate meaning from technological data and signals for the purpose they envision for the artefact. In other words, a technology or machine is no longer perceived as mechanical, but rather as a text or meaning that must be decoded. I believe the nurses are responsible for assigning the meaning to technology to produce certain social impact. For example, during my observations, I discovered that nurses consistently muted machine alarms during visiting hours, compared to other times. This creates the impression that the nurse, through her assessment, considered the alarm to be a disruption in the patient's interaction with his or her family. Whereas during the vast majority of other time periods, nurses did not hold such notions. This suggests that the nurse wanted the patient's family to focus on the patient rather than on what the technology was displaying. This action demonstrates that nurses recognised the symbolic significance of technology in facilitating particular social interactions.

The theory of emancipatory practice as discussed in chapter 8, argues that recognising the constraint environment has on the nursing professional identity can trigger

the nurses to capitalise on the benefits of technology on nursing care, thereby reducing the limitation that they may experience in providing nursing care that. To avoid dehumanising the patients, the current 'technological' mindset would need to be refocused from its traditional mechanistic approach to embrace greater adaptability (Christoff, 2014).

The argument being made is not for adopting a structured model that is applied within the technological care environment but rather, a paradigm for different thinking to how the emancipatory practice prevails and how it could continue prevails in the future. Instead of attempting to appropriating technology into nursing practice within the ICU (Delaney, 2010), this theory provides a framework to recognize that it may be advantageous to view the technological activities as a component of the overall organization that retains its own competencies that can contribute to improving nursing care quality. The principle that is used within this thesis is to create the theoretical foundation upon which to initiate the changes believed to be necessary for resolving the contextual situation that may become a barrier to quality nursing care practice through informed awareness and action. It is important to note that what would be required is a holistic and comprehensive approach, as supported by the literature review in Chapter 2 on the futility of attempting to resist to the transformation of practice in the technological era, because technology will continue to evolve and such evolvement may contribute to rising in complexity.

9.4 Limitations of the study

The research process for this thesis uncovered a few limitations, which are discussed in this section. By drawing attention to these restrictions, it is possible to consider the impact that they might have had on the research had it been conducted under different

circumstances. Before irrefutable claims can be made regarding the discovered core phenomenon of emancipatory practise, it is necessary to conduct research on the magnitude of constraint working environments.

Due to the interpretive nature of the methodology and the researcher's proximity to the empirical data, it was impossible to eliminate bias during data analysis, even though this present study used grounded theory methodology, which emphasised theoretical sensitivity. When a researcher has prior knowledge of the study context settings, they may be inclined to focus on what they already know during data collection when conducting interpretative data analysis.

Furthermore, researcher bias may have been introduced during the theoretical coding phase. Due to the researcher's increased emphasis on reviewing a broad range of literature during this phase, their interpretation could potentially expand even further. It is possible that this bias could be reduced if multiple researchers analysed the data. Only one research site utilised theoretical sampling for empirical data, which is seemingly limited. Theoretically, this could have limited the scope of the data, as other critical units may have contained additional data pertinent to the research topic. A different context could have uncovered different patterns and themes in the data, thereby enriching the overall emerging theory. Nevertheless, the contextually emergent data were supported by the literature, so this limitation does not, in my opinion, undermine the theory's credibility.

9.5 Study implications

9.5.1 Implication to nursing policy

The findings of this study indicated that nurses desired to be involved in the technology development of the ICU. On a similar note, this created insight for the leaders in healthcare organisations to implement technological solutions to overcome the inefficiencies in the ICU nursing workflow. The constrained working environment in ICU should be reviewed so that proper improvements can be made to fill gaps and make nursing care safer and more efficient.

9.5.2 Implication to nursing practise

The manifestation of the caring aspects of nursing in a highly-technological environment can be challenging. Despite having multiple automated features that enable nursing care and enhance patient safety, technology can never replace a nurse. The value of technology to nursing is determined by how efficient the nurses use technology. In the current practise, nurses mostly embrace new technology in view of how it transforms nursing professions and support innovation. As described in the first chapter, the Malaysian healthcare system has set out on a mission to embrace technology innovation in healthcare delivery. Thus, healthcare organisations need to incorporate new technologies and systems apart from improving existing ones. In certain cases, technologies that were less user-friendly and requiring workaround were perceived as detrimental to nursing practise. Many nurses felt that these technologies were established without first analysing whether they would increase the workloads or change the working practises in the ICU, or be acceptable

to patients. Therefore, this highlighted the importance for healthcare organisations to involve nurses in decision-making related to the implementation and development of technologies.

9.5.3 Implication to future research

To date, there is very limited research on the impact of healthcare technologies from the perspective of Malaysian nurses. This study was conducted using the grounded theory methodology. It successfully provided new insights into how nurses perceived the impact of technology on nursing care practise in the context of ICU in Malaysia. Consequently, this thesis contributed to several new lines of knowledge. From the perspective of a nurse, the theoretical concepts of emancipatory practise shed a light on the conflicting values that they have endured due to the ineffectiveness of technology development. Whilst these conflicting values resulting from technology development had been the subject of previous nursing research, studies that focus on their impacts to nursing practise are scarce. With regard to the emancipatory practise, despite the existing findings in the nursing literature, none presented the process of emancipatory practise from the context of ICU nursing practise. Furthermore, this thesis captured a broad range of processes in ICU nursing practise. In short, the core categories that emerged in this thesis were based on major themes grounded in the experiences of nurses in using technology to deliver nursing care and their perception on the impact of technology on nursing care practise.

REFERENCES

Abakah, E. (2018). Participation without a voice? Rural women's experiences and participation in local governance activities in the Abura–Asebu–Kwamankese district of Ghana. *Cogent Social Sciences*, *4*(1), 1549768. https://doi.org/10.1080/23311886.2018.1549768

Abdellah, I. M. (2016). *A grounded theory study of decision-making within Informal work environments. [Doctoral dissertation, University of Liverpool] University of Liverpool , United Kingdom*. (October), 266. Retrieved from https://search.proquest.com/docview/2429817662?accountid=17242%0Ahttp://livrepository.liverpool.ac.uk/3009490/

Acker, J. M., & Tham, R. (2010). *A method and system for synchronizing a patient monitoring device with a ventilator device*.

Agnew, T. (2022). Digital engagement in nursing: the benefits and barriers. *Nursing Times [Online]*, *118*(3), 1–4.

Aiken, L. H., Sermeus, W., Van Den Heede, K., Sloane, D. M., Busse, R., McKee, M., … Kutney-Lee, A. (2012). Patient safety, satisfaction, and quality of hospital care: Cross sectional surveys of nurses and patients in 12 countries in Europe and the United States. *BMJ (Online)*, *344*(7851), 1–14. https://doi.org/10.1136/bmj.e1717

Alasad, J. (2002). Managing technology in the intensive care unit: The nurses' experience. *International Journal of Nursing Studies*, *39*(4), 407–413. https://doi.org/10.1016/S0020-7489(01)00041-4

Alasad, J., & Ahmad, M. (2002). Managing technology in the intensive care unit: the nurses' experience. *International Journal of Nursing Studies*, *39*(4), 407–413.

https://doi.org/10.1016/S0020-7489(01)00041-4

Alasuutari, P., Bickman, L., & Brannen, J. (2008). *The SAGE handbook of social research methods* (1st ed.). Los Angeles: SAGE.

Alliex, S., & Irurita, V. F. (2004). Caring in a technological environment: how is this possible? *Contemporary Nurse : A Journal for the Australian Nursing Profession*, *17*(1–2), 32–43. https://doi.org/10.5172/conu.17.1-2.32

Almerud, S, Alapack, R. J., Fridlund, B., & Ekebergh, M. (2008). *Caught in an artificial split : A phenomenological study of being a caregiver in the technologically intense environment*. 130–136. https://doi.org/10.1016/j.iccn.2007.08.003

Almerud, Sofia, Alapack, R. J., Fridlund, B., & Ekebergh, M. (2007). Of vigilance and invisibility--being a patient in technologically intense environments. *Nursing in Critical Care*, *12*(3), 151–158. https://doi.org/10.1111/j.1478-5153.2007.00216.x

American Holistic Nurses Association. (1998). *Description of holistic nursing*. Flagstaff, Arizona.

Amin, S. G. (2011). A study to determine the influence of workload on nursing personnel. *ProQuest Dissertations and Theses*, 479. Retrieved from https://search.proquest.com/docview/868184747?accountid=17242%0Ahttps://scholarworks.wmich.edu/dissertations%0Ahttp://scholarworks.wmich.edu/dissertations/339

Angrosino, M. ., & de Perez, M. (2000). Rethinking observation from method to context. In N. . Denzin & Y. . Lincoln (Eds.), *Handbook of qualitative research* (2nd ed., pp. 673–702). Thousand Oaks: SAGE.

Antinaho, T., Kivinen, T., Turunen, H., & Partanen, P. (2015). Nurses' working time use - how value adding it is? *Journal of Nursing Management*, *23*(8), 1094–1105.

Apostolopoulou, B. E., Raftopoulos, V., Kithreotis, P., Stefanidis, E., Galanis, P., &

Veldekis, D. (2013). Surveillance of device-associated infection rates and mortality in 3 Greek intensive care units. *American Association of Critical-Care Nurses*, *22*(3), 12–20. https://doi.org/10.4037/ajcc2013324

Armstrong, P., & Lowndes, R. (2018). Creative teamwork: Developing rapid, site-switching ethnography. *Creative Teamwork: Developing Rapid, Site-Switching Ethnography*, (April 2022), 1–198. https://doi.org/10.1093/oso/9780190862268.001.0001

Aronson, E., & Festinger, L. (1997). Back to the future: retrospective review of Leon Festinger's "A Theory of Cognitive Dissonance." *The American Journal of Psychology*, Vol. 110, pp. 127–137. https://doi.org/10.2307/1423706

Article, R., Berthelsen, P. G., & Cronqvist, M. (2003). The first intensive care unit in the world: Copenhagen 1953. *Acta Anaesthesiologica Scandinavica*, *47*(10), 1190–1195. https://doi.org/10.1046/j.1399-6576.2003.00256.x

Aslan, M., Karaaslan, A., Yildiz, A., Dogan, F., & Evirgen, H. (2016). Workload of Nurses and Care Left Undone: Do we Really Care Enough? *International Journal of Caring Sciences*, *9*(2), 596–602. Retrieved from https://search.proquest.com/docview/1817069260?accountid=17215%255Cnhttp://limo.libis.be/resolver?url_ver=Z39.88-2004&rft_val_fmt=info:ofi/fmt:kev:mtx:journal&genre=article&sid=ProQ:ProQ%253Ahealthcompleteshell&atitle=Workload+of+Nurses+and+Care+Left+Undo

Asonye, C. (2020). *HEALTHCARE DELIVERY : TIME FOR A PARADIGM SHIFT TOWARDS A MORE*. (October).

Atkinson, D. (2013). *Nursing observation and assessment of patients in the acute medical unit. [Doctoral dissertation]. University of Salford, Salford*.

Azoulay, E., Soares, M., Darmon, M., Benoit, D., Pastores, S., & Afessa, B. (2011). Intensive care of the cancer patient: recent achievements and remaining challenges. *Annals of Intensive Care*, *1*(1), 5. https://doi.org/10.1186/2110-5820-1-5

Bagherian, B., Sabzevari, S., & Mirzaei, T. (2017). Effects of technology on nursing care and caring attributes of a sample of Iranian critical care nurses Ali Ravari c. *Intensive & Critical Care Nursing*, *39*, 18–27. https://doi.org/10.1016/j.iccn.2016.08.011

Bailey, J. E. (2011). Does health information technology dehumanize health care? *Virtual Mentor*, *13*(3), 181–185. https://doi.org/10.1001/virtualmentor.2011.13.3.msoc1-1103

Bailey, N., & Scerbo, M. (2007). Automation-induced complacency for monitoring highly reliable systems: The role of task complexity, system experience, and operator trust. *Theoretical Issues in Ergonomics Science*, *8*(4), 321–348. https://doi.org/10.1080/14639220500535301

Ball, J. E., Murrells, T., Rafferty, A. M., Morrow, E., & Griffiths, P. (2014). "Care left undone" during nursing shifts: associations with workload and perceived quality of care. *BMJ Quality & Safety*, *23*(2), 116–125. https://doi.org/10.1136/bmjqs-2012-001767

Barbosa, I. A., & Silva, M. J. P. D. (2017). Nursing care by telehealth: what is the influence of distance on communication? *Revista Brasileira de Enfermagem*, *70*(5), 928–934. https://doi.org/10.1590/0034-7167-2016-0142

Bargetz, B. (2015). The Distribution of Emotions: Affective Politics of Emancipation. *Hypatia*, *30*(3), 580–596. Retrieved from http://www.jstor.org/stable/24542144

Barnard, A. (2002). Philosophy of technology and nursing. *Nursing Philosophy*, *3*(07), 15–26. https://doi.org/10.1046/j.1466-769X.2002.00078.x

Barnard, A., & Locsin, R. (2007). *Technology and nursing: practice, concepts and issues*.

London: Palgrave-Macmillan.

Barnard, A., & Sandelowski, M. (2001). Technology and humane nursing care: (Ir)reconcilable or invented difference? *Journal of Advanced Nursing*, *34*(3), 367–375. https://doi.org/10.1046/j.1365-2648.2001.01768.x

Barnett, T., Namasivayam, P., & Narudin, D. A. . (2003). A critical review of the nursing shortage in Malaysia. *International Nursing Review*, *57*, 32–39. https://doi.org/10.1111/j.1466-7657.2009.00784.x

Basile, M. J., Rubin, E., Wilson, M. E., Polo, J., Jacome, S. N., Brown, S. M., … Hajizadeh, N. (2021). Humanizing the ICU Patient: A Qualitative Exploration of Behaviors Experienced by Patients, Caregivers, and ICU Staff. *Critical Care Explorations*, *3*(6), e0463. https://doi.org/10.1097/cce.0000000000000463

Beck, C. T. (2013). Glaserian grounded theory: the enduring method. In *Routledge International Handbook of Qualitative Nursing Research* (pp. 192–198). https://doi.org/10.4324/9780203409527-24

Beeby, J. P. (2000). Intensive care nurses' experiences of caring. Part 1: consideration of the concept of caring. *Intensive and Critical Care Nursing*, *16*(2), 76–83.

Bell, C. M., & Khoury, C. (2016). Organizational powerlessness, dehumanization, and gendered effects of procedural justice. *Journal of Managerial Psychology*, *31*(2), 570–585. https://doi.org/10.1108/JMP-09-2014-0267

Benner, P. E., Hooper-Kyriakidis, P., & Stannard, D. (1999). *Clinical wisdom and interventions in critical care*. Toronto, Otario: W.B.Saunders Co.

Berle, I. (2008). Clinical photography and patient rights: the need for orthopraxy. *Journal of Medical Ethics*, *34*(2), 89–92. https://doi.org/10.1136/jme.2006.019166

Bitektine, A., Hill, K., Song, F., & Vandenberghe, C. (2020). Organizational legitimacy,

reputation, and status: Insights from micro-level measurement. *Academy of Management Discoveries*, *6*(1), 107–136. https://doi.org/10.5465/amd.2017.0007

Bohns, V. K., & Flynn, F. J. (2013). Guilt by design: Structuring organizations to elicit guilt as an affective reaction to failure. *Organization Science*, *24*(4), 1157–1173. https://doi.org/10.1287/orsc.1120.0787

Bonis, S. A. (2009). Knowing in nursing: A concept analysis. *Journal of Advanced Nursing*, *65*(6), 1328–1341. https://doi.org/10.1111/j.1365-2648.2008.04951.x

Borges, M. S., & Soares, dos S. (2013). Caring field: A quantum and transpersonal approach to nursing care. *Ciência, Cuidado e Saúde*, *12*(3), 608. https://doi.org/10.4025/cienccuidsaude.v12i3.17159

Bouwman, H., van den Hooff, B., van de Wijngaert, L., & van Dijk, J. A. G. M. (2005). *Information and communication technology in organizations: adoption, implementation, use and effects*. London: SAGE Publications.

Bowers, B., & Schatzman, L. (2016). Dimensional analysis. In P. N. Stern, J. Corbin, B. Bowers, K. Charmaz, & A. E. Clarke (Eds.), *Developing grounded theory: the second generation* (pp. 67–94). Walnut Creek: Taylor and Francis.

Breckenridge, J. P., Jones, D., Elliott, I., & Nicol, M. (2012). *Choosing a Methodological Path : Reflections on the Constructivist Turn*. *11*(1), 64–72.

Bridi, A. C., Louro, T. Q., & Da Silva, R. C. L. (2014). Clinical Alarms in intensive care: Implications of alarm fatigue for the safety of patients. *Revista Latino-Americana de Enfermagem*, *22*(6), 1034–1040. https://doi.org/10.1590/0104-1169.3488.2513

Bringer, J. O. Y. D., Johnston, L. H., & Brackenridge, C. H. (2006). *Using Computer-Assisted Qualitative Data Analysis Software to Develop a Grounded Theory Project*. *18*(3), 245–266. https://doi.org/10.1177/1525822X06287602

Browne, M., & Cook, P. (2011). *Inappropriate trust in technology : implications for critical care nurses*. *16*(2), 92–99.

Bryant, A. (2017). *Grounded Theory and Grounded Theorizing: Pragmatism in Reaserch Practice* (Oxford University Press, Ed.). New York, NY.

Buchanan-Oliver, M., & Cruz, A. (2011). Discourses of technology consumption: Ambivalence, fear, and liminality. *Advances in Consumer Research*, *39*(Turner 1967), 287–291.

Buchanan, C., Howitt, M. L., Wilson, R., Booth, R. G., Risling, T., & Bamford, M. (2020). Compassion in a technological world: Advancing AMS ' strategic aims. *JMIR Research Protocols*, *9*(4), 1–14.

Bunch, E. H. (2002). High technology and nursing: ethical dilemmas nurses and physicians face on high-technology units in Norway. *Nursing Inquiry*, *9*(3), 187–195. https://doi.org/10.1046/j.1440-1800.2002.00143.x

Burritt, J., & Steckel, C. (2009). Supporting the learning curve for contemporary nursing practice. *Journal of Nursing Administration*, *39*(11), 479–484. https://doi.org/10.1097/NNA.0b013e3181bd5fd5

Butler, J. (2016). Revisiting bodies and pleasures. *Theory, Culture & Society*, *16*(2), 11–20. https://doi.org/10.1177/02632769922050520

Byrd, M., & Chlup, D. (2012). Theorizing African American women's learning and development: Leveraging workforce diversity through socio-cultural adult learning theories. *Handbook of Research on Workforce Diversity in a Global Society: Technologies and Concepts*. https://doi.org/10.4018/978-1-4666-1812-1.ch003

Caiata-Zufferey, M. (2018). The abductive art of discovery: Insights from a qualitative study on unaffected women managing genetic risk of breast and ovarian cancer.

International Journal of Qualitative Methods, *17*(1), 1–11. https://doi.org/10.1177/1609406917750973

Carminati, L. (2018). Generalizability in qualitative research: A tale of two traditions. *Qualitative Health Research*, *28*(13), 2094–2101. https://doi.org/10.1177/1049732318788379

Cassano, C. (2014). The right balance –Technology and patient care. *OJIN: The Online Journal of Issues in Nursing*, *18*(3), Manuscript 1. Retrieved from http://www.himss.org/right-balance-technology-and-patient-care?ItemNumber=33541

Chan, E. A., Jones, A., & Wong, K. (2013). The relationships between communication, care and time are intertwined: A narrative inquiry exploring the impact of time on registered nurses' work. *Journal of Advanced Nursing*, *69*(9). https://doi.org/10.1111/jan.12064

Chandra, Y. (2017). Social entrepreneurship as emancipatory work. *Journal of Business Venturing*, *32*(6), 657–673. https://doi.org/https://doi.org/10.1016/j.jbusvent.2017.08.004

Charmaz. (2014). Constructing Grounded Theory. In *Sage Publications, Inc.* London: SAGE.

Charmaz, K. (1997). *Grounded Theory Method*. 397–412.

Charmaz, K. (2004). Premises, principles, and practices in qualitative research: Revisiting the foundations. *Qualitative Health Research*, *14*(7), 976–993. https://doi.org/10.1177/1049732304266795

Charmaz, K. (2006). *Constructing Grounded Theory: A Practical Guide through Qualitative Analysis*. 55 City Road, London: SAGE Publications Ltd.

Chiang, V. C. L. (2011). Surviving a critical illness through mutually being there with each

other: A grounded theory study. *Intensive and Critical Care Nursing*, *27*(6), 317–330. https://doi.org/10.1016/j.iccn.2011.09.001

Chinn, P. (1991). *Anthology of caring*. New York: Ampersand Publisher Services Inc.

Chinn, P. ., & Kramer, M. (2011). *Integrated theory and knowledge development in nursing* (8th ed.). St. Louis, MI: Mosby, Inc.

Chitale, A. ., Mohanty, R. ., & Dubey, N. . (2012). *Organizational behaviour: Text and cases*. Retrieved from https://books.google.co.id/books?id=sUssQKyJJjMC

Christoff, K. (2014). Dehumanization in organizational settings: some scientific and ethical considerations. *Frontiers in Human Neuroscience*, *8*, 748.

Ciesielska, M., & Jemielniak, D. (2017). Qualitative methodologies in organization studies. *Qualitative Methodologies in Organization Studies*, *2*(December), 1–264. https://doi.org/10.1007/978-3-319-65442-3

Cipriano, P. F., & Hamer, S. (2014). Enabling the ordinary: More time to care. *American Nurse Today*, *8*(11), SR2–SR4. Retrieved from http://www.americannursetoday.com/wp-content/uploads/2014/07/ant11-Technology-1107.pdf

Clarke, A., & Charmaz, K. (2020). Grounded theory and situational analysis. In P. Atkinson, S. Delamont, A. Cernat, J. Sakshaug, & R. Williams (Eds.), *SAGE research methods foundations*. https://doi.org/10.4135/9781526421036

Closs, & Cheater. (1999). Evidence for nursing practice: a clarification of the issues. *Journal of Advanced Nursing*, *30*(1), 10–17. https://doi.org/10.1046/j.1365-2648.1999.01043.x

Cohen, G. L., & Sherman, D. (2014). Self-enhancement and Self-affirmation: The Consequences of Positive Self-thoughts for Motivation and Health. *Annu. Rev.*

Psychol, *65*, 333–371. https://doi.org/10.1146/annurev-psych-010213-115137

Conlon, C., Carney, G., Timonen, V., & Scharf, T. (2015). 'Emergent reconstruction' in grounded theory: learning from team-based interview research. *Qualitative Research : QR*, *15*(1), 39–56.

Connell, E. O., & Landers, M. (2008). *The importance of critical care nurses ' caring behaviours as perceived by nurses and relatives*. *24*, 349–358. https://doi.org/10.1016/j.iccn.2008.04.002

Coombs, M. (2003). Power and conflict in intensive care clinical decision making. *Intensive and Critical Care Nursing*, *19*(3), 125–135. https://doi.org/10.1016/S0964-3397(03)00040-5

Cooney, A. (2011). Rigour and grounded theory. *Nurse Researcher*, *18*(4), 17–22. https://doi.org/10.7748/nr2011.07.18.4.17.c8631

Corbin, B. J., & Strauss, A. (2020). *Introduction to Context , Process , and Theoretical Integration Procedures for Developing Grounded Theory*.

Corbin, J., & Strauss, A. (1990). *Grounded Theory Research : Procedures , Canons , and Evaluative Criteria*. *13*.

Coyer, F. M., Wheeler, M. K., Wetzig, S. M., & Couchman, B. A. (2007). Nursing care of the mechanically ventilated patient : What does the evidence say ? Part two. *Intensive and Critical Care Nursing*, *23*. https://doi.org/10.1016/j.iccn.2006.08.004

Creswell, J., Clark, P., & Vicki, L. (2018). *Designing and conducting mixed methods research* (3rd ed.). Los Angeles: SAGE.

Creswell, J. W. (2007). Qualitative Inquiry & Research Design. *Sage Publications, Inc.*, pp. 731–750. https://doi.org/10.1111/1467-9299.00177

Creswell, J. W. (2014). The Use of Theory. *Research Design*, 49–72.

https://doi.org/10.1590/S1415-65552003000100015

Creswell, J. W., & Poth, C. (2018). Philosophical assumptions and interpretive frameworks. *Qualitative Inquiry & Research Design: Choosing among Five Approaches*, 47–78.

Crocker, C., & Timmons, S. (2009). The role of technology in critical care nursing. *Journal of Advanced Nursing*, *65*(1), 52–61. https://doi.org/10.1111/j.1365-2648.2008.04838.x

Crosbie, B. (2014). *Nurses' understanding of health technology in the intensive care unit (Doctoral dissertation, University of Sheffield, United Kingdom)* (University of Sheffield). Retrieved from https://etheses.whiterose.ac.uk/7607/1/thesis-nurses understanding of technology.docx

da Silva, R C, & Ferreira, M. A. (2011). Technology in intensive care and its effects on nurses' actions. *Revista Da Escola de Enfermagem*, *45*(6), 1403–1411. https://doi.org/10.1590/S0080-62342011000600018

Dados, F. N., & Datos, F. E. L. (2018). *Data analysis : comparison between the different methodological perspectives of the Grounded Theory*. 1–9.

Dankenbring, C. (2014). *Eliciting and characterizing students' mental model within the context of engineering design. [Master's thesis]*. Purdue University, Indiana.

Darvish, A., Bahramnezhad, F., Keyhanian, S., & Navidhamidi, M. (2014). The role of nursing informatics on promoting quality of health care and the need for appropriate education. *Global Journal of Health Science*, *6*(6), 11–18. https://doi.org/10.5539/gjhs.v6n6p11

de Melo, C. M., Gratch, J., & Krueger, F. (2021). Heuristic thinking and altruism toward machines in people impacted by COVID-19. *IScience*, *24*(3), 102228.

https://doi.org/https://doi.org/10.1016/j.isci.2021.102228

Dean, B. (1998a). Reflections on technology : increasing the science but diminishing the art of nursing ? *Accident and Emergency Nursing*, *6*, 200–206.

Dean, B. (1998b). Reflections on technology: increasing the science but diminishing the art of nursing? *Accident & Emergency Nursing*, *6*(4), 200–206. https://doi.org/10.1016/S0965-2302(98)90080-7

del Carmen Salazar, M. (2013). A Humanizing Pedagogy: Reinventing the Principles and Practice of Education as a Journey Toward Liberation. *Review of Research in Education*, *37*(1), 121–148.

Delaney, P. J. (2010). *A grounded theory study of technology appropriation in anaesthesia. [Doctoral dissertation]*. Queensland University of Technology.

Deng, E., Mutlu, B., & Mataric, M. J. (2019). Embodiment in socially interactive robots. *Foundations and Trends® in Robotics*, *7*(4), 251–356. https://doi.org/10.1561/2300000056

Dimick, J. B., Pronovost, P. J., Heitmiller, R. F., & Lipsett, P. A. (2001). Intensive care unit physician staffing is associated with decreased length of stay, hospital cost, and complications after esophageal resection. *Critical Care Medicine*, *29*(4), 753–758. https://doi.org/10.1097/00003246-200104000-00012

Donchin, Y., & Seagull, F. J. (2002). *The hostile environment of the intensive care unit*. 316–320. https://doi.org/10.1097/01.CCX.0000019846.92818.8B

Drago, E. (2015). The effect of technology on face-to-face communication. *The Elon Journal of Undergraduate Research in Communications*, *6*(2), 13–19.

Ebright, P. R. (2010). The complex work of RNs: implications for healthy work environments. *Online Journal of Issues in Nursing*, Vol. 15, p. 11.

https://doi.org/10.3912/OJIN.Vol15No01Man04

Edworthy, J., & Hellier, E. (2006). Alarms and human behaviour: Implications for medical alarms. *British Journal of Anaesthesia*, *97*(1), 12–17. https://doi.org/10.1093/bja/ael114

Elfering, A., Grebner, S., & Ebener, C. (2015). Workflow interruptions, cognitive failure and near-accidents in health care. *Psychology, Health and Medicine*, *20*(2), 139–147. https://doi.org/10.1080/13548506.2014.913796

Ellingson, L. L., & Sotirin, P. (2020). Engaging fieldnotes. In *Making Data in Qualitative Research* (1st ed., pp. 15–32). Routledge.

Elwood, S. A., & Martin, D. G. (2000). "Placing" Interviews: Location and Scales of Power in Qualitative Research. *Professional Geographer*, *52*(4), 649–657. https://doi.org/10.1111/0033-0124.00253

Emerson, R. M. (2011). Writing ethnographic fieldnotes / Robert M. Emerson, Rachel I. Fretz, Linda L. Shaw. In *Writing ethnographic fieldnotes* (Second edi). Chicago: The University of Chicago Press.

Evans, R. S. (2016). Electronic Health Records: Then, Now, and in the Future. *Yearbook of Medical Informatics, Suppl 1*(Suppl 1), S48-61. https://doi.org/10.15265/IYS-2016-s006

Fairbrother, G., Cashin, A., Mekki, T. ., Graham, I., & McKormick, B. (2017). Commentary: Is it possible to bring the emancipatory practice development and evidence-based practice agendas together in nursing and midwifery? *International Practice Development Journal*, *7*(1), 1–7. https://doi.org/10.19043/ipdj.71.013

Ferguson, C., Inglis, S. C., Breen, P. P., Gargiulo, G. D., Byiers, V., Macdonald, P. S., & Hickman, L. D. (2020). Clinician perspectives on the design and application of

wearable cardiac technologies for older adults: Qualitative study. *JMIR Aging*, *3*(1). https://doi.org/10.2196/17299

Festerling, J., & Siraj, I. (2021). Anthropomorphizing Technology: A Conceptual Review of Anthropomorphism Research and How it Relates to Children's Engagements with Digital Voice Assistants. *Integrative Psychological and Behavioral Science*, (0123456789). https://doi.org/10.1007/s12124-021-09668-y

Fine, G., & Sandstrom, K. (2011). Symbolic Interactionism. *Sociology*. Oxford University Press.

Fiore, S. M., & Wiltshire, T. J. (2016). Technology as Teammate: Examining the Role of External Cognition in Support of Team Cognitive Processes. *Frontiers in Psychology*, *7*, 1531. https://doi.org/10.3389/fpsyg.2016.01531

Flick, U. (2018). Grounded theory coding : Ways and versions. In *Doing Grounded Thoery* (Second). 55 City Road, London: SAGE Publications Ltd.

Flick, U. (2019). *Going beyond : Theoretical sampling , saturation and sorting*. https://doi.org/10.4135/9781529716658

Franco, C., & Colinvaux, D. (2000). Grasping mental models. In J. K. Gilbert & C. J. Boulter (Eds.), *Developing models in science education*. Dordrecht: Springer N.

Freire, P. (2000). Pedagogy of the oppressed. In *The Applied Theatre Reader* (30th anniv). https://doi.org/10.4324/9780203891315-58

Fridh, I., Forsberg, A., & Bergbom, I. (2009). *Doing one ' s utmost : Nurses ' descriptions of caring for dying patients in an intensive care environment*. https://doi.org/10.1016/j.iccn.2009.06.007

Fries, R. (2001). *Handbook of medical device design*. New York: Marcel Dekker Inc.

Funk, M. (2011). As health care technology advances: benefits and risks. *American*

Journal of Critical Care, *20*(4), 285–291. https://doi.org/10.4037/ajcc2011810

Gadow, S. (1984). Touch and technology: Two paradigms of patient care. *Journal of Religion & Health*, *23*(1), 63–69. https://doi.org/10.1007/BF00999900

Gärdenfors, P., & Lombard, M. (2020). Technology led to more abstract causal reasoning. *Biology and Philosophy*, *35*(4), 1–23. https://doi.org/10.1007/s10539-020-09757-z

Garrett, S. K., & Craig, J. B. (2009). Medication administration and the complexity of nursing workflow. *Society for Health Systems Conference and Expo*. Retrieved from http://www.scopus.com/inward/record.url?eid=2-s2.0-77950565083&partnerID=tZOtx3y1

GetanehAlemu, Stevens, B., Ross, P., & Chandler, J. (2015). The Use of a Constructivist Grounded Theory Method to Explore the Role of Socially-Constructed Metadata (Web 2.0) Approaches. *Qualitative & Quantitative Methods in Libraries*, (4), 517. https://doi.org/ISSN 2241-1925

Gibson, E. J. (2002). *Perceiving the affordances : a portrait of two psychologists*. London: L. Erlbaum.

Gill, P. S., Kamath, A., & Gill, T. S. (2012). Distraction: an assessment of smartphone usage in health care work settings. *Risk Management and Healthcare Policy*, *5*, 105–114. https://doi.org/10.2147/RMHP.S34813

Gillespie, A. (2007). *The social basis of self-reflection*. Cambridge University Press.

Glaser, B. (1978). *Theoretical sensitivity : advances in the methodology of grounded theory* [Book]. Mill Valley, Calif.: Sociology Press.

Glaser, B. (2002). Conceptualization: On Theory and Theorizing Using Grounded Theory. *International Journal of Qualitative Methods*, *1*(2), 23–38. https://doi.org/10.1177/160940690200100203

Glaser, B. G. (1998). *Doing Grounded Theory: Issues and Discussions*. Retrieved from https://books.google.com.my/books?id=XStmQgAACAAJ

Glaser, B. G., & Strauss, A. L. (1999). *The Discovery of Grounded Theory*. https://doi.org/https://doi.org/10.4324/9780203793206

Glaser, B., & Strauss, A. (1967). *The Discovery of grounded theory: Strategies for qualitative research*. London: Weidenfeld and Nicolson.

Golay, D., Salminen Karlsson, M., & Cajander, Å. (2021). Negative Emotions Induced by Work-Related Information Technology Use in Hospital Nursing. *CIN: Computers, Informatics, Nursing*, *Publish Ah*(0), 1–8. https://doi.org/10.1097/cin.0000000000000800

Gold, M. (2013). *in the Real World to Transform Delivery*. *19*(10), 377–382.

Gomes De Oliveira, J., & Vianna, Á. A. (2013). Hospital nursing and humanization: knowledge of undergraduate nursing student. *J Health Sci Inst*, *31*(3), 36–42.

Gondek, E. J. (2001). *Nurses using information technology: The lived experience. (Order No. 3022120). Available from ProQuest Dissertations & Theses Global. (251135653).* Retrieved from https://search-proquest-com.ezproxy.is.ed.ac.uk/docview/251135653?accountid=10673

Goodare, P. (2017). Literature review: Why do we continue to lose our nurses? *Australian Journal of Advanced Nursing*, *34*(4), 50–56. Retrieved from https://search.informit.org/doi/10.3316/informit.947634096009471

Goulding, C. (1998). Grounded theory: the missing methodology on the interpretivist agenda. *Qualitative Market Research*, *1*(1), 50–57. https://doi.org/10.1108/13522759810197587

Govasli, L., & Solvoll, B. A. (2020). Nurses' experiences of busyness in their daily work.

Nursing Inquiry, *27*(3), 1–8. https://doi.org/10.1111/nin.12350

Greca, I. M., & Moreira, M. A. (2000). Mental models, conceptual models, and modelling. *International Journal of Science Education*, *22*(1), 11. https://doi.org/10.1080/095006900289976

Grissinger, M. (2019). Understanding human over-reliance on technology. *P and T*, *44*(6), 320–321.

Grube, J. A., & Piliavin, J. A. (2015). Role identity, organizational experiences, and volunteer performance. *Personality and Social Psychology Bulletin*, *26*(9), 1108–1119. https://doi.org/10.1177/01461672002611007

Guba, E. G., & Lincoln, Y. S. (2001). *GUIDELINES AND CHECKLIST FOR CONSTRUCTIVIST (a . k . a . FOURTH GENERATION) EVALUATION*. (November), 1–15.

Gubrium, J. F., & Holstein, J. A. (2012). 1 From the Individual Interview to the Interview Society. In *Handbook of Interview Research*. https://doi.org/10.4135/9781412973588.d3

Haddad, L. ., Annamaraju, P., & Toney-Butler, P. . (2022). Nursing Shortage. In *StatPearls [Internet]*. Retrieved from https://www.ncbi.nlm.nih.gov/books/NBK493175/

Han, B., Li, Q., Chen, X., & Zhao, G. (2020). Workflow for Intensive Care Unit Nurses: A Time and Motion Study. *SAGE Open*, *10*(3), 2158244020947433. https://doi.org/10.1177/2158244020947433

Happ, M. B. (2000). Using a best practice approach to prevent treatment interference in critical care. *Progress in Cardiovascular Nursing*, *15*(2), 58–62. https://doi.org/10.1111/j.0889-7204.2000.080394.x

Haque, O. S., & Waytz, A. (2012). Dehumanization in Medicine: Causes, Solutions, and Functions. *Perspectives on Psychological Science*, *7*(2), 176–186. https://doi.org/10.1177/1745691611429706

Haris, S., Yahya, S., Aryati, W., Wan, W., Alam, S., Sciences, M., & Alam, S. (2009). ICT policy and regulation in Malaysia. *Journal of Media and Information Warfare*, *2*, 75–88.

Harlow, S. (2017). Liberation Technology in el Salvador: Re-Appropriating Social Media among Alternative Media Projects. In *Liberation Technology in el Salvador*. Cham: Springer International Publishing AG.

Harris, P. R., Griffin, D. W., Napper, L. E., Bond, R., Schüz, B., Stride, C., & Brearley, I. (2019). Individual differences in self-affirmation: Distinguishing self-affirmation from positive self-regard. *Self and Identity*, *18*(6), 589–630. https://doi.org/10.1080/15298868.2018.1504819

Harrison, M. I., Koppel, R., & Bar-Lev, S. (2007). Unintended consequences of information technologies in health care--an interactive sociotechnical analysis. *Journal of the American Medical Informatics Association : JAMIA*, Vol. 14, pp. 542–549. https://doi.org/10.1197/jamia.M2384

Hasandoost, F., Mohammadi, E., Khademi, M., & Seddighi, M. (2020). *Humanistic Care in the Intensive Care Unit: A Qualitative Study*. 1–20. Retrieved from https://doi.org/10.21203/rs.3.rs-56266/v2

Haslam, D. (2015). "More than kindness." *Journal of Compassionate Health Care*, *2*(1), 6. https://doi.org/10.1186/s40639-015-0015-2

Haslam, N., & Haslam, N. (2017). *Dehumanization : An Integrative Review Dehumanization : An Integrative Review*. *10*(February 2006), 252–264.

https://doi.org/10.1207/s15327957pspr1003

Haslam, N., & Loughnan, S. (2014). Dehumanization and Infrahumanization. *Annual Review of Psychology*, *65*(1), 399–423. https://doi.org/10.1146/annurev-psych-010213-115045

Healy, K. (2016). After the Biomedical Technology Revolution: Where to Now for a Bio-Psycho-Social Approach to Social Work? *British Journal of Social Work*, *46*(5), 1446–1462. https://doi.org/10.1093/bjsw/bcv051

Heidegger, M. (1977). *The Question concerning technology and other essays*. New York: Harper & Row.

Herschbach, D. R., With, C., & Design, O. (1992). Technology and Efficiency: Competencies as Content. *Journal of Technology Education*, *3*(2), 15–25.

Hesse-Biber, S. N., & Leavy, P. (2006). *Emergent methods in social research*. Thousand Oaks, Calif.: SAGE.

Hirschmann, R. (2020). Malaysia urban population 2005-2018. Retrieved July 26, 2020, from https://www.statista.com/statistics/603362/malaysia-urban-population/

Ho, S. S., Holloway, A., & Stenhouse, R. (2019). Analytic Methods' Considerations for the Translation of Sensitive Qualitative Data From Mandarin Into English. *International Journal of Qualitative Methods*, *18*, 1–6. https://doi.org/10.1177/1609406919868354

Hoggett, P., & Thompson, S. (2012). *Politics and the emotions: the affective turn in contemporary political studies* (Eds.). New York: Bloomsbury Academic & Professional.

Holloway, I, & Biley, F. (2011). Being a Qualitative Researcher. *Qualitative Health Research*, *21*, 968–975.

Holloway, Immy, & Galvin, K. (2016). *Qualitative Research in Nursing and Healthcare*. Hoboken: John Wiley & Sons, Incorporated.

Hopkinson, S. G., & Wiegand, D. L. (2017). The culture contributing to interruptions in the nursing work environment: An ethnography. *Journal of Clinical Nursing*, *26*(23–24), 5093–5102. https://doi.org/10.1111/jocn.14052

Howard, M., Sundareswara, R., Daily, M., Bhattacharyya, R., Kaplan, S., Mundhenk, N., … Neely, H. (2013). Using tactile displays to maintain situational awareness during driving. *2013 IEEE International Multi-Disciplinary Conference on Cognitive Methods in Situation Awareness and Decision Support, CogSIMA 2013*, 228–237. https://doi.org/10.1109/CogSIMA.2013.6523852

Hsiao, J. L., Chang, H. C., & Chen, R. F. (2011). A study of factors affecting acceptance of hospital information systems: A nursing perspective. *Journal of Nursing Research*, Vol. 19, pp. 150–160. https://doi.org/10.1097/JNR.0b013e31821cbb25

Huang, S., Tanioka, T., Locsin, R., Parker, M., & Masory, O. (2011). Functions of a caring robot in nursing. *NLP-KE 2011 - Proceedings of the 7th International Conference on Natural Language Processing and Knowledge Engineering*, 425–429. https://doi.org/10.1109/NLPKE.2011.6138237

Hunt, J. S., Siemienczuk, J., Gillanders, W., Leblanc, B. H., Rozenfeld, Y., Bonin, K., & Pape, G. (2009). The impact of a physician-directed health information technology system on diabetes outcomes in primary care: A pre- And postimplementation study. *Informatics in Primary Care*, *17*(3), 165–174. https://doi.org/10.14236/jhi.v17i3.731

Huston, C. (2013). The Impact of Emerging Technology on Nursing Care: Warp Speed Ahead Carol Huston, MSN, DPA, FAAN. *The Online Journal of Issues in Nursing*, Vol. 18, p. 1. https://doi.org/10.3912/OJIN.Vol18No02Man01

Hutchison, A. J., Johnston, L. H., & Breckon, J. D. (2010). Using QSR-NVivo to facilitate the development of a grounded theory project: an account of a worked example. *International Journal of Social Research Methodology*, *13*(4), 283–302. https://doi.org/10.1080/13645570902996301

Irinoye, O. O., Ayandiran, E. O., Fakunle, I., & Mtshali, N. (2013). Nurses' perception and barriers to use of information communication technology in a teaching hospital in Nigeria. *CIN - Computers Informatics Nursing*, *31*(8), 394–400. https://doi.org/10.1097/NXN.0b013e3182997a6e

Island, R., Alpert, W., Island, R., Harris, D. A., Poplau, S., Kroth, P. J., … Information, H. (2018). *Reports Summarize Health Information Technology Study Results from Brown University School of Medicine (Physician stress and burnout : the impact of health information technology)*.

Isman, A. (2012). Technology and technique: An educational perspective. *Turkish Online Journal of Educational Technology*, *11*(2), 207–213.

Jamil, J., & Ibrahim, R. (2017). *Issues and trends in Nursing education in Malaysia : A literature review*.

Jarrar, M., Rahman, H. A., & Shamsudin, A. S. (2015). The impact of patient to nurse ratio on quality of care and patient safety in the medical and surgical wards in Malaysian private hospitals: A cross-sectional study. *Asian Social Science, 11*(9), 326–332. https://doi.org/10.5539/ass.v11n9p326

Jarrín, O. F. (2012). The integrality of situated caring in nursing and the environment. *Advances in Nursing Science*, *35*(1), 14–24. https://doi.org/10.1097/ANS.0b013e3182433b89

Jasmine, T. (2009). Art, science, or both? Keeping the care in nursing. *The Nursing Clinics*

of North America, *44*(4), 415–421. https://doi.org/10.1016/j.cnur.2009.07.003

Johannessen, J. A., Olaisen, J., & Olsen, B. (2001). Mismanagement of tacit knowledge: The importance of tacit knowledge, the danger of information technology, and what to do about it. *International Journal of Information Management*, *21*(1), 3–20. https://doi.org/10.1016/S0268-4012(00)00047-5

John, A., Halley, L., & David, J. (2010). *Using QSR-NVivo to facilitate the development of a grounded theory project : an account of a worked example*. *13*(4), 283–302. https://doi.org/10.1080/13645570902996301

Jones, T. L. (2010). A holistic framework for nursing time: implications for theory, practice, and research. *Nursing Forum*, *45*(3), 185–196. https://doi.org/10.1111/j.1744-6198.2010.00180.x

Judge, T. A., Erez, A., Bono, J. E., & Thoresen, C. J. (2002). Are measures of self-esteem, neuroticism, locus of control, and generalized self-efficacy indicators of a common core construct? *Journal of Personality and Social Psychology*, *83*(3), 693–710. https://doi.org/10.1037/0022-3514.83.3.693

Jung, E., & Hecht, M. L. (2004). Elaborating the communication theory of identity: Identity gaps and communication outcomes. *Communication Quarterly*, *52*(3), 265–283. https://doi.org/10.1080/01463370409370197

Kabir, N. (2012). Effects of Advances in Technology on Tacit Knowledge Transferability. *International Conference on Intellectual Capital and Knowledge Management and Organisational Learning*, (October). https://doi.org/10.13140/RG.2.1.2629.2646

Kadri, M. S. El, Molinari, A. C., & Ramos, S. M. (2019). Deliberative pedagogy, language and power: emancipation and social trasnformation in education according to critical theory. *Revista Ibero-Americana de Estudos Em Educação*, *14*(esp 4), 2088-.

Kean, S. (2007). *The emergence of negotiated family care in intensive care - a grounded theory approach. [Doctoral dissertation]* (The University of Edinburgh). Retrieved from http://hdl.handle.net/1842/2838

Keenan, G. M., Yakel, E., Tschannen, D., & Mandeville, M. (2008). Documentation and the Nurse Care Planning Process. *Patient Safety and Quality: An Evidence-Based Handbook for Nurses:Vol.3*, 3-175-3–206. https://doi.org/NBK2674 [bookaccession]

Kelleher, S. (2006). Providing patient-centred care in an intensive care unit. *Nursing Standard*, *21*(13), 35–40. https://doi.org/10.7748/ns2006.12.21.13.35.c6388

Kelman, H. C. (1958). Compliance, identification, and internalization: three processes of attitude change. *Journal of Conflict Resolution*, *2*(1), 51–60.

Khademi, M., Mohammadi, E., & Vanaki, Z. (2017). A grounded theory of humanistic nursing in acute care work environments. *Nursing Ethics*, *24*(8), 908–921.

Kieft, R. A. M. M., de Brouwer, B. B. J. M., Francke, A. L., & Delnoij, D. M. J. (2014). How nurses and their work environment affect patient experiences of the quality of care: a qualitative study. *BMC Health Services Research*, *14*(1), 249. https://doi.org/10.1186/1472-6963-14-249

Kiran, A. H., & Verbeek, P.-P. (2010). Trusting our selves to technology. *Knowledge, Technology & Policy*, *23*(3), 409–427. https://doi.org/10.1007/s12130-010-9123-7

Kitson, A. L., Muntlin Athlin, Å., & Conroy, T. (2014). Anything but basic: Nursing's challenge in meeting patients' fundamental care needs. *Journal of Nursing Scholarship*, *46*(5), 331–339. https://doi.org/10.1111/jnu.12081

Knezevic, A. (2020). The epistemic value of participant observation. [Master's thesis, Central European University]. ProQuest Dissertations and Theses Global.

Kockelman, P. (2013). Information is the enclosure of meaning: Cybernetics, semiotics,

and alternative theories of information. *Language and Communication*, *33*(2), 115–127. https://doi.org/10.1016/j.langcom.2013.01.002

Kolb, S. M. (2016). *Grounded theory and the constant comparative method : Valid research strategies for educators Grounded Theory and the Constant Comparative Method : Valid Research Strategies for Educators*. (January 2012).

Kongsuwan, W., & Locsin, R. C. (2011). Thai nurses' experience of caring for persons with life-sustaining technologies in intensive care settings: a phenomenological study. *Intensive & Critical Care Nursing : The Official Journal of the British Association of Critical Care Nurses*, *27*(2), 102–110. https://doi.org/10.1016/j.iccn.2010.12.002

Krel, C., Vrbnjak, D., Bevc, S., Štiglic, G., & Pajnkihar, M. (2022). Technological Competency As Caring in Nursing: a Description, Analysis and Evaluation of The Theory. *Zdravstveno Varstvo*, *61*(2), 115–123. https://doi.org/10.2478/sjph-2022-0016

Lai, M.-C., & Yap, S.-F. (2006). Technology development in Malaysia and the newly industrializing economies: A comparative analysis. *Asia-Pacific Development Journal*, *11*(2), 53–80. https://doi.org/10.18356/09d91982-en

Lane, A. (2016). *2. Emancipation through Open Education: Rhetoric or Reality?*

Latiff, N., Teo, L., Jamaludin, N., Ramli, M., Razali, M. H., Amram, M., & Jayakumar, K. (2016). The comparisons and contrasts between English and Malay languages. *English Review: Journal of English Education*, *4*, 209. https://doi.org/10.25134/erjee.v4i2.335

Lee, H. W., Ramayah, T., & Zakaria, N. (2012). External factors in hospital information system (HIS) adoption model: a case on Malaysia. *Journal of Medical Systems*, *36*(4), 2129–2140. https://doi.org/10.1007/s10916-011-9675-4

Limbu, S., Kongsuwan, W., & Yodchai, K. (2019). Lived experiences of intensive care nurses in caring for critically ill patients: Lived experiences of intensive care nurses. *Nursing in Critical Care*, *24*(1), 9–14. https://doi.org/10.1111/nicc.12349

Lindebaum, D. (2017). *Emancipation Through Emotion Regulation at Work*. https://doi.org/10.4337/9781786436337

Locsin, R. C. (2001). *Advancing technology, caring and nursing*. Connecticut: House, Auburn.

Locsin, R. C. (2005). *Technological competency as caring in nursing: A model for practice*. Indiana, USA: Sigma Theta Tau International.

Lopez-Dicastillo, O., & Belintxon, M. (2014). The Challenges of Participant Observations of Cultural Encounters within an Ethnographic Study. *Procedia - Social and Behavioral Sciences*, *132*, 522–526. https://doi.org/10.1016/j.sbspro.2014.04.347

Lunenburg, F. (2011). Self-efficacy in the workplace: implications for motivation and performance. *International Journal of Management, Business, and Administration*, *14*(1).

MacDonald du Mont, P. (2002). The Concept of Therapeutic Presence in Nursing. *Fifth Annual International Workshop: PRESENCE*, 1–18. Retrieved from http://www.temple.edu/ispr/prev_conferences/proceedings/2002/Final papers/du Mont.pdf

Madden, R. (2017). Description: Writing 'Down' Fieldnotes. In *Being Ethnographic: A Guide to the Theory and Practice of Ethnography* (Second, pp. 115-). 55 City Road: SAGE Publications Ltd.

Maddock, C. (2019). The dehumanization of the American healthcare professional : The Impact of technology on the ever-evolving world of medicine. *Honor Scholar Theses*,

112.

Mador, R. L., & Shaw, N. T. (2009). The impact of a Critical Care Information System (CCIS) on time spent charting and in direct patient care by staff in the ICU: a review of the literature. *International Journal of Medical Informatics*, *78*(7), 435–445. https://doi.org/10.1016/j.ijmedinf.2009.01.002

Maher, C., Hadfield, M., Hutchings, M., & de Eyto, A. (2018). Ensuring Rigor in Qualitative Data Analysis: A Design Research Approach to Coding Combining NVivo With Traditional Material Methods. *International Journal of Qualitative Methods*, *17*(1), 1–13. https://doi.org/10.1177/1609406918786362

Malaysian Ministry of Health. (2013). *Anaesthesiology and intensive care services operational policy. Second Edition*.

Malaysian Pharmaceutical Society. (2016). *Brief Overview of the Medical Professionals in Malaysia*. Retrieved from http://www.mpc.gov.my/wp-content/uploads/2016/10/C2-2.pdf

MAMPU. (2019). BILANGAN JURURAWAT DI KKM MENGIKUT NEGERI & INSTITUSI - BILANGAN JURURAWAT DI KKM MENGIKUT NEGERI & INSTITUSI BAGI TAHUN 2015 - 2018 -. Retrieved July 7, 2010, from http://www.data.gov.my/data/ms_MY/dataset/10-bil-jururawat-di-kkm-mengikut-negeri-institusi-bagi-tahun-2015-2017/resource/9a9ac827-71c4-40d9-a396-c9b0d1cd8832

Mann, S. (2016). Interview Context. In *The Research Interview* (pp. 58–85). London: Palgrave Macmillan.

Marcum, J. A. (2008). Humanizing Modern Medicine. In *Humanizing Modern Medicine*. https://doi.org/10.1007/978-1-4020-6797-6

Marx, L. (2016). On Heidegger ’ s Conception of " Technology " and Its Historical Validity. *The Massachusetts Review*, *25*(4), 638–652.

Mason, M. (2010). Sample size and saturation in PhD studies using qualitative interviews. *Forum Qualitative Sozialforschung*, *11*(3), 19–11.

Matthewman, S. (2011). *Technology and Social Theory*. New York, NY: Palgrave Macmillan.

Mazzotta, C. P. (2016). Biomedical approaches to care and their influence on point of care nurses: a scoping review. *Journal of Nursing Education and Practice*, *6*(8), 93–101. https://doi.org/10.5430/jnep.v6n8p93

McDermid, F., Peters, K., Jackson, D., & Daly, J. (2014). Conducting qualitative research in the context of pre-existing peer and collegial relationships. *Nurse Researcher*, *21*(5), 28–33. https://doi.org/10.7748/nr.21.5.28.e1232

Mcgrath, M. (2008). *The challenges of caring in a technological environment : critical care nurses ’ experiences*. 1096–1105. https://doi.org/10.1111/j.1365-2702.2007.02050.x

Melas, C. D., Zampetakis, L. a, Dimopoulou, A., & Moustakis, V. (2011). Modeling the acceptance of clinical information systems among hospital medical staff: an extended TAM model. *Journal of Biomedical Informatics*, *44*(4), 553–564. https://doi.org/10.1016/j.jbi.2011.01.009

Mellahi, K., & Wilkinson, A. (2010). Managing and coping with organizational failure: Introduction to the special issue. *Group and Organization Management*, *35*(5), 531–541. https://doi.org/10.1177/1059601110383404

Mills, J., Bonner, A., & Francis, K. (2006). *The Development of Constructivist Grounded Theory* (Vol. 5).

Miner-Williams, D. (2007). Connectedness in the Nurse-Patient Relationship: a Grounded Theory Study. *Issues in Mental Health Nursing*, *28*(11), 1215–1234. https://doi.org/10.1080/01612840701651462

Ministry of Health Malaysia. (2005). *2005 Report*.

Ministry of Health Malaysia. (2015). *Country health plan: 10th Malaysia plan 2011-2015*. Retrieved from https://www.moh.gov.my/moh/images/gallery/Report/Country_health.pdf

Mitra, S., & O'Brien, V. (2021). Navigating Methodological Concerns at the Data Collection Stage: Lessons from a Qualitative Indian-Irish Adoption Study. *The Qualitative Report*, *26*(8), 2521–2537. https://doi.org/10.46743/2160-3715/2021.4508

Mohamadali, N. A., & Aziz, N. F. A. (2017). The Technology Factors as Barriers for Sustainable Health Information Systems (HIS)-A Review. *Procedia Computer Science*, *124*, 370–378. https://doi.org/10.1016/j.procs.2017.12.167

Mohamadi Asl, S., Khademi, M., & Mohammadi, E. (2022). The influential factors in humanistic critical care nursing. *Nursing Ethics*, *29*(3), 608–620.

Mohammadipour, F., Atashzadeh-Shoorideh, F., Parvizy, S., & Hosseini, M. (2017). Concept Development of "Nursing Presence": Application of Schwartz-Barcott and Kim's Hybrid Model. *Asian Nursing Research*, *11*(1), 19–29. https://doi.org/10.1016/j.anr.2017.01.004

Moore, S., & Jayewardene, D. (2014). The use of smartphones in clinical practice. *Nursing Management*, *21*(4), 18–22. https://doi.org/10.7748/nm.21.4.18.e1225

Morley, L., & Cashell, A. (2017). Collaboration in Health Care. *Journal of Medical Imaging and Radiation Sciences*, *48*(2), 207–216. https://doi.org/10.1016/j.jmir.2017.02.071

Morse, J. M., Barrett, M., Mayan, M., Olson, K., Spiers, J., & Hon, D. (2002). *Verification Strategies for Establishing Reliability and Validity in Qualitative Research*. *1*(2), 1–19.

Moser, A., & Korstjens, I. (2018). Series: Practical guidance to qualitative research. Part 3: Sampling, data collection and analysis. *European Journal of General Practice*, *24*(1), 9–18. https://doi.org/10.1080/13814788.2017.1375091

Mulhall, A. (2003). In the field: notes on observation in qualitative research. *Journal of Advanced Nursing*, *41*(3), 306–313.

Mun, T. W. (2018). *A study of turnover intention and exit choice among the registered nurses in the private hospitals in peninsular Malaysia [Doctoral dissertation, University of Malaya]. University of Malaya Research Repository.* Retrieved from http://studentsrepo.um.edu.my/8806/6/wai_mun.pdf

Mun Tang, W., & Idris, A. R. (2016). Nursing practice environment as perceived by the Malaysian private hospital nurses. *International E-Journal of Science, Medicine & Education*, *10*(2), 11–20. https://doi.org/10.56026/imu.10.2.11

Musante, K., & DeWalt, B. R. (2010). *Participant Observation: A Guide for Fieldworkers*. Blue Ridge Summit: AltaMira Press.

Mutepa, R. M. (2016). The Process of Writing a Constructivist Dissertation: A Constructivist Inquiry Into the Meaning of Pregnancy for African American Women Infected With HIV. *SAGE Open*, *6*(1). https://doi.org/10.1177/2158244016629188

Nantsupawat, A., Nantsupawat, R., Kulnaviktikul, W., & Mchugh, M. D. (2015). Relationship between nurse staffing levels and nurse outcomes in community hospitals, Thailand. *Nursing and Health Sciences*, *17*(1), 112–118. https://doi.org/10.1111/nhs.12140

Nasi, G., Cucciniello, M., & Guerrazzi, C. (2015). The role of mobile technologies in health care processes: the case of cancer supportive care. *Journal of Medical Internet Research*, *17*(2), e26. https://doi.org/10.2196/jmir.3757

Nelson, S. (2012). The lost path to emancipatory practice: Towards a history of reflective practice in nursing. *Nursing Philosophy*, *13*(3), 202–213. https://doi.org/10.1111/j.1466-769X.2011.00535.x

Ng, A., & San, C. (2013). *The Modified Technology Acceptance Model for Private Clinical Physicians : A Case Study in Malaysia , Penang*. *3*(2), 380–403.

Nkosi, Z. Z., Asah, F., & Pillay, P. (2011). Post-basic nursing students' access to and attitudes toward the use of information technology in practice: A descriptive analysis. *Journal of Nursing Management*, *19*(7), 876–882. https://doi.org/10.1111/j.1365-2834.2011.01303.x

Noh, C. H., Arthur, D., & Sohng, K. Y. (2002). Relationship between technological influences and caring attributes of Korean nurses. *International Journal of Nursing Practice*, *8*(5), 247–256. https://doi.org/10.1046/j.1440-172X.2002.00374.x

Northouse, P. G. (2016). *Leadership : theory and practice* (7th ed.). Los Angeles: SAGE.

Nuutila, K., Tapola, A., Tuominen, H., Kupiainen, S., Pásztor, A., & Niemivirta, M. (2020). Reciprocal Predictions Between Interest, Self-Efficacy, and Performance During a Task. *Frontiers in Education (Lausanne)*, *5*. https://doi.org/10.3389/feduc.2020.00036

Omobhude, C., & Chen, S.-H. (2019). The roles and measurements of proximity in sustained technology development: a literature review. *Sustainability (Basel, Switzerland)*, *11*(1), 224. https://doi.org/10.3390/su11010224

Orland-Barak, L., & Wilhelem, D. (2005). Novices in clinical practice settings: Student

nurses stories of learning the practice of nursing. *Nurse Education Today*, *25*(6), 455–464. https://doi.org/10.1016/j.nedt.2005.04.006

Orlikowski, W. J. (1992). The Duality of Technology : Rethinking the Concept of Technology in Organizations. *Organization Science*, *3*(3), 398–427.

Oshodi, T. O., Bruneau, B., Crockett, R., Kinchington, F., Nayar, S., & West, E. (2019). Registered nurses' perceptions and experiences of autonomy: A descriptive phenomenological study. *BMC Nursing*, *18*(1), 1–14. https://doi.org/10.1186/s12912-019-0378-3

Oxford University Press. (n.d.). Emancipate. Retrieved from Oxford Learner's Dictionaries website: https://www.oxfordlearnersdictionaries.com/definition/english/emancipate

Papatheodorou, T., & Luff, P. (2012). *Child observation for learning and research*. New York: Routledge.

Parasuraman, R., Sheridan, T. B., & Wickens, C. D. (2008). Situation awareness, mental workload, and trust in automation: viable, empirically supported cognitive engineering constructs. *Journal of Cognitive Engineering and Decision Making*, *2*(2), 140–160. https://doi.org/10.1518/155534308X284417

Parsons, M., & Urbanski, S. (2012). Recognizing dysfunctional communications a means of improving organizational practice. *Online Journal of Communication and Media Technologies*, *2*(4). https://doi.org/10.29333/ojcmt/2404

Paynton, S. (2009). The informal power of nurses for promoting patient care. *Online Journal of Issues in Nursing*, *14*(1), 3. https://doi.org/10.3912/OJIN.Vol14No1PPT01

Peacock, J. W., & Nolan, P. W. (2000). Care under threat in the modern world. *Journal of Advanced Nursing*, *32*(5), 1066–1070. https://doi.org/10.1046/j.1365-

2648.2000.01575.x

Pepito, J. A., & Locsin, R. (2019). Can nurses remain relevant in a technologically advanced future? *International Journal of Nursing Sciences*, *6*(1), 106–110. https://doi.org/10.1016/j.ijnss.2018.09.013

Pineda, J. (2021). *Digital commons perceiving sociable technology : Exploring the role of qnthropomorphism and agency perception on human-computer interaction (HCI)*.

Pipe, T. B. (2012). *Bringing Back the Basics of Nursing*. *36*(3), 225–233. https://doi.org/10.1097/NAQ.0b013e31825afb3c

Pipe, T. B., Connolly, T., Spahr, N., Lendzion, N., Buchda, V., Jury, R., & Cisar, N. (2012). Bringing back the basics of nursing: defining patient care essentials. *Nursing Administration Quarterly*, *36*(3), 225–233. https://doi.org/10.1097/NAQ.0b013e31825afb3c

Polit, D., & Beck, C. (2010). Generalization in quantitative and qualitative research: Myths and strategies. *International Journal of Nursing Studies*, *47*(11), 1451–1458. https://doi.org/10.1016/j.ijnurstu.2010.06.004

Pontefract, S. K., Coleman, J. J., Vallance, H. K., Hirsch, C. A., Shah, S., Marriott, J. F., & Redwood, S. (2018). The impact of computerised physician order entry and clinical decision support on pharmacist-physician communication in the hospital setting: A qualitative study. *PLoS ONE*, *13*(11), 1–15. https://doi.org/10.1371/journal.pone.0207450

Porras, P. (2011). *Self-affirmation, autonomy-connectedness & mood*. (July), 1–7.

Powell-cope, G., Nelson, A. L., & Patterson, E. S. (2008). Patient care technology and safety. In R. Hughes (Ed.), *Patient Safety and Quality: An Evidence-Based Handbook for Nurses* (pp. 207–220). Retrieved from

https://www.ncbi.nlm.nih.gov/books/NBK2686/

Quek, D. K. L. (2014). The Malaysian Health Care System: A Review. *Intensive Workshop on Health Systems in Transition*, (July), https://www.researchgate.net/publication/237409933. https://doi.org/10.1161/CIRCULATIONAHA.108.847798

Rachel, S. (2021). Embodied computing: Wearables, implantables, embeddables, ingestibles by Isabel Pedersen and Andrew Iliadis. In *International Journal of Law and Information Technology* (Eds, Vol. 29). https://doi.org/10.1093/ijlit/eaaa018

Rad, M., Mirhaghi, A., & Shomoossi, N. (2016). *Loving and Humane Care : A Missing Link in Nursing*. *5*(2), 10–11. https://doi.org/10.1177/0969733015600910.

Rashid, M. (2011). Technology and the future of intensive care unit design. *Critical Care Nursing Quarterly*, *34*(4), 332–360. https://doi.org/10.1097/CNQ.0b013e31822ba782

Rettberg, J. W. (2014). *Seeing ourselves through technology: how we use selfies, blogs and wearable devices to see and shape ourselves*. https://doi.org/10.1057/9781137476661.0001

Reuben, D. B., & Tinetti, M. E. (2014). The hospital-dependent patient. *The New England Journal of Medicine*, *370*(8), 694–697. https://doi.org/10.1056/NEJMp1315568

Ribes, D., Jackson, S., Geiger, S., Burton, M., & Finholt, T. (2013). Artifacts that organize: delegation in the distributed organization. *Information and Organization*, *23*(1), 1–14. https://doi.org/10.1016/j.infoandorg.2012.08.001

Richards, D. A., & Borglin, G. (2019). 'Shitty nursing' – The new normal? *International Journal of Nursing Studies*, *91*(1), 148–152.

Rnanic, S. A., Alapack, R. J., Fridlund, B., Rnan, R. N. T., Ekebergh, M., & Rnan, R. N. T. (2008). *Original article Beleaguered by technology : care in technologically*

intense environments. 55–61.

Roberts, P. (2016). Freire's Philosophy and Pedagogy: Humanization and Education. In M. A. Peters (Ed.), *Encyclopedia of Educational Philosophy and Theory* (pp. 1–5). https://doi.org/10.1007/978-981-287-532-7_102-1

Robinson, O. J., Vytal, K., Cornwell, B. R., & Grillon, C. (2013). The impact of anxiety upon cognition: perspectives from human threat of shock studies. *Frontiers in Human Neuroscience*, *7*(May), 1–21. https://doi.org/10.3389/fnhum.2013.00203

Rogers, A. E., Hwang, W. T., Scott, L. D., Aiken, L. H., & Dinges, D. F. (2004). The working hours of hospital staff nurses and patient safety. *Health Affairs*, *23*(4), 202–212. https://doi.org/10.1377/hlthaff.23.4.202

Rowley, E., & Waring, J. (2011). *A socio-cultural perspective on patient safety*. Boca Raton, Florida, Florida: CRC Press.

Rubeis, G. (2020). Guardians of humanity? The challenges of nursing practice in the digital age. *Nursing Philosophy*. https://doi.org/10.1111/nup.12331

Rumball-Smith, J., Ross, K., & Bates, D. W. (2020). Late adopters of the electronic health record should move now. *BMJ Quality and Safety*, *29*(3), 238–240. https://doi.org/10.1136/bmjqs-2019-010002

Rushkoff, D. (2021). Instead of People Using Technology, Technology Is Using People. *NIM Marketing Intelligence Review*, *13*(1), 42–45.

Rusiman, M. S., Adnan, R., Nasibov, E., & Jacob, K. (2011). *Modification of continuous and binary ICU data in FCRM models*. https://doi.org/10.13140/2.1.3993.0887

Safurah, J., Kamaliah, M. ., Khairiyah, A. ., Nour, H. ., & Healy, J. (2013). Malaysia Health System Review. *Malaysia Health System Review*, *3*(1), 103. Retrieved from http://apps.who.int/iris/bitstream/handle/10665/206911/9789290615842_eng.pdf;j

Salhani, D., & Coulter, I. (2009). The politics of interprofessional working and the struggle for professional autonomy in nursing. *Social Science and Medicine*, *68*(7), 1221–1228. https://doi.org/10.1016/j.socscimed.2009.01.041

Salvage, J., & Smith, R. (2000). Doctors and nurses: doing it differently. *BMJ (Clinical Research Ed.)*, *320*(7241), 1019–1020. https://doi.org/10.1136/bmj.320.7241.1019

Samaniego, V. C., & Cárcamo, S. (2013). The nursing image and professional identity. The future of a construction. *Invest. Educ. Enferm*, *31*(1), 54–62.

Samy, G. N., Ahmad, R., & Ismail, Z. (2010). Security threats categories in healthcare information systems. *Health Informatics Journal*, *16*(3), 201–209. https://doi.org/10.1177/1460458210377468

Sanchez, G., & Patel, N. (2018). *Interactive multilevel alarm*.

Santos, H. P. O., Black, A. M., & Sandelowski, M. (2015). Timing of translation in cross-language qualitative research. *Qualitative Health Research*, *25*(1), 134–144. https://doi.org/10.1177/1049732314549603

Sarlan, A., Ahmad, R., Fatimah, W., Ahmad, W., & Dominic, P. D. D. (2013). *Private Healthcare in Malaysia : Investigation on Technology Profiles and Technology Acceptance Factors*. (December), 2–4.

Sattarov, F. (2019). *Power and Technology: A Philosophical and Ethical Analysis*. Retrieved from https://books.google.com.my/books?id=uy%5C_LwwEACAAJ

Sbaraini, A., Carter, S. M., Evans, R. W., & Blinkhorn, A. (2011). How to do a grounded theory study: a worked example of a study of dental practices. *BMC Medical Research Methodology*, *11*(1), 128. https://doi.org/10.1186/1471-2288-11-128

Schneider, D. J. (2003). *The Psychology of Stereotyping*. New York: Guilford Publications.

Schultz, G. S., & Cobb-Stevens, R. (2004). Husserl's theory of wholes and parts and the methodology of nursing research. *Nursing Philosophy*, *5*(3), 216–223. https://doi.org/10.1111/j.1466-769X.2004.00190.x

Sepasi, R. R., Abbaszadeh, A., Borhani, F., & Rafiei, H. (2016). Nurses' Perceptions of the Concept of Power in Nursing: A Qualitative Research. *Journal of Clinical and Diagnostic Research : JCDR*, *10*(12), LC10–LC15. https://doi.org/10.7860/JCDR/2016/22526.8971

Shahjahan, R. A. (2018). Re/conceptualizing time in higher education. *Discourse: Studies in the Cultural Politics of Education*, *0*(0), 1–12. https://doi.org/10.1080/01596306.2018.1550041

Sharlene Swartz, S. S., & Nyamnjoh, A. (2018). Research as freedom : using a continuum of interactive, participatory and emancipatory methods for addressing youth marginality. *Hervormde Teologiese Studies*, *74*(3), 1–11.

Shostek, K. (2007). Critical Care Safety Essentials. *Patient Safety & Quality Healthcare*. Retrieved from https://www.psqh.com/sepoct07/criticalcare.html

Sikka, N., Carlin, K. N., Pines, J., Pirri, M., Strauss, R., & Rahimi, F. (2012). The se of mobile phones for acute wound care: attitudes and opinions of emergency department patients. *Journal of Health Communication*, *17*(sup1), 37–43. https://doi.org/10.1080/10810730.2011.649161

Silva, Rafael Celestino da, Ferreira, M. de A., Apostolidis, T., & Brandão, M. A. G. (2015). A conceptual framework of clinical nursing care in intensive care. *Revista Latino-Americana de Enfermagem*, *23*(5), 837–845. https://doi.org/10.1590/0104-1169.0501.2622

Sinclair, S., Beamer, K., Hack, T. F., McClement, S., Raffin Bouchal, S., Chochinov, H.

M., & Hagen, N. A. (2017). Sympathy, empathy, and compassion: A grounded theory study of palliative care patients' understandings, experiences, and preferences. *Palliative Medicine*, *31*(5), 437–447. https://doi.org/10.1177/0269216316663499

Singh, A. (2010). Modern medicine: Towards prevention, cure, well-being and longevity. *Mens Sana Monographs*, *8*(1), 17–29. https://doi.org/10.1590/s1415-47142010000200008

Singh, S., & Estefan, A. (2018). Selecting a Grounded Theory Approach for Nursing Research. *Global Qualitative Nursing Research*, *5*. https://doi.org/10.1177/2333393618799571

Skjott Linneberg, M., & Korsgaard, S. (2019). Coding qualitative data: a synthesis guiding the novice. *Qualitative Research Journal*, *19*(3), 259–270. https://doi.org/10.1108/QRJ-12-2018-0012

Smith, E. (2001). The role of tacit and explicit knowledge in the workplace. *Journal of Knowledge Management*, *5*(4), 311–321. https://doi.org/10.1108/13673270110411733

Smith, H. A., Mckeen, J. D., & Singh, S. (2007). Developing information technology strategy for business value. *Journal of Information Technology Management*, *XVIII*, 49–58. Retrieved from http://jitm.ubalt.edu/XVIII-1/article4.pdf

Snyder, M. (2014). Emancipatory knowing: Empowering nursing students toward reflection and action. *Journal of Nursing Education*, *53*(2), 65–69. https://doi.org/10.3928/01484834-20140107-01

Sowtali, S. (2018). Projection of Nursing Profession in Malaysia: Where We Are and What Need to be Improved? *Nursing & Healthcare International Journal*, *3*(1), 1–6. https://doi.org/10.23880/nhij-16000174

Spence Laschinger, H. K., Wilk, P., Cho, J., & Greco, P. (2009). Empowerment, engagement and perceived effectiveness in nursing work environments: does experience matter? *Journal of Nursing Management*, *17*(5), 636–646. https://doi.org/10.1111/j.1365-2834.2008.00907.x

Stage, E. (2007). *Nurses ' Experiences Using a Nursing Information System*. *25*(5), 294–300.

Stanton, N. A., Chambers, P. R. G., & Piggott, J. (2001). Situational awareness and safety. *Safety Science*, *39*(3), 189–204. https://doi.org/10.1016/S0925-7535(01)00010-8

Starfield, B. (2011). Is patient-centered care the same as person-focused care? *The Permanente Journal*, *15*(2), 63–69. https://doi.org/10.7812/TPP/10-148

Stayt, L. C., Seers, K., & Tutton, E. (2015). Patients' experiences of technology and care in adult intensive care. *Journal of Advanced Nursing*, *71*(9), 2051–2061. https://doi.org/10.1111/jan.12664

Steele, C. M. (1988). The Psychology of Self-Affirmation: Sustaining the Integrity of the Self. *Advances in Experimental Social Psychology*, *21*(C), 261–302. https://doi.org/10.1016/S0065-2601(08)60229-4

Stern, P. N. (2016). Glaserian Grounded Theory. In P. N. Stern, J. Corbin, B. Bowers, K. Charmaz, & A. E. Clarke (Eds.), *Developing Grounded Theory: The second generation* (pp. 44–65). Walnut Creek: Taylor and Francis.

Sutcliffe, K. M., Lewton, E., & Rosenthal, M. M. (2004). Communication failures: an insidious contributor to medical mishaps. *Academic Medicine*, *79*(2), 186–194. https://doi.org/10.1097/00001888-200402000-00019

Suzina, A. C., & Tufte, T. (2020). Freire's vision of development and social change: Past experiences, present challenges and perspectives for the future. *International*

Communication Gazette, *82*(5), 411–424. https://doi.org/10.1177/1748048520943692

Taran, S. (2010). An examination of the factors contributing to poor communication outside the physician-patient sphere. *McGill Journal of Medicine*, *13*(1), 86–91.

Teng, C., Hsiao, F., & Chou, T. (2010). Nurse-perceived time pressure and patient-perceived care quality. *Journal of Nursing Management*, *18*(3), 275–284.

Tetley, J. (2013). Using participatory observation to understand older people's experiences: lessons from the field. *The Qualitative Report*, *18*(45), 1–18. Retrieved from http://www.nova.edu/ssss/QR/QR18/tetley4.pdf

Thede, L. (2003). *Informatics and nursing: opportunities and challenges* (2nd ed.). Philadelphia: Lippincott Williams & Wilkins.

Thornberg, R. (2011). A Grounded Theory of Collaborative Synchronizing in Relation to Challenging Students. *Urban Education*, *47*(1), 312–342. https://doi.org/10.1177/0042085911427735

Thornton, R., & Nardi, P. M. (1975). The dynamics of role acquisition. *American Journal of Sociology*, *80*(4), 870–885. Retrieved from http://www.jstor.org.ezproxy.is.ed.ac.uk/stable/2777199

Thrift, N. (2004). Remembering the Technological Unconscious by Foregrounding Knowledges of Position. *Environment and Planning D: Society and Space*, *22*(1), 175–190. https://doi.org/10.1068/d321t

Tie, Y. C., Birks, M., & Francis, K. (2019). *Grounded theory research : A design framework for novice researchers*. https://doi.org/10.1177/2050312118822927

Timmermans, S., & Almeling, R. (2009). Objectification, standardization, and commodification in health care: A conceptual readjustment. *Social Science and Medicine*, *69*(1), 21–27. https://doi.org/10.1016/j.socscimed.2009.04.020

Timonen, V., Foley, G., & Conlon, C. (2018). Challenges when using grounded theory: A pragmatic introduction to doing GT research. *International Journal of Qualitative Methods*, *17*(1), 1–10. https://doi.org/10.1177/1609406918758086

Tjale, A. A., & Bruce, J. (2007). A concept analysis of holistic nursing care in paediatric nursing. *Curationis*, *30*(4), 45–52. https://doi.org/https://doi.org/10.4102/curationis.v30i4.1116

Tobi, S., Masrom, M., & Mohammed, A. (2018). *The 11th Malaysia Health Plan: Demand for Investigation on Health Consumers' Intention Toward National Web-Based Health Information Service*. https://doi.org/10.1007/978-981-10-6053-3_8

Traynor, M., & Buus, N. (2016). Professional identity in nursing: UK students' explanations for poor standards of care. *Social Science and Medicine*, *166*, 186–194. https://doi.org/10.1016/j.socscimed.2016.08.024

Tristan, G. (2020). Liberation dependence : Reconceptualizing emancipatory education in the new climate regime. *Sisyphus — Journal of Education*, *8*(3), 9–22. https://doi.org/https://doi.org/10.25749/sis.20107

Trotter, L. T. (2019). "I'm Not a Doctor. I'm a Nurse": Reparative Boundary-Work in Nurse Practitioner Education. *Social Currents*, *6*(2), 105–120. https://doi.org/10.1177/2329496518783683

Turner, M., Kitchenham, B., Brereton, P., Charters, S., & Budgen, D. (2010). Does the technology acceptance model predict actual use? A systematic literature review. *Information and Software Technology*, *52*(5), 463–479. https://doi.org/10.1016/j.infsof.2009.11.005

Valdez, A. M. (2008). Transitioning from Novice to Competent: What Can We Learn From the Literature About Graduate Nurses in the Emergency Setting? *Journal of*

Emergency Nursing, *34*(5), 435–440. https://doi.org/10.1016/j.jen.2007.07.008

Valverde, S. (2016). Major transitions in information technology. *Philosophical Transactions of the Royal Society B: Biological Sciences*, *371*(1701). https://doi.org/10.1098/rstb.2015.0450

van Nes, F., Abma, T., Jonsson, H., & Deeg, D. (2010). Language differences in qualitative research: Is meaning lost in translation? *European Journal of Ageing*, *7*(4), 313–316. https://doi.org/10.1007/s10433-010-0168-y

Vardaman, J. M., Cornell, P. T., & Clancy, T. R. (2012). Complexity and Change in Nurse Workflows. *JONA: The Journal of Nursing Administration*, *42*(2), 78–82. https://doi.org/10.1097/NNA.0b013e3182433677

Vasel, L. A. (2016). *LEARNING OBJECTIVES The learner will be able to describe potential Provide a framework illustrating the factors factors influencing the cognitive load of nurses identified in the literature as contributing to in nursing practice . increased cognitive load*. *1*(2011), 2005–2007.

Verbeek, P.-P. (2015). Beyond interaction. *Interactions*, *22*(3), 26.

Verhulst, O. (2008). Technology in the ICU; the nurses' point of view [Article]. *Critical Care*, *12*(Suppl 2), P528. https://doi.org/10.1186/cc6749

Vincent, J. (2013). *Critical care – where have we been and where are we going ? 17*(Suppl 1), 1–6.

Vlieghe, J. (2018). Rethinking emancipation with Freire and Rancière: A plea for a thing-centred pedagogy. *Educational Philosophy and Theory*, *50*(10), 917–927.

Vollstedt, M., & Rezat, S. (2019). *An Introduction to Grounded Theory with a Special Focus on Axial Coding and the Coding Paradigm Á Coding paradigm Á Coding*. https://doi.org/10.1007/978-3-030-15636-7

Wahab, S. A., & Rose, R. C. (2012). *Defining the Concepts of Technology and Technology Transfer : A Literature Analysis*. *5*(1), 61–71. https://doi.org/10.5539/ibr.v5n1p61

Walford, G. (2009). The practice of writing ethnographic fieldnotes. *Ethnography and Education*, *4*(2), 117–130.

Wall, T., Bellamy, L., Evans, V., & Hopkins, S. (2017). Revisiting impact in the context of workplace research: a review and possible directions. *Journal of Work-Applied Management*, *9*(2), 95–109. https://doi.org/10.1108/jwam-07-2017-0018

Watson, J. (2002a). Intentionality and caring-healing consciousness: a practice of transpersonal nursing. [Article]. *Holistic Nursing Practice*, *16*(4), 12–19. https://doi.org/10.1097/00004650-200207000-00005

Watson, J. (2002b). Re-visioning empathy. In D. J. Cain & J. Seeman (Eds.), *Humanistic psychotherapies: handbook of research and practice* (pp. 445–471). Washington D.C: American Psychological Association.

Watson, J. (2007). Theoretical questions and concerns: Response from a caring science framework. *Nursing Science Quarterly*, *20*(1), 13–15. https://doi.org/10.1177/0894318406296785

Watson, J. (2020). Nursing's global covenant with humanity – Unitary caring science as sacred activism. *Journal of Advanced Nursing*, *76*(2), 699–704.

Weiner, M., & Biondich, P. (2006). The influence of information technology on patient-physician relationships. *Journal of General Internal Medicine*, *21*(S1), 35–39.

Weston, M. J. (2008). Defining control over nursing practice and autonomy. *The Journal of Nursing Administration*, *38*(9), 404–408. https://doi.org/10.1097/01.NNA.0000323960.29544.e5

Whalen, D. A., Covelle, P. M., Piepenbrink, J. C., Villanova, K. L., Cuneo, C. L., &

Awtry, E. H. (2014). Novel approach to cardiac alarm management on telemetry units. *Journal of Cardiovascular Nursing*, *29*(5), 13–22. https://doi.org/10.1097/JCN.0000000000000114

Whitepaper. (2019). *Alarm Rationalization* (pp. 1–13). pp. 1–13. Retrieved from http://www.emerson.com/alarmmanagement

Wikström, A.-C., Cederborg, A.-C., & Johanson, M. (2007). The meaning of technology in an intensive care unit--an interview study. *Intensive & Critical Care Nursing : The Official Journal of the British Association of Critical Care Nurses*, *23*(4), 187–195. https://doi.org/10.1016/j.iccn.2007.03.003

Wilkin, K. (2004). *The meaning of caring to nurses : an investigation into the nature of caring work in an intensive care unit*.

Wimpenny, P., & Gass, J. (2000). Interviewing in phenomenology and grounded theory: is there a difference? *Journal of Advanced Nursing*, *31*(6), 1485–1492. https://doi.org/10.1046/j.1365-2648.2000.01431.x

World Health Organisation. (2013). Human resources for health country profiles: Malaysia. In *WHO Press*. Retrieved from file:///C:/Users/FISYA/Downloads/WPR_Country_Profile.pdf

World Health Organization. (2012). *Malaysia health system review*. WHO Regional Office for the Western Pacific.

World Population Review. (2020). Malaysia Population 2020 (live). Retrieved July 26, 2020, from https://worldpopulationreview.com/countries/malaysia-population

Wright, S. M., & Fallacaro, M. D. (2011). Predictors of situation awareness in graduate student registered nurse anesthetists. *AANA Journal*, *79*(6), 484–490.

You, L. ming, Aiken, L. H., Sloane, D. M., Liu, K., He, G. ping, Hu, Y., … Sermeus, W.

(2013). Hospital nursing, care quality, and patient satisfaction: Cross-sectional surveys of nurses and patients in hospitals in China and Europe. *International Journal of Nursing Studies*, *50*(2), 154–161. https://doi.org/10.1016/j.ijnurstu.2012.05.003

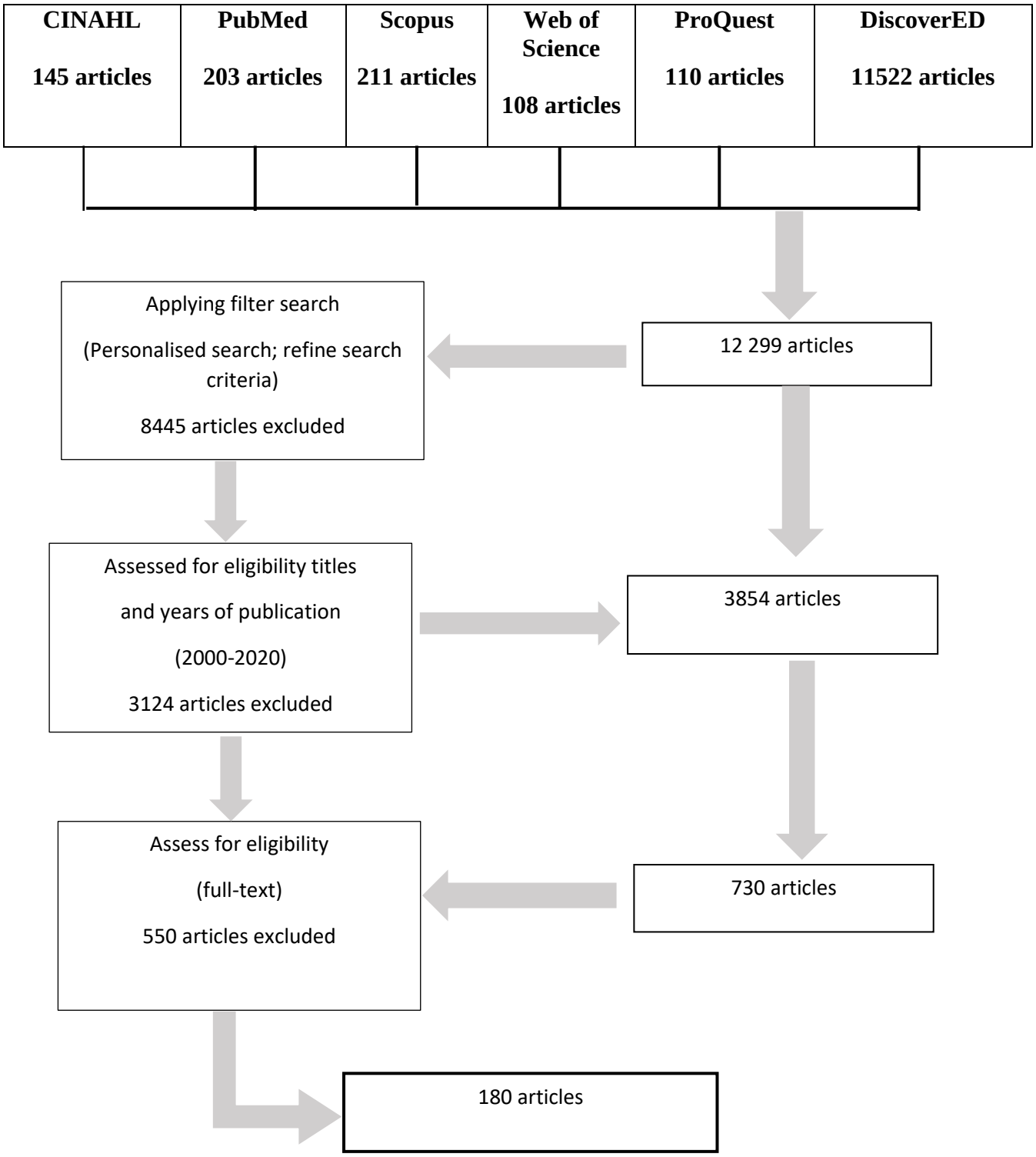
Yunus, Y. M., Idris, K., Rahman, A. A., & Lai, H. I. (2017). The role of quality of nursing work Life and turnover intention in hrimary Healthcare services among negistered nurses in Selangor. *International Journal of Academic Research in Business and Social Sciences*, *7*(6), 1201–1213. https://doi.org/10.6007/ijarbss/v7-i6/3353

Zerilli, J., Knott, A., Maclaurin, J., & Gavaghan, C. (2019). Algorithmic decision-making and the control problem. *Minds and Machines*, *29*(4), 555–578. https://doi.org/10.1007/s11023-019-09513-7

Zigmond, D. (2011). Five executive follies. How commodification. *Journal of Holistic Health*, *9*, 7–10.

APPENDICES

Appendix 1: Flow diagram of literature search strategy



Appendix II: Gantt chart of the data collection timeline of the study

	Task Name	Duration	Start	Finish	1st Half	2nd Half
1.	Data Collection	127 days			64 days	65 days
2.	Start Data Collection	-	26.10.2014	20.12.2015	26.10.014 – 20.12.2014	22.10.2015 – 20.12.2015
3.	Initial Contact	-	15.8.2014	-	-	-
	Meeting with the registered nurses to inform them about the study	3 days	22.9.2014	-	-	-
	Distributing the participant information sheet	-	26.10.2014	20.12.2015	26.10.014 – 20.12.2014	22.10.2015 – 20.12.2015
4.	Participant Observation	-				
	Arrange the interview schedule with the nursing manager	-	29.10.2014	-	-	-
	Follow up with participants to schedule a semi-structured interview and obtain the consent form	-	-	-	-	--
5.	Conducting Semi-structured interviews	-	1.11.2014	20.12.15	1.11.2014 – 20.12.2014	5.11.2015 – 20.12.2015
6.	Data Analysis					
	Transcribe the interview	-	26.10.2014	20.12.2015	-	-
	Translate the interview	-	30.10.2014	17.12.2015		
7.	Complete data collection	-	20.12.2015	-	-	-

Appendix III: Self-Audit Checklist University of Edinburgh Ethics Review

Self-Audit Checklist for Level 1 Ethics Review

University of Edinburgh,

School of Health in Social Science

RESEARCH ETHICS COMMITTEE

The audit is to be conducted by investigators:

- ***For funded research***: *the Principal Investigator.*
- ***For other research conducted by members of academic staff:*** *the academic staff member.*
- ***Postdoctoral research fellows:*** *the research fellow in collaboration with the mentor or proposed mentor.*
- ***Postgraduate research students*** *(PhD and Masters by Research): the student in collaboration with the supervisor(s).*
- ***Taught Masters dissertation students*** *and* ***Undergraduate dissertation/project students:*** *the student in collaboration with the dissertation/project supervisor*

Note: all members of staff and students should conduct the self-audit level of ethics review of their proposed research as part of the proposal process.

1. IRAS or LOCAL AUTHORITY/SOCIAL WORK ethical review

Does the project require IRAS review or other external review including by bodies abroad?

YES/NO

2. Protection of research subject confidentiality

Are there any issues of CONFIDENTIALITY which are not ADEQUATELY HANDLED by normal tenets of academic confidentiality?

YES/

NO

These include well-established sets of undertakings that may be agreed more or less explicitly

with collaborating individuals/organisations, for example, regarding:

(a) Non-attribution of individual responses;
(b) Individuals and organisations anonymised in publications and presentation;
(c) Specific agreement with respondents regarding feedback to collaborators and publication.

3. Data protection and consent

Are there any issues of DATA HANDLING and CONSENT which are not ADEQUATELY DEALT WITH and compliant with established procedures? YES/**NO**

These include well-established sets of undertakings, for example regarding:

(a) Compliance with the University of Edinburgh's Data Protection procedures (see www.recordsmanagement.ed.ac.uk);

(b) Respondents giving consent regarding the collection of personal data;

(c) No special issues arising about confidentiality/informed consent;

(d) Application for Caldicott Guardian approval.

4. Moral issues and Researcher/Institutional Conflicts of Interest

Are there any SPECIAL MORAL ISSUES/CONFLICTS OF INTEREST? YES/**N**

(a) An example of conflict of interest would be a financial or non-financial benefit for him/herself or for a relative of friend.

(b) Particular moral issues or concerns could arise, for example where the purposes of research are concealed, where respondents are unable to provide informed consent, or where research findings would impinge negatively/differentially upon the interests of participants.

1. Potential physical or psychological harm, discomfort or stress

(a) Is there a SIGNIFICANT FORSEEABLE POTENTIAL FOR PSYCHOLOGICAL HARM OR STRESS for participants? YES/**NO**

(b) Is there a SIGNIFICANT FORSEEABLE POTENTIAL FOR PHYSICAL HARM OR DISCOMFORT? YES/**NO**

(c) Is there a SIGNIFICANT FORSEEABLE RISK TO THE RESEARCHER? YES/**NO**

6. Bringing the University into disrepute

Is there any aspect of the proposed research which might bring the University into disrepute?

YES/**NO**

7. Vulnerable participants

Are any of the participants or interviewees in the research vulnerable, e.g. children and young people, people who are in custody or care, such as students at school, self help groups, residents of nursing home? YES/NO

8. Duty to disseminate research findings

Are there issues which will prevent all participants and relevant stakeholders having access to a clear, understandable and accurate summary of the research findings? YES/**NO**

Overall assessment

If all the answers are NO, the self-audit has been conducted and confirms the ABSENCE OF REASONABLY FORESEEABLE ETHICAL RISKS.

All students (undergraduate, Masters and Doctoral) lodge completed self-audit forms electronically with their supervisor and/or the Subject Area Research Ethics Co-ordinator as advised in information provided by the subject area. The subject area considers the information provided and either confirm ethical approval or refer the request back to the student.

Postdoctoral research fellows lodge completed self-audit forms electronically with their mentor and/or the Subject Area Research Ethics Co-ordinator as advised in information provided by the subject area. The subject area will consider the information provided and either confirms ethical approval or refers the request back to the postdoctoral researcher.

Academic staff (excluding postdoctoral research fellows) lodge completed self-audit forms electronically with the Subject Area Research Ethics Co-ordinator as advised in information provided by the subject area. The subject area will consider the information provided and log the information or confirm ethical approval or refer the request back to the staff member as appropriate.

If one or more answers to the self-audit is YES, level 2 assessment is required. See the School Research Ethics Policy and Procedures for full details. http://www.ed.ac.uk/schools-departments/health/research/policyandprocedures.

Ethics review form for level 2 and level 3 assessment

University of Edinburgh

School of Health is Social Science

RESEARCH ETHICS COMMITTEE

This form should be used for all research projects carried out by staff or students in the School of Health in Social Science that have been identified by self-audit as requiring detailed assessment - i.e. level 2 and level 3 within the three-tier system of ethics approval set out by the School Research Ethics Committee. The levels within the system are explained in the School Research Ethics Policy
and Procedures document. Please indicate which level applies to your research.

If you are applying for IRAS review or other external review submitted in English, you do not need to complete this form but must deposit a copy of your application to IRAS or another body as directed by your subject area Research Ethics Co-ordinator.

This form provides general School-wide guidance. Proposers should supplement these with detailed provisions that may be stipulated by research collaborators (e.g. NHS) or professional bodies (e.g. BPS, SRA). The signed and completed form should be submitted, along with a copy of the research proposal, research instruments and information and consent sheets to the relevant person (Subject Area Research Ethics Co-ordinator for staff, postdoctoral fellows and postgraduate students, Dissertation supervisor for undergraduate students). Level 3 requests should also be lodged electronically with the School Research Ethics Administrator for forwarding to the Chair of the School Research Ethics Committee.

Research Ethics Committee will monitor level 2 proposals annually to satisfy themselves that the School Ethics Policy and Procedures are being complied with. They will revert to proposers in cases where there may be particular concerns or queries. For level 2 and 3 assessments, research work must not proceed until issues raised have been considered by the appropriate people. It is particularly important that level 3 applications are submitted well in advance of any required date of approval.

The form developed by the College of Humanities and Social Science is used for level 2 and 3 reviews. If the answer to any of the questions below is ‘yes’, please give details of how this issue is being/will be addressed to ensure that ethical standards are maintained.

1 THE RESEARCHERS	
Your name and position	Norafisyah Makhdzir – PhD Student
Proposed title of research	Nurses' perception about the impact of technology on the quality of nursing care in the intensive care unit.
Funding body	Ministry of Higher Education, Malaysia
Time scale for research	11 Months
List those who will be involved in conducting the research, including names and positions (e.g. 'PhD student')	Norafisyah Makhdzir–PhD Student

2 RISKS TO, AND SAFETY OF, RESEARCHERS	
Do any of those named above need appropriate training to enable them to conduct the proposed research safely and in accordance with the ethical principles set out by the College?	**NO**
Are any of the researchers likely to be sent or go to any areas where their safety may be compromised, or they may need support to deal with difficult issues?	**NO**
Could researchers have any conflicts of interest?	**NO**

3 RISKS TO, AND SAFETY OF, PARTICIPANTS	
Could the research induce any psychological stress or discomfort?	**NO**
Does the research involve any physically invasive or potentially physically harmful procedures?	**NO**
Could this research adversely affect participants in any other way?	**NO**

4 DATA PROTECTION	
Will any part of the research involve audio, film or video recording of individuals?	**YES (AUDIO RECORDING)**
Will the research require collection of personal information from any persons without their direct consent?	**NO**
How will the confidentiality of data, including the identity of participants (whether specifically recruited for the research or not) be ensured?	• Anonymity of participants: Use of numerical identity data security procedures during data collection, analysis and after the completion of the project. • Transcription under supervision • Data will be destroyed approximately 7 years after research completed
Who will be entitled to have access to the raw data?	The Principal Investigator and Research Supervisors.
How and where will the data be stored, in what format, and for how long?	Hard copies will be stored in locked cupboards at Unit manager's room at the field site, while electronic copies will be stored in the PI's laptop with code access and University networks
What steps have been taken to ensure that only entitled persons will have access to the data?	Data will be stored in lockable cabinet and Principal Investigator will keep the keys, electronic copies will be stored in a laptop with code access, transcription will be conducted under the supervision of the researcher
How will the data be disposed of?	Electronic copies will be erased and hard copies will be shredded off
How will the results of the research be used?	A dissertation will be submitted to the University of Edinburgh, Publications will be made but participants anonymity and setting anonymity will be maintained
What feedback of findings will be given to participants?	All findings pertaining to nursing care practises in ICU and the recommendations and strategies to improve the quality of nursing care.
Is any information likely to be passed on to external companies or organisations in the course of the research?	**NO**

Will the project involve the transfer of personal data to countries outside the European Economic Area?	**NO**

5 RESEARCH DESIGN	
The research involves living human subjects specifically recruited for this research project *If 'no', go to section 6*	**YES**
How many participants will be involved in the study?	**TWENTY**
What criteria will be used in deciding on inclusion/exclusion of participants?	ICU nurses with different qualifications 1. Ten registered ICU nurses without formal post-registration qualifications related to critical care. 2. Ten registered ICU nurses with formal post-registration qualifications related to critical care.
How will the sample be recruited?	Theoretical Sampling
Will the study involve groups or individuals who are in custody or care, such as students at school, self help groups, residents of nursing home?	**NO**
Will there be a control group?	**NO**
What information will be provided to participants prior to their consent? (e.g. information leaflet, briefing session)	Information leaflet and briefing session
Participants have a right to withdraw from the study at any time. Please tick to confirm that participants will be advised of their rights, including the right to continue receiving services if they withdraw from the study.	√
Will it be necessary for participants to take part in the study without their knowledge and consent? (e.g. covert observation of people in non-public places)	**NO**

Where consent is obtained, what steps will be taken to ensure that a written record is maintained?	Participants will sign two written consent forms and one will be kept by researcher and another copy by the participant
In the case of participants whose first language is not English, what arrangements are being made to ensure informed consent?	The Consent Form and Information leaflet will be translated into local language
Will participants receive any financial or other benefit from their participation?	**NO**
Are any of the participants likely to be particularly vulnerable, such as elderly or disabled people, adults with incapacity, your own students, members of ethnic minorities, or in a professional or client relationship with the researcher?	**NO**
Will any of the participants be under 16 years of age?	**NO**
Do the researchers named above need to be cleared through the Disclosure Scotland procedures?	**NO**
Will any of the participants be interviewed in situations which will compromise their ability to give informed consent, such as in prison, residential care, or the care of the local authority?	**NO**

6 EXTERNAL PROFESSIONAL BODIES	
Is the research proposal subject to scrutiny by any external body concerned with ethical approval?	**YES**
If so, which body?	Malaysia National Medical Research Register (NMRR)
Date approval sought	Early May

Outcome, if known *or*	NOT YET
Date outcome expected	End June

7 ISSUES ARISING FROM THE PROPOSAL
*In my view, ethical issues have been satisfactorily addressed, *OR In my view, the ethical issues listed below arise and the following steps are being taken to address them.   Signature Date 20/05/2014

Appendix IV: University of Edinburgh Ethics Research Approval

NORAFISYAH MAKHDZIR
THE UNIVERSITY OF EDINBURGH
SCHOOL OF HEALTH IN SOCIAL SCIENCE
DOOR WAY 6
MEDICAL QUAD
VIOT PLACE
EDINBURGH EH8 9AG
Telephone: +60127130810
Email: fisya75@yahoo.com

Title: Nurses' perception regarding the impact of technology on nursing care quality in the intensive care unit.

Information sheet for interview

You are being invited to participate in a research study. However, before you decide whether to accept this invitation it is important that you know what this study is about, why it is being undertaken and what it will involve. Please take the time to read this information and feel free to discuss this with other people. Please do not hesitate to contact one of the researchers if there is anything that is not clear or if you would like more information. Our contact details are given at the end of this sheet. Please take time to decide whether or not you would like to take part in this study.

Study title:

Nurses' perception regarding the impact of technology on nursing care quality in the intensive care unit (ICU).

What is this study about?

The study will explore ICU nurses' perception regarding how technology influence nursing care in the ICU and impact the quality of nursing care given to the patient.

Why is this study being carried out?

While the Malaysian Ministry of Health has acknowledge that there is a need for more stringent monitoring to address the interface between technology and healthcare delivery, there is at present very little attention to whether technology is used by nurses in a manner that will improve nursing care quality to patients.

Do I have to take part?

No. It is entirely up to you whether or not you take part in this study.

What would I have to do?

If you decide to take part it would involve taking part in an individual interview with one researcher (Norafisyah Makhdzir, Principle Investigator). The interview will last approximately 60 minutes and will take place at a time and location convenient for participants. With your permission, we would like to record the interview for later data analysis. The recording will be used for research purposes only, anonymised and will be stored securely until it is destroyed approximately after 7 years.

Confidentiality

Everything you or any other participants will say will be kept **confidential** between you and the researcher. Your name will not be attached to any documents nor will you be identified as a participant in this study or in any subsequent publications of study results.

What will the study result be used for?

The study will contribute to an understanding of how technology is perceived and experienced by ICU nurses in Malaysia. The study will result in recommendations to improve the quality of nursing care in the ICU.

Who is funding the study?

The study is funded by the Malaysian Ministry of Education.

Are there possible benefits or risks in taking part?

In taking part you ensure that your voice is heard on the issue but apart from that there are no benefits or risks in taking part.

Can I change my mind?

Should you change our mind and no longer wish to take part in the study just let us know. You do not need to give us any reason for this change.

How can I contact the researchers to take part in this study or to get further information?

Please contact us if you want to take part in the study or have any further questions:

- Norafisyah Makhdzir at fisya75@yahoo.com or phone +60127130810 (Malaysia)
- Dr Jennifer Tocher at or phone +440131 651 1991 (United Kingdom)
- Dr Susanne Kean at or phone +440131 650 6927 (United Kingdom)

All at: School of Health in Social Science
The University of Edinburgh
Medical School, Doorway6
Teviot Place
Edinburgh EH8 9AG

And finally….

Thank you for taking the time reading this information leaflet! We hope to see you soon!

Appendix V: Participant Consent Form

NORAFISYAH MAKHDZIR
THE UNIVERSITY OF EDINBURGH
SCHOOL OF HEALTH IN SOCIAL SCIENCE
DOOR WAY 6 MEDICAL QUAD
TEVIOT PLACE
EDINBURGH EH8 9AG

Telephone: +60127130810
Email: fisya75@yahoo.com

CONSENT FORM: INTERVIEW

Title of Study: Nurses' perception regarding the impact of technology on nursing care quality in the intensive care unit.

Name of Researcher: Ms Norafisyah Makhdzir (Principle Investigator)

Please initial box

1. I confirm that I have read the information sheet for the above study and have had the opportunity to ask questions. ☐
2. I understand that my participation is voluntary and that I am free to withdraw at any time without giving a reason. ☐
3. I understand that the interview will be recorded and that this recording will be used for research purposes only. ☐
4. I understand that findings will be published after completion of the study and that I will not be identified in any publication or report. ☐
5. I agree to take part in the above study. ☐

_____	_____	_____
Name of Participant	Date	Signature
_____	_____	_____
Name of Researcher	Date	Signature

Norafisyah Makhdzir
Doctoral Research in Nursing Studies
School of Health in Social Science
Medical School
Teviot Place
Edinburgh
EH8 9AG

18 June 2014

SCHOOL OF HEALTH IN SOCIAL SCIENCE
The University of Edinburgh
Doorway 6
Medical Quad
Teviot Place
Edinburgh
EH8 9AG

E-mail: fisya75@yahoo.com
Telephone +447885627339
Fax 0131 650 3891

Dear Norafisyah,

APPLICATION FOR LEVEL 2 APPROVAL

PROJECT TITLE: NURSES' PERCEPTIONS REGARDING THE IMPACT OF TECHNOLOGIES ON THE QUALITY OF NURSING CARE IN THE INTENSIVE CARE UNIT.

Thank you for submitting the above research project for review by the School of Health in Social Science Ethics Research Panel.

I can confirm that the submission has been independently reviewed and was approved on

Should there be any change to the research protocol, it is important that you alert us to this as this may necessitate further review.

Yours sincerely

Appendix IV: ICU Head of Department and Institutional Approval

Vers: 2.0 Tarikh: 15 Feb

INVESTIGATOR'S AGREEMENT, HEAD OF DEPARTMENT'S AND INSTITUTIONAL APPROVAL

PERSETUJUAN PENYELIDIK, PENGESAHAN KETUA JABATAN DAN INSTITUSI

This document is intended for online submission for purpose of formal research review and approval. It is to be used in lieu of other equivalent manually printed document such as Borang JTP/KKM 1-2 and Borang JTP/KKM 3. After completing the form below and obtaining the required signatures, please scan this document and submit online.

Dokumen ini adalah untuk penghantaran atas talian (online) mengikut prosedur resmi semakan dan persetujuan penyelidikan. Borang ini dikeluarkan sebagai gantian dokumen kebenaran manual yang serupa seperti Borang JTP/KKM 1-2 dan Borang JTP/KKM 3. Selepas melengkapkan borang di bawah dan mendapatkan tanda tangan yang diperlukan, sila imbaskan dokumen ini dan hantar atas talian.

Unique Research ID : *(Nombor Pendaftaran)*	20241
Research Title : *(Tajuk)*	Nurses' perception of the impact of technology on the quality of nursing care in the intensive care unit.
Protocol Number if available : *(Nombor Protokol jika ada)*	

Investigator agreement ***[Persetujuan penyelidik]***

I have understood the above titled proposed research and I agree to participate in the research as an investigator.

Saya faham cadangan penyelidikan yang bertajuk di atas dan saya bersetuju mengambil bahagian dalam projek tersebut sebagai penyelidik.

Name of Investigator : *(Name Penyelidik)*	Norafiyah Binti Makhdzir
IC number : *(Nombor KP)*	751008025888
Site Institution : *(Institusi)*	Selayang Hospital
Signature & Official stamp : *(Tandatangan dan Cop Rasmi)*	
Date : *(Tarikh)*	

Head of Department Agreement ***[Persetujuan Ketua Jabatan]***

I agree to allow the above named investigator to conduct or to participate in the above titled research.

Saya membenarkan pegawai yang bernama di atas untuk menjadi penyelidik dalam projek penyelidikan tersebut di atas.

Name of Head : *(Name Ketua)*	DR. ARBAYAH RAIS MD(UKM), Mmed (UKM) Pakar Perunding Ketua Jabatan Anestesiologi & Rawatan Rapi Hospital Selayang MMC No.: 24478
Name of Department and Institution *(Jabatan dan Institusi)*	
Signature & Official stamp : *(Tandatangan dan Cop Rasmi)*	
Date : *(Tarikh)*	

Institutional approval ***[Pengesahan Institusi]***

This section may be omitted if one of the NIH institute is authorized to approve on behalf of institution. Refer NIH for details.

(Bahagian ini tidak perlu jika salah satu daripada institusi NIH diberi kuasa pengesahan bagi pihak institusi tersebut. Rujuk NIH untuk maklumat lanjut)

I agree to allow the investigator(s) named above to conduct or to participate in the above titled research. Where applicable further agree to allow my institution to be one of the sites participating in the research.

Saya membenarkan pegawai yang bernama di atas menjalankan penyelidikan selaku penyelidik dalam projek penyelidikan tersebut. Jika berkenaan, saya juga membenarkan institusi ini mengambil bahagian dalam projek tersebut.

Name of Director : *(Name Pengarah)*	DR. HJH. SITI ZALEHA BINTI MOHD SALLEH (AMN, PIS 11) MD (UKM), MCH (UKM), CMA (MOSH) MMC No.: 24687 Pengarah Hospital Selayang
Name of Institution *(Institusi)*	
Signature & Official stamp : *(Tandatangan dan Cop Rasmi)*	
Date : *(Tarikh)*	25/06/2014

Appendix V: Approval to Conduct Study in Malaysia

NORAFISYAH BINTI MAKHDZIR
Jabatan Perubatan,
Fakulti Perubatan dan Sains Kesihatan,
Universiti Putra Malaysia,
43300, Serdang, Selangor.
Email: fisya75@yahoo.com

UPE: 40/200/19/3143

10 September 2014

APPLICATION TO CONDUCT RESEARCH IN MALAYSIA

With reference to your application, I am pleased to inform you that your application to conduct research in Malaysia has been *approved* by the **Research Promotion and Co-Ordination Committee, Economic Planning Unit, Prime Minister's Department.** The details of the approval are as follows:

Researcher's name	:	**NORAFISYAH BINTI MAKHDZIR**
Passport No./ I.C No	:	**751008025868**
Nationality	:	**MALAYSIA**
Title of Research	:	**"Nurses' view regarding the impact of technology on the quality of nursing care in the intensive care unit."**
Period of Research Approved	:	**3 YEARS**

2. Please collect your Research Pass in person from the Economic Planning Unit, Prime Minister's Department, Parcel B, Level 4 Block B5, Federal Government Administrative Centre, 62502 Putrajaya, Malaysia and bring along two (2) colour passport size photographs.

3. I would like to draw your attention to the undertaking signed by you that you will submit without cost to the Economic Planning Unit the following documents:

a) A brief summary of your research findings on completion of your research and before you leave Malaysia; and

b) Three (3) copies of your final dissertation/publication.

4. Lastly, please submit a copy of your preliminary and final report directly to the State Government where you carried out your research. Thank you.

Yours sincerely,

(MUNIRAH BT. ABD MANAN)
For Director General,
Economic Planning Unit.
E-mail: munirah@epu.gov.my
Tel: 88882809
Fax: 88883798

ATTENTION

This letter is only to inform you the status of your application and **cannot be used as a research pass.**

Appendix VI: Ethical Approval From Medical Research and Ethics Committee (MREC)

JAWATANKUASA ETIKA & PENYELIDIKAN PERUBATAN
(Medical Research & Ethics Committee)
KEMENTERIAN KESIHATAN MALAYSIA
d/a Institut Pengurusan Kesihatan
Jalan Rumah Sakit, Bangsar
59000 Kuala Lumpur

Tel : 03 2282 0491
Faks : 03 2282 8072 / 03 2282 0015

Ruj. Kami : ( ) KKM/NIHSEC/P14-1151
Tarikh : 19hb Disember 2014

Noraflsyah binti Makhdzir,
Department of Medicine
Faculty of Medicine and Health Sciences,
University Putre Malaysia,
43400 Serdang,
Selangor Darul Ehsan,

Tuan/Puan,

NMRR-14-915-20741 (IIR)
Nurses' Perception Of The Impact Of Technology On The Quality Of Nursing Care In The Intensive Care Unit.

Lokasi Kajian: Hospital Selayang.

Dengan hormatnya perkara di atas adalah dirujuk.

2. Jawatankuasa Etika & Penyelidikan Perubatan (JEPP), Kementerian Kesihatan Malaysia (KKM) mengambil maklum bahawa projek tersebut adalah untuk memenuhi keperluan akademik program **Doktor Falsafah di *University of Edinburgh***.

3. Sehubungan dengan ini, dimaklumkan bahawa pihak JEPP KKM tiada halangan, dari segi etika, ke atas pelaksanaan projek tersebut. JEPP mengambil maklum bahawa kajian ini tidak melibatkan sebarang intervensi terhadap subjek dan hanya melibatkan temubual dalam mengumpul data kajian. Segala rekod dan data adalah **SULIT** dan hanya digunakan untuk tujuan kajian dan semua isu serta prosedur mengenai ***data confidentiality*** mesti dipatuhi. Kebenaran daripada Pengarah Hospital di mana kajian akan dijalankan mesti diperolehi terlebih dahulu sebelum kajian dijalankan. Tuan perlu akur dan mematuhi keputusan tersebut.

4. Adalah dimaklumkan bahawa kelulusan ini adalah sah sehingga **19hb Disember 2015**. Tuan perlu menghantar *'Continuing Review Form'* selewat-lewatnya 2 bulan sebelum tamat tempoh kelulusan ini bagi memperbaharui kelulusan etika. Pihak tuan juga perlu mengemukakan laporan tamat kajian dan juga laporan mengenai *'All adverse events, both serious and unexpected'* kepada Jawatankuasa Etika & Penyelidikan Perubatan, KKM jika berkenaan. Borang-borang berkaitan boleh dimuat turun daripada laman web MREC (http://www.nih.gov.my/mrec)

Sekian terima kasih.

BERKHIDMAT UNTUK NEGARA

Saya yang menjalut perintah,

(DATO' DR CHANG KIAN MENG)
Pengerusi
Jawatankuasa Etika & Penyelidikan Perubatan
Kementerian Kesihatan Malaysia

cc : Pengarah Hospital Selayang

Appendix VII: Participant Information Sheet for Interview

NORAFISYAH MAKHDZIR
THE UNIVERSITY OF EDINBURGH
SCHOOL OF HEALTH IN SOCIAL SCIENCE
DOOR WAY 6
MEDICAL QUAD
VIOT PLACE
EDINBURGH EH8 9AG
Telephone: +60127130810
Email: fisya75@yahoo.com

Title: Nurses' perception regarding the impact of technology on nursing care quality in the intensive care unit.

Information sheet for interview

You are being invited to participate in a research study. However, before you decide whether to accept this invitation it is important that you know what this study is about, why it is being undertaken and what it will involve. Please take the time to read this information and feel free to discuss this with other people. Please do not hesitate to contact one of the researchers if there is anything that is not clear or if you would like more information. Our contact details are given at the end of this sheet. Please take time to decide whether or not you would like to take part in this study.

Study title:

Nurses' perception regarding the impact of technology on nursing care quality in the intensive care unit (ICU).

What is this study about?

The study will explore ICU nurses' perception regarding how technology influence nursing care in the ICU and impact the quality of nursing care given to the patient.

Why is this study being carried out?

While the Malaysian Ministry of Health has acknowledge that there is a need for more stringent monitoring to address the interface between technology and healthcare delivery, there is at present very little attention to whether technology is used by nurses in a manner that will improve nursing care quality to patients.

Do I have to take part?

No. It is entirely up to you whether or not you take part in this study.

What would I have to do?

If you decide to take part it would involve taking part in an individual interview with one researcher (Norafisyah Makhdzir, Principle Investigator). The interview will last approximately 60 minutes and will take place at a time and location convenient for participants. With your permission, we would like to record the interview for later data analysis. The recording will be used for research purposes only, anonymised and will be stored securely until it is destroyed approximately after 7 years.

Confidentiality

Everything you or any other participants will say will be kept **confidential** between you and the researcher. Your name will not be attached to any documents nor will you be identified as a participant in this study or in any subsequent publications of study results.

What will the study result be used for?

The study will contribute to an understanding of how technology is perceived and experienced by ICU nurses in Malaysia. The study will result in recommendations to improve the quality of nursing care in the ICU.

Who is funding the study?

The study is funded by the Malaysian Ministry of Education.

Are there possible benefits or risks in taking part?

In taking part you ensure that your voice is heard on the issue but apart from that there are no benefits or risks in taking part.

Can I change my mind?

Should you change our mind and no longer wish to take part in the study just let us know. You do not need to give us any reason for this change.

How can I contact the researchers to take part in this study or to get further information?

Please contact us if you want to take part in the study or have any further questions:

- Norafisyah Makhdzir at fisya75@yahoo.com or phone +60127130810 (Malaysia)
- Dr Jennifer Tocher at or phone +440131 651 1991 (United Kingdom)
- Dr Susanne Kean at or phone +440131 650 6927 (United Kingdom)

All at: School of Health in Social Science
The University of Edinburgh
Medical School, Doorway6
Teviot Place
Edinburgh EH8 9AG

And finally….

Thank you for taking the time reading this information leaflet! We hope to see you soon!

Appendix VIII: Participant Consent Form

NORAFISYAH MAKHDZIR
THE UNIVERSITY OF EDINBURGH
SCHOOL OF HEALTH IN SOCIAL SCIENCE
DOOR WAY 6 MEDICAL QUAD
TEVIOT PLACE
EDINBURGH EH8 9AG

Telephone: +60127130810
Email: fisya75@yahoo.com

CONSENT FORM: INTERVIEW

Title of Study: Nurses' perception regarding the impact of technology on nursing care quality in the intensive care unit.

Name of Researcher: Ms Norafisyah Makhdzir (Principle Investigator)

Please initial box

6. I confirm that I have read the information sheet for the above study and have had the opportunity to ask questions. ☐
7. I understand that my participation is voluntary and that I am free to withdraw at any time without giving a reason. ☐
8. I understand that the interview will be recorded and that this recording will be used for research purposes only. ☐
9. I understand that findings will be published after completion of the study and that I will not be identified in any publication or report. ☐
10. I agree to take part in the above study. ☐

_____	_____	_____
Name of Participant	Date	Signature
_____	_____	_____
Name of Researcher	Date	Signature

Appendix IX: Participants' Profile

Code	Participant's Name	Gender	Years of Experience in The ICU	Past Working Experience	Highest Level of Education	ICU Post-Basic	Role	Field
P1	Shona	Female	12 years	-	Degree of nursing	Yes	Registered nurse	Clinical
P2	Amira	Female	5 years	-	Diploma in nursing	No	Registered nurse	Clinical
P3	Maria	Female	10 years	-	Diploma in nursing	Yes	Registered nurse	Clinical
P4	Anne	Female	5 years	5 Years working in a Burn Unit	Diploma in nursing	No	Registered nurse	Clinical
P5	Ruby	Female	12 years	-	Degree in nursing (on-going)	Yes	Ward Manager	Non-clinical (Management)
P6	Henry	male	1 year	-	Diploma in nursing	No	Registered nurse	Clinical
P7	Sara	Female	16 year	4 years in a Paediatric ICU in other hospital	Diploma in nursing	Yes	Registered nurse	Clinical
P8	Janet	Female	20 years	-	Diploma in nursing	Yes	Ward Manager	Non-clinical (Management)
P9	Sharon	Female	5 years	-	Diploma in nursing	-	Registered nurse	Clinical

THEORETICAL SAMPLING								
P10	Diana	Female	10 years	-	Diploma in nursing	Yes	Registered nurse	Clinical
P11	Arissa	Female	20 years		Diploma in nursing	Yes	Ward Manager	Non-clinical (Management)
P12	Liza	Female	1 year	10 years in a Neuro ward from other hospital	Diploma in nursing	Yes	Registered nurse	Non-Clinical (Audit)
P13	Shida	Female	5 years	7 years in the ICU from other hospital	Diploma in nursing	Yes	Registered nurse	Clinical
P14	Azima	Female	15 years	-	Degree in nursing	Yes	Ward Manager	Non-clinical (Management)
P15	Izat	Female	6 years	-	Diploma in nursing	-	Registered nurse	Clinical
P16	Fuad	Male	1 year	-	Diploma in nursing	-	Registered nurse	Clinical
P17	Hans	Male	15 years	5 years in an Emergency Department	Diploma in Medical Assistant	Yes	Medical Assistant	Technical/ Management
P18	Izwan	Male	8 years	4 years in the ICU from other hospital	Diploma in nursing	Yes	Registered nurse	Clinical
P19	Rika	Female	5 years	-	Diploma in nursing	-	Registered nurse	Clinical
P20	Coleen	Female	12 years	-	Diploma in nursing	Yes	Registered nurse	Clinical