

UNIVERSITY OF BAHRAIN

**College of Health
and Sport Sciences**



Nursing Department

**Knowledge and Attitude of Critical Care
Nurses on Supplemental Vital Signs: Level of
Consciousness, Pain, and Urine Output in a
Tertiary Hospital, Bahrain**

**In partial fulfilment of the requirements for the degree
of Master in Adult Health Nursing**

Submitted by

Hesham Mohamed Albadawi
University ID 20117071

Supervised by

Dr. Gayathrpriya Narayanan
(Assistant Professor)
University of Bahrain

Co-supervised by

Dr. Fariba Al-Darazi
(Assistant Professor)
University of Bahrain

Kingdom of Bahrain

March, 2023

Defence Committee's Approval

University of Bahrain
Deanship of Graduate Studies
and Scientific Research



جامعة البحرين
عمادة الدراسات العليا والبحث العلمي

Thesis Discussion Committee Decision

Student Name: Hesham Mohamed Muqbel Abdulla	Student ID: 20104477
Department: Nursing	College: Health and Sport Sciences
Program: Master of Science in Adult Health Nursing	
Thesis Title: Knowledge and Attitude of Critical Care Nurses about Supplemental Vital Signs; Level of Consciousness, Pain, and Urine Output in Critical Care Units in a Tertiary Hospital in Bahrain.	
Supervisor's name: Dr. Gayathri Priya	Student's GPA: 3.44

The Discussion Committee met on _20th March 2023_ In Microsoft team meeting. Upon discussing the student whose details are stated above in public, the discussion committee recommends the following:

The student is awarded a grade __B+____ in the thesis subject.

☐ Without making any changes to the thesis.

☒ After making the modifications attached with this decision.

Discussion Committee Members Approval:

Name

Signature

Dr. Gayathri Priya (Advisor)

Dr. Magda Bayoumi (Internal Examiner)

Dr. Mirna Fawaz (External Examiner)

Abstract

Background: Nurses have traditionally relied on five vital signs to assess their patients: temperature, pulse, blood pressure, respiratory rate and oxygen saturation. These vital signs may not be sufficient to detect patient deterioration and assess the general status. Thus, other vital signs such as level of consciousness, pain, and urine output are frequently evaluated together with the classic symptoms in the critical care areas which could contribute in ensuring patient safety through awareness of changes in critical care patients' health status, and it provide immediate timely therapeutic interventions. **Aim:** to assess critical care nurses' knowledge and attitude on supplemental vital signs, urine output, level of consciousness, and pain and detect the early patient's condition deterioration in critical care areas. **Research Design:** Descriptive cross-sectional study design. **Setting:** The study was conducted in adult critical care areas in a tertiary hospital in Kingdom of Bahrain. **Sample:** convenient sample of 123 nurses working in the critical care area was recruited for the study. **Tools:** Nurses' knowledge (16 items) and attitude (6 items) scale towards utilization of new supplemental vital signs chart in ICU was used by using an electronic survey link among critical care nurses via e-mail. **Results:** data showed that the overall mean knowledge of the participants was lower than their attitudes (73.8 % and 98.0 %, respectively). Of all the three examined supplemental vital signs, the level of the attitude toward pain management was lower compared to attitudes toward urine output and level of consciousness. Nurses' knowledge of utilization of the urine output in assessing the patient's conditions was lower than the level of consciousness and pain severity. Furthermore, the association between participants' attitudes and knowledge towards utilization of the supplemental vital signs and their sociodemographic characteristics showed no differences except in the knowledge level among males and females. Specifically, female nurses had significantly higher knowledge of the additional vital signs compared to male nurses. **Conclusion:** The critical care nurses' knowledge of supplemental vital signs varies, and the majority almost many of them have a positive attitude. Additionally, the sociodemographic factors had no significant impact on the knowledge and attitude of critical-care nurses.

Keywords:

Critical Care, Vital Signs, Evidence-Based Nursing, Nursing Practice

Acknowledgement

First, thanks to **ALLAH**, whose magnificent help was the main factor in accomplishing this work.

Words are never enough to convey my whole-hearted thanks, deepest gratitude, appreciation and acknowledgement to Dr Gayathrpriya Narayanan, Assistant Professor, and Dr Fariba Al-Darazi, Assistant Professor, for their patience, support and direction throughout the study process

My profound thanks to Dr. Magda Bayoumi Assistant Professor of Nursing, College of Health and Sport Sciences, University of Bahrain for his/her constructive guidance, valuable suggestions, fruitful advice and helpful support.

My thanks to Mr. Hasan Albasri for his advices in the statistical analysis.

My deepest thanks to all staff members who work in all critical care units at King Hamad University Hospital for their cooperation

A special acknowledgement is directed to Nursing and research Department for their cooperation and support.

Dedication page

I dedicate my thesis work to my family and many friends. A special feeling of gratitude to my loving parents, whose words of encouragement and push for tenacity ring in my ears. I also dedicate this thesis to my many friends who have supported me throughout the process. I will always appreciate all they have done, especially Mr. Mahmood Alawainati for the many hours of proofreading.

TABLE OF CONTENT

Chapter	Page
LIST OF TABLES.....	vii
LIST OF FIGURES.....	viii
LIST OF ABBREVIATIONS.....	ix
CHAPTER I	
Introduction.....	10
Research Problem	15
Research Significance.....	15
Aim of the Study	15
Research Objectives.....	16
Research Questions.....	16
Research Terminology.....	16
CHAPTER II	
Introduction.....	20
Vital Signs	21
Supplemental Vital Signs	22
Knowledge of Nurses on Supplemental Vital Signs	23
Attitude of Nurses on Supplemental Vital Signs.....	26
Assessment of Vital Signs	33
Theoretical Framework	37
The Role of APN (Core Competences)	45
Chapter III. MATERIALS & METHODS	47
Chapter IV. RESULTS.....	56
Chapter V. DISCUSSION.....	70
Chapter VI. CONCLUSION, LIMITATION, & RECOMMENDATIONS.....	83
Chapter VII. ENGLISH & ARABIC SUMMARY.....	87
REFERENCES.....	89
APPENDICES	106

LIST OF TABLES

Table	Page
1. Sociodemographic characteristics of the participants	58
2. Number & percentages of nurses' knowledge towards utilization of the supplemental vital signs nurses 'knowledge towards utilization of the supplemental vital signs	59
3. Mean and standard deviation of nurses' knowledge towards utilization of the supplemental vital signs	61
4. Level of knowledge towards utilization of the supplemental vital signs	62
5. Number and percentages of the participants' attitude towards utilization of the supplemental vital signs	63
6. Mean and standard deviation of participants' attitude towards utilization of the supplemental vital signs	64
7. Level of attitude towards utilization of the supplemental vital signs	64
8. Overall mean score of knowledge and attitude towards utilization of the supplemental vital signs	65
9. Spearman's correlations between knowledge and attitude towards utilization of the supplemental vital signs	66
10. Associations between sociodemographic variables and knowledge and attitude towards utilization of the supplemental vital signs	66
11. Spearman's correlations between knowledge and attitude towards utilization of the supplemental vital signs and each age and year of experience	68

LIST OF FIGURES

Figure	Page
Modified Conceptual Framework Based on Ida Jean Orlando Theory (1961)	44
Level of knowledge towards utilization of the supplemental vital signs	62
Mean score of knowledge and attitude towards utilization of the supplemental vital signs	65

LIST OF ABBREVIATIONS

WHO	: World Health Organization
GCC	: Gulf Cooperation Council
NHRA	: National Health Regulatory Authority
SpO2	: Oxygen saturation
EWS	: Early Warning Scoring
CPOT	: Critical-Care Pain Observation Tool
GCS	: Glasgow Coma Scale
ICU	: Intensive Care Unit
KHUH	: King Hamad University Hospital
UOB	: University of Bahrain

Chapter I

Introduction

INTRODUCTION

Intensive care units (ICUs) are specialized hospital units that provide intensive and continuous care for critically ill patients who require advanced medical interventions. Intensive care units provides care to patients with severe or life-threatening illnesses and injuries, which require constant care, close supervision from life support equipment and medication in order to ensure normal bodily functions. It serves the level II and III patients. A level 2 ICU can provide invasive monitoring and basic life support for a short period. A level 3 ICU provides a full spectrum of monitoring and life support technologies, serves as a regional resource for the care of critically ill patients, and may play an active role in developing the specialty of intensive care through research and education (John et.al.,2017)

Critical care nurses are trained and skilled healthcare professionals who specialize in providing care for patients in the ICU. These nurses play a crucial role in the management and monitoring of patients with life-threatening conditions, such as severe infections, cardiac arrest, or respiratory failure. They are responsible for administering medications, monitoring vital signs, and assisting with procedures and medical equipment. Critical care nurses possess a unique combination of technical skills and compassion, providing essential support for patients and their families during challenging times. A critical care nurse is responsible for constant monitoring of the patient's condition, as well as recognition of any subtle changes. These nurses use a large amount of technology within their practice and function as integral members of the multidisciplinary health care team. The ICU nurse is primary responsible for the care taking and treatment of patients with an unstable and/or critical clinical situation. The critical care nurse manages and coordinates nursing care through an in-depth and ongoing assessment, therapies and high-intensity interventions. In the Intensive Care Unit, a nurse takes crucial clinical decisions based on the best available scientific evidence, clinical experience, and patient conditions (Manuele, 2022)

Critical patients in the ICU are those who require specialized medical care and monitoring due to life-threatening conditions. These patients are often in unstable conditions, such as after a major surgery, severe trauma, or respiratory or cardiac failure. Critical patients may require mechanical ventilation, invasive monitoring, and medication infusions to maintain their vital signs and manage their conditions. The goal of ICU care is to stabilize the patient's condition, prevent further deterioration, and support their recovery to the point where they can be safely discharged to a lower level of care. Monitoring of patient vital signs is crucial during intensive care where patients have imminent or manifest failure in one or more vital organ functions. Changes in patients' condition can occur in seconds, and vital signs can indicate if the patients' state is about to deteriorate. Deterioration may rapidly develop into a life-threatening event that might be preventable if noticed and managed correctly. Vital signs that can indicate such deterioration are blood pressure, heart rate and respiratory rate (Morton and Fontaine, 2018). In addition to being used to track changes in patient status during routine monitoring, vital signs are used for goal-state achievement and verification, problem solving and interpretation of historical data (Seagull et al., 2000). Thus, monitoring of patients' vital functions is one of many important responsibilities for nurses at intensive care units (ICUs) and is essential for providing safe care for critically ill patients (Henneman et al., 2012, Morton and Fontaine, 2018). Nurses have traditionally relied on five vital signs to assess their patients: temperature, pulse, blood pressure, respiratory rate and oxygen saturation. However, these vital signs may not be adequate to identify those who are clinically deteriorating (Elliott & Coventry (2012).

Most of the published medical and critical health research literature in medical journals has constantly linked the adverse events occurring in healthcare institutions to the failure to identify the patient's severity of illness and critical care nurses. The problem of failure to identify patients' severity of illness has often been compounded by poor

communication among health professionals, nurses and physicians, which has been largely attributed to attitude and perception issues among healthcare professionals. This poor communication was supported by many studies by Al Sabei et al. 2020; Bratt, Broome, Kleber, & Lostocco, 2000; Mohammed, Hayton, Clements, Smith, & Prytherch, 2009; Mok, Wang, Cooper, Ang, & Liaw, 2015; Mutula, 2015; Nilsson, 2012; Tofino, 2003; Van Bogaert, Clarke, Roelant, Meulemans, & Van de Heyning, 2010.

Because of this attitude and perceptual issues, critical care nurses and health care professionals have often been unable to either recognize earlier or respond timely to the deteriorating patient's condition. This delay in recognizing patients' deteriorating conditions may account for many hospital fatalities. According to Cardona-Morrell et al., (2016) instead of being dictated by policy, monitoring and responding to the vital signs seem to depend on the clinical judgment or time availability of the nurses. The identification of patients who are deteriorating may be delayed by the frequency of incomplete records of vital signs. A qualitative study was conducted by Leenen et al (2022) including twelve nurses of a surgical ward in a tertiary hospital with experience of working with continuous vital signs monitoring. It was concluded that some nurses believed that effective vital signs analysis and follow-up depended heavily on their cooperation with doctors. Also, they thought that doctors should be actively participating in the follow-up of divergent vital signs trends because they have a greater degree of expertise in trend evaluation. Additionally, some nurses stated that close cooperation between the nurse and doctor is crucial when monitoring vital signs

Vital signs monitoring is critical to the nursing profession since it allows for early diagnosis of patients' diseases and their general decrease in health (Petersen et al., 2016). Vital signs monitoring can significantly help in detecting the early vital signs deterioration in critically ill patient. Mok et al. (2015) postulated that only 63% of critical alarms in monitors were correct. However, critical vital signs alarms limits may cause alarm fatigue

as staff may be desensitized from alarms that made to alert the nurses about vital signs changes (Mok et al., 2011)

Most hospitalized patients who suffer from cardiorespiratory compromise or complications do not die suddenly or unexpectedly, although specific warning signals exist. Heart rate, respiratory rate, body temperature, SpO₂, and blood pressure are among the factors that deteriorate in more than 80% of instances a few hours before cardiac arrest (Giusti, et al., 2017). Therefore, these five classical vital signs chart has been utilized to monitor patients in critical and non-critical areas (Da Silva et al., 2021).

According to the Australian Resuscitation Council (2011), the early recognition and effective treatment of the deteriorating patient might prevent cardiac arrest, death, or an unplanned intensive care unit admission".

Therefore, this confirms the importance of carrying out the accurate recording of vital signs. This aids the nurses in understanding the physiological variations that might reveal the patient's warning clinical condition (Le Lagadec & Dwyer, 2017).

Qualified nurses must be competent enough to correctly analyze the assessment findings and relate them to pathophysiological changes as nowadays patients become sicker than in the past; nurses must work on additional vital signs when assessing their patients (Elliott & Coventry, 2012). Five classical vital signs are used among nurses worldwide to assess their patients like pulse, temperature, oxygen saturation, respiratory rate, and blood pressure. These vital signs may not be sufficient to detect patient deterioration. Hence, this research intends to fill that gap and suggest the need for supplemental vital signs to aid the knowledge and understanding of medical staff and nursing staff so that they can detect the deterioration of patients earlier and make appropriate recommendations.

Problem Statement

Supplemental vital signs, level of consciousness, pain, and urine output are important indicators of a patient's physiological status and are essential components of nursing care. Critical care nurses play a vital role in monitoring and interpreting these indicators to ensure prompt and appropriate interventions. However, the knowledge and attitude of critical care nurses towards these indicators may vary, which could affect patient outcomes.

Research Significance

The study findings will help the nursing staff, nursing students, and other healthcare personnel to learn the importance of monitoring the vital signs, including the supplemental vital signs (level of consciousness, pain, urine output); It will help in developing research and evidence-based practices in monitoring patients' clinical status. Most hospitalized patients who develop cardiorespiratory failure or problems do not die suddenly or unexpectedly, but there is a pattern of accumulated clinical symptoms. These include temperature, pulse, respiratory rate, oxygen saturation, and blood pressure, which account for worsening in more than 80% of instances a few hours before a cardiac arrest. Therefore, education and conducting workshops are essential to improve the patient's status monitoring and decrease the chance of mortality rate and further complications.

Aim /Objectives

To address the research problem, the following objectives will be pursued:

- To evaluate the knowledge and attitude of critical care nurses about supplemental vital signs, level of consciousness, pain, and urine output in a tertiary hospital in Bahrain.

Objectives

1. To assess the level of knowledge of critical care nurses about supplemental vital signs, level of consciousness, pain, and urine output.
2. To determine the attitude of critical care nurses towards utilizing supplemental vital signs in critical areas.
3. To find out the correlation between knowledge and attitude among nurses towards utilizing supplemental vital signs in critical areas.
4. To associate the socio-demographic characteristics of critical care nurses with their knowledge and attitude towards utilizing supplemental vital signs.

Research Questions

To fulfill the objective of the research, the following research questions will be answered in this research.

1. What is the level of knowledge of critical care nurses about supplemental vital signs, level of consciousness, pain, and urine output?
2. What is critical care nurses' attitude towards utilizing supplemental vital signs in critical areas?
3. What is the correlation between knowledge and attitude among nurses towards utilizing supplemental vital signs in critical areas?
4. What is the relationship between socio-demographics and the knowledge and attitude of critical care nurses towards vital clinical signs?

Research Terminology

Conceptual Definitions:

Knowledge of Critical Care Nurses:

"Nursing knowledge acquired in biomedical education is culturally informed by that context, reflecting what one knows about the physiologic, psychologic, and social (biopsychosocial) functioning of human beings, primarily in terms of biologic outcomes and secondarily in terms of interpersonal relationships and quality of life. Further, giving and evaluating nursing care are formulated in terms of achieving physiologic balance, which, in turn, has an impact on biopsychosocial functioning" (Potter & Frisch, 2007).

The Attitude of Critical Care Nurses:

According to Bob Price (2015), it is defined as how nurses understand and process the issues and incorporate them into care and determine what is essential, suitable, relevant, and appropriate.

Critical Care Nurses:

It is defined as nurses who provide care for critically ill patients who require constant observation and organ-supportive treatments. In order to treat these critically ill patients and their family members with holistic respect, the nurse must be able to put their knowledge, skills, and critical reasoning. (New Zealand College of Critical Care Nurses, 2015) **Vital Signs:** are the dimensions of the body's basic meanings. The typical vital signs change with age, sex, weight, exercise tolerance, and overall health (Koyama et al., 2020).

Tertiary Hospital: Flegel (2015) postulates that a tertiary hospital is demarcated as the care of a vastly mechanized, technical, and specialized nature provided in a university-affiliated medical center. It is usually a preserve for those patients with extraordinarily austere, intricate, or rare health problems. Its principal purpose is to offer multifaceted clinical care to those patients that would have been referred to it from the lower levels (Martin Hensher, 2003). However, no agreed international definition currently exists of which specific services should be provided in secondary or tertiary hospitals in developing countries like the Kingdom of Bahrain.

Supplemental vital signs such as pain, level of consciousness, and urine output are vital to detect early signs of clinical deterioration. The three vital signs are identified as the following:

Pain: This is sensed by the outlying nerve filaments, and the thalamus and cerebral cortex interpret it, and it varies from patient to patient. Pain is a critical indicator that can directly reveal successful nursing care effectiveness (McCarberg, 2011). It also would shorten the length of stay in the hospital and generally improve outcomes. The patients complaining of ongoing pain may mirror indecorous or insufficient pain valuation (West et al., 2011).

However, this may result from a need for nursing staff attentiveness to patients' pain cues, leading to a gap between pain evaluation and management (West et al., 2011). Choudhry et al. (2011) postulate that it is essential to document the pain assessment if the patient is not complaining of pain. The Critical-Care Pain Observation Tool (CPOT) scale is the most efficaciously applied and has a constructive influence on pain control in patients with altered awareness. According to Ganeshkumar & Gopalakrishnan (2013), In addition to the pain scoring system, barriers to pain assessment and sleep, and emotional distress, it is critical to include other elements such as the onset and configuration, position, quality, exasperating and discharging factors, previous treatment, effect on physical function, and previous treatment.

The Level of Consciousness: is the dimension of a person's arousal sensitivity and receptiveness to the stimuli generated from the surrounding environment (Palmer & Knight, 2006). It is measured using the Glasgow coma scale (GCS). For instance, conditions like hypoglycemia and hypotension, as well as the side effects of some medications, can lead to changes in patient behavior like Anticonvulsants, which may then cause delirium or confusion, cognitive impairment, and amnesia (Saenubol et al., 2020). Also, the level of consciousness can help detect internal brain injuries (Una Kyriacos, Jelsma, & Jordan, 2014). However, altered consciousness levels can vary in

severity, including confusion, drowsiness, agitation, memory loss, vegetation, and coma (Saenubol et al., 2020).

Urine Output: In critical care practices, urine output is measured daily, every hour. Elliott & Coventry (2012) postulate that the average rate of urine output is at least 0.5ml/kg/hour, which reflects renal function and fluid status of the patient's body; it varies across patients due to renal perfusion and cardiac output (Pesce et al., 2012). Any renal lack can be noted through urine output per hour (Passik et al., 2006). Additionally, nurses should look at other features of urine like color, odor, and specific gravity (Elliott & Coventry, 2012; Gourlay & Heit, 2010)

Chapter II

Literature Review

LITERATURE REVIEW

The second chapter presents a theoretical summary of the study themes, divided into various thematic groups. The chapter provides an outline of the theories as well as the theoretical models pertinent to the research subject. The chapter aims to provide a systematic, objective argument of the theoretical framework underpinning this study. Following that, the chapter will position a meticulous literature search strategy to locate and analytically encapsulate the significant pragmatic literature on critical care nurses' knowledge and attitude toward supplemental vital signs, level of consciousness, pain, and urine output in critical care units. It begins by providing a basis for the literature review and offers an explication of the literature review strategy. The chapter then culminates in a thematic discussion of the research gaps identified in the literature review. The discussion is abridged and enunciated within the set parameters of the review.

The upcoming section will provide summary of reviewed literatures based on the identified outlines. Outlines include studies that share similarities in the findings.

Outline 1: Vital signs:

The nurses are accountable for the nursing of the critical care patients under their watch, specifically for the vital signs of clinical decline. The vital signs of clinical deterioration are usually most successfully discovered using bedside Early Warning Scoring (EWS) systems. These systems typically use a standardized recording system (Una Kyriacos, Jelsma, James, et al., 2014). The variations in a patient's clinical parameters, such as sallowness and a low level of awareness, and irregular bodily vital signs signal the patient's decline (Una Kyriacos et al., 2019). This variation in the patient's condition frequently occurs within 6–8 hours following a severe adverse event in the patient. Bodily values are recorded on charts within partitioned coloured bands with given threshold points and their matching colour-coded activate points to assist nurses in recognizing patient deterioration (Higgs et al., 2020).

Outline 2: Supplemental Vital Signs:

Supplemental vital signs such as pain, level of consciousness, and urine output are vital to detect early signs of clinical deterioration. The three vital signs are identified as the following:

Pain: This is sensed by the outlying nerve filaments, and the thalamus and cerebral cortex interpret it, and it varies from patient to patient. *Pain* is a critical indicator that can directly reveal successful nursing care effectiveness (McCarberg, 2011). It also would shorten the length of stay in the hospital and generally improve outcomes. The patients complaining of ongoing pain may mirror indecorous or insufficient pain valuation (West et al., 2011).

However, this may result from a lack of nursing staff attentiveness to patients' cues of pain, leading to a gap between pain evaluation and management (West et al., 2011). Choudhry et al. (2011) postulate that it is essential to document the pain assessment if the patient is not complaining of pain. The Critical-Care Pain Observation Tool (CPOT) scale is the most efficaciously applied and has a constructive influence on pain control in patients with altered awareness. According to Ganeshkumar & Gopalakrishnan (2013), In addition to the pain scoring system, barriers to pain assessment and sleep, and emotional distress, it is critical to include other elements such as the onset and configuration, position, quality, exasperating and discharging factors, previous treatment, effect on physical function, and previous treatment.

Level of consciousness: is defined as the dimension of a person's arousal sensitivity and receptiveness to the stimuli generated from the surrounding environment (Palmer & Knight, 2006). An individual with an insignificantly dejected level of awareness or attentiveness may be called lethargy. As a result, somebody in such a state can be stimulated with little difficulty (McLeod, 2004). Generally, the obtunded people naturally have a characteristically more dejected level of awareness and, therefore, cannot be fully

aroused (McLeod, 2004; Palmer & Knight, 2006). Patients who cannot be aroused from a deep sleep-like state are said to be stuporous, while a coma is regarded as the incapability to make any decisive retort to arousal (*Mary Lou Sole, Deborah G. Klein, Marthe J. Moseley*). This is controlled by the brain stem, which is also influenced by cerebral perfusion” (Rylance et al., 2009). It is measured using the Glasgow coma scale (GCS). For instance, conditions like hypoglycemia and hypotension, as well as the side effects of some medications, can lead to changes in patient behavior like Anticonvulsants which may then cause delirium or confusion, cognitive impairment, and amnesia (Saenubol et al., 2020).

The deterioration in a patient's consciousness level can result from changes in the brain and neuronal functions, which can affect the patient’s responsiveness to the surrounding stimulus (Una Kyriacos et al., 2019). Also, the level of consciousness can help detect internal brain injuries (Una Kyriacos, Jelsma, & Jordan, 2014). However, altered consciousness levels can vary in severity, including confusion, drowsiness, agitation, memory loss, vegetation, and coma (Saenubol et al., 2020).

Urine output: In critical care practices, urine output is measured daily, every hour. Elliott & Coventry (2012) postulate that the average rate of urine output is at least 0.5ml/kg/hour, which reflects renal function and fluid status of the patient's body; it varies across patients due to renal perfusion and cardiac output (Pesce et al., 2012). Any renal lack can be noted through urine output per hour (Passik et al., 2006). Additionally, nurses should look at other features of urine like color, odor, and specific gravity (Elliott & Coventry, 2012; Gourlay & Heit, 2010)

Outline 3: Knowledge of Nurses on Supplemental Vital Signs

Recognizing and acting upon clinical deterioration, the knowledge and skills to recognize deterioration are mandatory for all nurses in acute settings. The importance of

accurate recording of vital signs; for example, respiratory rate, the nurses should understand the physiological changes in the respiratory rate that may reflect the patient clinical condition. Moreover, nurses believe many tasks are more critical for improving patient outcomes than accurately counting a patient's vital signs, such as respiratory rate (Flenady et al., 2017).

Vital signs assessment is essential to detect and identify patient deterioration (Stevenson et al., 2016).

U. Kyriacos (2011) conducted a literature review research. This research aimed to appraise the necessity for adult inpatients outside the emergency or critical care departments to be assessed using the Early Warning Scoring (EWS) systems, hence the need to develop such a system. The research reviewed published clinical health literature. The research was premised on the background that it had been established that serious adverse events that occur in patients could be stopped by identifying and reacting to the early signs of physiological observation and clinical deterioration. The research evaluated a total of papers amounting to over 500 clinical articles published on adult inpatients, and EWS systems were identified. Of these articles, 14 papers had operational data on the need for advancement and the usefulness of EWS systems. The research excluded the Systems that were found to be without the aggregate weighted scores. The research established that EWS systems could facilitate the recognition of uncharacteristic deteriorating patients' physiological parameters; however, there are some drawbacks to what they can and cannot do. The research also established that no standard recording tool exists across diverse diagnoses.

The research also established no evidence of possible corroboration of EWS systems as its implementation is also based on clinical trials. No evidence corroborates that the application of EWS Western world systems is appropriate in developing countries' resource-poor locations. This research review posited a need for better monitoring

systems, which implies better care. However, the research indicated that there needs to be more data to validate the implementation and evaluation of the clinical testing and monitoring systems of the vital signs in general wards. The implication of this research suggests that recording vital signs in the hospital wards is not enough since the safety of patients lies more in the nurses' clinical judgment of deterioration. Thus, the research recommendation suggests that more funds are required to validate and evaluate EWS systems in contextual settings. Therefore, this research is being conducted on that premise. Similarly,

Samarkand et al. conducted a cross-sectional study among 247 Saudi nurses to explore Saudi nurses' knowledge and attitudes toward pain management. The study showed lower pain knowledge and attitudes levels than nurses from other regions and worldwide. The authors recommended including pain management in continuous education and nursing undergraduate curricula. (Samarkandi et. al., 2018). Another study was done by Issa et al. aimed to evaluate the impact of pain management educational programs on the knowledge and attitudes of intensive care unit staff nurses toward pain assessment and management. After delivering a pain management education program, the results showed significant improvement in knowledge and attitudes about pain assessment and management among ICU nurses. Thus, the researchers concluded that the deficits and preconceptions in pain assessment and management could be improved by implementing pain management educational programs. (Issa et al., 2019).

According to Al-Sayaghi et al. (2022), the patient may continue suffering from pain due to under-assessment and lack of immediate or proper management. However, insufficient education in nursing schools may contribute to a lack of knowledge and negative attitude among nurses in the clinical area. Moreover, Education programs using the learning simulations technique can increase nurses' knowledge, attitude, and decision-making for assessing and managing patients with sepsis. Therefore, better patients'

outcome can be enforced by professional training programs and evidencedbased practice (Rababa et al., 2022).

Outline 4: Attitude of Nurses on Supplemental Vital Signs:

Most of the medical and critical health research literature published in medical journals has constantly linked the adverse events occurring in healthcare institutions to the failure to identify the patient's severity of illness and critical care nurses. The problem of failure to identify patients' severity of illness has often been compounded by poor communication among health professionals, which has been largely attributed to attitude and perception issues among healthcare professionals. This poor communication was supported by studies by Al Sabei et al. 2020; Bratt, Broome, Kleber, & Lostocco, 2000; Mohammed, Hayton, Clements, Smith, & Prytherch, 2009; Mok, Wang, Cooper, Ang, & Liaw, 2015; Mutula, 2015; Nilsson, 2012; Tofino, 2003; Van Bogaert, Clarke, Roelant, Meulemans, & Van de Heyning, 2010.

Because of this attitude and perceptual issues, critical care nurses and health care professionals have often been unable to either recognize earlier or respond timely to the deteriorating patient's condition. This delay in recognizing patients' deteriorating conditions may account for many hospital fatalities. The health early warning systems (HEWS) for monitoring patients in critical conditions were developed to alert purpose staff and Nursing staff to a patient's rapid decline in clinical condition (Le Lagadec & Dwyer, 2017).

The research was conducted in Japan at a single center, and the study was retrospective and observational of the ICU's unforeseen admittances from the general wards. The research was longitudinal and observational, and the study period was between December 2015 and February 2017. The research comprised patients who were transferred from the general ward to the ICU section with emergency medical intubations.

In this clinical research, the vital signs measured inside the 24-hour threshold preceding the ICU admission were compared between patients who required tracheal intubation emergency in the general ward and those who did not. The research conducted a survey to reconnoiter nurses' attitudes toward vital sign measurements. The research established that the respiratory rate was significantly less frequently measured than other vital signs. Also, the researchers concluded that the respiratory rate measuring was less prevalent in the 38 intubated patients compared to the 102 patients who were not intubated in the general ward. The research discovered that 54% of the nurses participating in the clinical survey deliberated on the assessing the respiratory rate and valued it as a significant trifling nursing chore. Approximately 15% of the clinical nurses were found not to measure routinely respiratory rates. Therefore, this posits that respiratory rate may be problematic as it was not as recurrently assessed in the general ward among the weakening patients. The reason for that could be that it is considered a troublesome task.

Kyriacos et al. (2014) conducted a clinical assessment study in Cape Town, South Africa. This clinical research was directed at the design, advancement, deployment, and validation of the constructs of an assessment model and the content of the observations assessment model chart for clinical healthcare nurses. This was done by incorporating the amended early warning scoring system with an acronym MEWS which was to be used by the healthcare nurses for the monitoring of patients in general wards in a South African public hospital.

This was done by consensus, and the parameters integrated were physiological. The research used the Delphi, and the adjusted nominal group interacting face-to-face and unanimity methods were applied to develop and authenticate a model for the observations chart. The UK MEWS system, which already existed, was incorporated into the clinical research. The participants in the research were purposively sampled because the research intended to build harmony in the MEWS development. These were one medical

emergency specialist, one specialist anesthesiologist, eight highranking ward nurses who were seasoned in bedside monitoring, and two critical care nurses. This clinical study revealed that after conducting five consensus rounds on five cut points of the seven physiological bounds, which are temperature, respiratory and heart rates, urine output, and systolic BP, a 70% or more agreement was achieved.

In contrast, a relaxed rule of 70% or less agreement was applied for oxygen saturation and consciousness level in this research. The study established and incorporated a reporting algorithm in the MEWS chart; the algorithm represented the decision rules used to determine an assessment's degree of urgency. The parameters that were used and expurgated points differed from those used in the MEWS in developed countries. The study concluded that a MEWS that is supposed to be used for those countries in the developing world record seven parameters should, at the very least. The study posited that the experts from the very contexts of those developing countries should stipulate cut points in the physiological parameters as they are best placed. This is why this research is being carried out in Bahrain, as research of that nature has yet to be carried out in the Bahrain context.

Mok et al., (2015) carried out research in an acute tertiary hospital. The research intended to develop and determine the V-scale instrument's psychometrics properties and to discover the clinical nurses' attitudes concerning the vital signs observed to detect deterioration of the patient's clinical conditions in the general wards. The clinical study employed scale growth with psychometric testing and a descriptive quantitative survey. The research was piloted at a referral hospital, and 614 general ward nurses in total took part in the research. The research performed the principal analysis of the components and this analysis of a five-factor solution in which 16-in items instrument was discovered. The critical indicators established are message, technology, capacity, and knowledge, which explained 56.27% of the variance. The research established a Cronbach's alpha of 0.71,

which is satisfactory for internal consistency, and a strong item subscale of correlations of 0.56-0.89. The test and retest reliability for this clinical study were sufficient, with an ICC of 0.85. However, the study also established that many nurses accounting for 56.9%, did BP changes erroneously as the first pointer of deterioration in a patient. However, 46% of the research participants agreed that a change in the respiratory rate is the least important indicator. The majority of the nurses, 59.8% in this research, indicated that they relied on oxygen saturation to evaluate respiratory dysfunction. In comparison, 27.4% of the respondents indicated that they quickly approximated the respiratory rate.

However, the research pointed out that the nurses saw the then-current practices that were being practised for vital signs nursing as overwhelming to do with 35.3% as well as time-consuming at 21.0%, and this indicated that, the research established that the level of education most meaningfully impacted the nurses' assertiveness as attitude was found to be positive for those nurses who had a degree qualification. The other factors that were found to have a bearing on the attitude of nurses were whether the nurses had been working in a general ward with a forte and more than five years of working experience. The research was an exploratory clinical study that delivers substantiation for the V-scale psychometric properties. The research postulates that there is a need for professionalizing the advancement of clinical care nurses to continuously change the attitudes of ward clinical care nurses towards vital signs monitoring. The issue of monitoring vital signs is critical and should be prioritized in the workload plan.

Another research was carried out by Una Kyriacos, Jelsma, & Jordan (2014), which explored the sufficiency of the vital signs' recordings responses to clinical and physiological worsening in the first 8 hours after their operations (post-operative hours). Recordings of the vital signs in this research were the heart rate, respiratory rate, temperature, level of consciousness, systolic blood pressure (BP), oxygen saturation, and urine output. The research also investigated the factors that are concomitant to the death

of patients in the ward between the transits from the time they leave the theatre recovery suite to the seventh-day post-operation procedure. The research design was a reflective assessment of fatalities annals of the 11 persons who had perished together with four records used as controls for each case. The researchers collected the 55 patients' clinical records, which qualified for the criteria used for inclusion and, in this case, the general anesthetic of the patient and the patient's age, which was above 13. The complete patient records from all six surgical wards of a teaching hospital were collected. The research was conducted for three months commencing on the 1st of May 2009 and running up to the 31st of July 2009. Because of the nonexistence of routine post-operative vital signs monitoring procedures, the researchers employed the standard practice of graphical plots of recordings used by the nurses. These recordings were entered into the MEWS system using the formats with 0 indicating average while 1-3 represented higher or inferior limits. The responses to clinical waning were deduced using the MEWS reporting algorithms.

The research findings revealed that no patients' records had all the parameterized seven recordings exhibited on the MEWS system. The research concluded that there was no substantiation of a response in 22/36, which is 61.1% to uncharacteristic vital signs for the patients that had lost their lives that would possibly have activated an enhanced reporting algorithm on the MEWS with 81/87 (93.1%) for controls. The research reported that death was linked to the age of patients greater or equal to 61 years and those with two or more pre-existing co-morbidities like high/low systolic BP on admission and tachycardia. The research concluded that there is a need for provisions of guidelines for establishing post-operative vital signs' monitoring and reporting. The MEWS offers a precious recording system for understanding clinical worsening and providing guidance for intervention. The research proposed the need for exploring the Cape Town MEWS chart's ability, the algorithm's reporting to advance the recognition of physiological

deterioration and clinical signs, and safeguarding additional expert backing is essential. Therefore, it necessitates carrying out this research in the context of Bahraini.

Fu, L. H., et al, (2020) carried out a research review of the literature published in the three databases PubMed, Cochrane Library, and CINAHL. The research reviewed the articles based on the quality of model reporting. It laid bare the overview of the methodology applied for EWS development and validation for adult patients in critical healthcare settings. The research highlighted the methodologies' strengths and limitations and subsequently branded the future directions for EWS foundation and validation studies. The review factored only the noble appraised articles and the clinical guiding principles that were published in the three journals concerning the development and validation of the EWSs for mature patients in dire care settings.

More than 600 research articles were pulled out and appraised by the authors. The research evaluated the selected studies on the foundation of the checklist provided by the TRIPOD system. The research articles were categorized and scrutinized in line with the article's research design approach, the prognosticator assortment, the measurement outcome, the method of demonstrating, and the validation strategy. The research established that out of the 29 research articles that were incorporated in the ultimate examination, 26 of those articles had researched and reported on the novel EWS advancement and substantiation. In contrast, the other three had reported on authentication and classic alteration. The research subsequently reported that only eight studies out of the 29 that made it to the final analysis met more than 75% of the TRIPOD checklist items.

The research further established that the number of prognosticators incorporated into the EWS system mottled from 3 to 72 and had a middling of seven. Twenty-eight of the models were found to have included the vital physiological and clinical signs, while 11 of the models encompassed laboratory data. This research analysis also established that

mental status, Pulse oximetry, and some other variables that were mined from the health records from the computerized databases were amongst supplementary commonly used predictors. While the inadvertent relocation to the ICU, inhospital mortality rates and cardiac seizure were the most frequently used for clinical conclusions.

This literature analysis validates that the features of a component, its conjecturers, and the consequence of the selection and the metrics for prototypical authentication show significant discrepancies across EWS studies; hence no unanimity was established on the prime approach that must be used for developing such algorithms. This is because the data-driven replicas that have good prognostic precision are usually contextual setting specific. The research posits that while a consistent measurement for clinical forecast archetypal reporting subsists, only some clinical studies have incorporated some reporting associated with that standard tool in their journal articles. The models anchored on data are context-specific; hence they are biased to the EHR data they would have used. Thus, the researchers must provide some detailed study *modus operandi* and admit; the influence exerted, or perhaps reduces the probable prejudices of the data that would have been used for the development of the tool to progress the pellucidity and generalizability.

Another research was conducted by Alam N, et al (2014) on the acute deterioration that occurs in seriously ill patients' serious adverse events (SAEs). Variations in biological parameters, including pulse, temperature, respiratory rate, and blood pressure, regularly precede the acute deterioration of patients. The researchers used the EWS recording classification to support the detection of functional variations, which may help ascertain those patients at risk of additional weakening.

Consistent with the findings in the current study, several previous studies found gaps in knowledge, attitudes, and practices toward supplementary vital signs. For instance, a descriptive cross-sectional study was conducted by Bayoumi et al., (2018), and involved 45 nurses from intensive care units between 2015 and 2017 in Egypt. The study

aimed to assess nurses' perception of using a new eight-vital signs chart at ICUs. The study found that as high as 68.9% of the nurses agreed to use eight vital signs, and 84.4% had adequate knowledge regarding the assessment of pain, level of consciousness, and urine output. In addition, more than half of the participants (55.6%) reported that assessing the additional three vital signs with basic vital signs was extremely important. (Bayoumi et al., 2018).

In a cross-sectional study done by Yamamoto et al. (2022) about healthcare providers' attitudes toward advance care planning for critically ill patients with critical illnesses in critical care areas, it was concluded that 40% of hospitals included in the study were using ACP for critically ill patients. It was concluded that many reasons resulted in this low percentage: a lack of nurses' knowledge about ACP, late initiating the ACP for a patient admitted in the critical area, and finally, variances of attitude and knowledge among nurses.

Outline 5: Assessment of Vital Signs

The delay in recognizing a patient's deteriorating condition in the general ward clinical care nurses may result in the unforeseen admission of patients to the hospital's intensive care unit (ICU). This situation is usually associated with delayed transfers, which result in poor patient outcomes. A deficit of general recognition of the significance of the respiratory status of the patient and the subsequent delay of the intervention process for that patient's worsening situation may lead to emergency tracheal intubation in the general wards (Koyama et al., 2020). Respiratory inadequacy is a major avertible cause of cardiac arrest cases in the general ward of in-hospitals worldwide; it submits that the early acknowledgment of respiratory weakening is fundamental to the survival of patients. Thus, among vital signs assessed at the patient's bedside, the respiratory rate is the initial undisputable sign of a patient's worsening situation and has subsequently been displayed to be a dominant prognosticator of fatal events (Cardona-Morrell et al., 2016).

Therefore, assessing vital signs has been postulated as a significant clinical nursing purpose that enables clinical care nurses to recognize worsening patients early. However, the question would be whether these critical care nurses would aptly construe these abnormal vital sign measurements and react to the obtaining situation before the patient's condition deteriorates further is pivotal and at the epicenter of critical care nursing and healthcare services (Currie et al., 2018). However, numerous clinical care research studies have exhibited that these vital signs of hospitalized patients are not correctly and consistently measured, recorded, and reported as exposed (Cardona-Morrell et al., 2016; Connor et al., 2020; Fridman et al., 2015; Fu et al., 2020; Ganesh et al., 2017; Kamio et al., 2018a; Kesavadev et al., 2021; Leenen et al., 2020; Santoso et al., 2018; Wu et al., 2020).

In other clinical research articles that have been published in medical and clinical health journals, poor clinical monitoring has been reported as the most prominent source of preventable deaths that have been occurring in all acute care hospitals across the world (Alam et al., 2014; Drayer, 1976; U. Kyriacos et al., 2011; Morasco et al., 2011). In contrast, many researchers have addressed the evaluation and assessment of vital sign measurements that are empirically being done for all deteriorating patients who require emergency intubation to prevent cardiopulmonary arrest before being admitted to ICU (De Meester et al., 2013; Fu et al., 2020). Therefore, this research intends to explore that and the other additional vital signs.

The shortcomings of the traditional five vital signs in the contemporary clinical health world point to the need for additional vital signs, such as pain, level of consciousness, and urine output which are very important to detect the early signs of clinical deterioration. According to (Ganeshkumar & Gopalakrishnan, 2013), in addition to the pain scoring system, barriers to pain assessment and sleep, and emotional distress,

it is necessary to include other elements like the onset and configuration, position, quality, exasperating and discharging factors, previous treatment, effect on physical function.

Conditions like hypoglycemia and hypotension, as well as the side effects of some medications, can lead to changes in patient behavior like Anticonvulsants which may cause delirium or confusion, cognitive impairment, and amnesia (Saenubol et al., 2020). Deterioration in a patient's consciousness level can result from changes in the brain and neuronal functions, which can affect the patient's responsiveness to the surrounding stimulus (Una Kyriacos et al., 2019). Also, the level of consciousness can help detect internal brain injuries (Una Kyriacos, Jelsma, & Jordan, 2014). However, altered consciousness levels can vary in severity, including confusion, drowsiness, agitation, memory loss, vegetation, and coma (Saenubol et al., 2020). Any renal lack can be noted through urine output per hour (Passik et al., 2006). Additionally, nurses should look at other features of urine like color, odor, and specific gravity (Elliott & Coventry, 2012; Gourlay & Heit, 2010)

Therefore, if the nurses need to be more competent in recognizing patient deterioration signs, and there is the nonexistence of trigger points, this may collectively constrain the nurses' capacity to summon clinical assistance when needed on time. Additionally, the severity of diseases nowadays is higher (Aird & McIntosh, 2004). So, in critical cases, nurses need to monitor more than the classic five vital signs as these five vital signs are inadequate to detect early clinical deterioration, as suggested by Elliott & Coventry (Elliott & Coventry, 2012). Clinical care nurses can no longer be dependent on the classic five vital signs; they must also work on evaluating the additional vital signs when assessing their patients, which requires practitioners with a positive attitude.

According to Elliott & Coventry (2012), healthcare nurses have habitually trusted using five vital signs to evaluate the state of the patients. The classic vital signs, like pulse,

oxygen saturation, blood pressure, respiratory rate, and temperature, have been used successfully for decades, patients who are hospitalized today appear to be much sicker than they would have been in the past, so these vital signs may fall short in the quest for the assessment and identification of those who are clinically deteriorating. This study provided a visual summary of clinical considerations that should be addressed while assessing vital signs. The study offered various extra assessments, such as degree of awareness, urine output, and pain, as part of routine patient evaluation.

The absence of respirational suffering recognition may culminate in the tracheal intubation emergency in the hospital general ward. Conversely, very little scholarly research has scrutinized the variances in the measurement of vital signs among patients who have tracheal intubation emergency and those without it in the general ward. Kamio, Kajiwarra, Iizuka, Shiotsuka, & Sanui (2018) conducted research to probe the dissimilarities identified in the occurrence of the vital signs measurements between those patients with tracheal intubation emergency and without it.

A *theoretical structure* is a foundation on which the research is anchored. It was postulated by Grant & Azadeh Osanloo (2014) as the blueprint that initiates the viewpoint, which is used to encapsulate and substantiate the research significance, explicate the research problem and interpret its findings. According to Rockinson-Szapkiw & Knight (n.d.), the foundations are central to everything; hence the authors quoted the Biblical parable about the two types of builders. The story draws parallels between the two different types of builders where. One builds his house on a solid foundation, while the other builder builds his house on the sand. When these storms descend on both houses, one house built on a solid foundation remains standing while the one built on sand falls.

Additionally, a study by Kamio et al. found that measuring respiratory rate, level of consciousness, and urinary output were the least assessed vitals and most troublesome ones among all vital signs. The study also revealed that a poor understanding of the

importance of these measures and signs was a common cause of not measuring and assessing them. (Kamio et. al., 2018). Moreover, insufficient time and resources, multi-tasks, and shifts were among the common reason for not assessing and registering the vital signs, as determined by Elizabeth et al. (Elizabeth et al., 2015). Another study conducted by Smith (2020), there is a positive relationship between low staffing and late detection of deteriorating patients' vital signs and mortality rate. Hence, adequate staffing is crucial to decrease such incidences

Theoretical Framework

This research explores critical care nurses' knowledge concerning supplemental vital signs like pain, level of consciousness, and urine output in critical care units and to understand their attitudes towards these supplementary vital signs. Therefore, the critical care nurses' attitude towards the supplementary vital signs influences their judgment and decision-making in critical care nursing settings. This research primarily concerns nurses' knowledge of critical vital signs. The research intends to unravel how nurses recognize supplemental vital signs, interpret them and respond appropriately.

Clinical judgment is the healthcare professionals' thought procedure enabling a person to make clinical decisions based on objective and subjective information about a patient (Laura M. Cascella, n.d.). Thompson, Aitken, Doran, & Dowding (2013) posits that nurses are central in the healthcare systems; hence they are strategically positioned to make regularly repeated decisions and making judgments in practice that are critical to the well-being of patients. Identifying and categorizing the patients that require more medical assistance or not and the optimal timing determination of this is vital. Therefore, critical thinking is a function of the knowledge and attitude of the individual.

Nurses must have an excellent aptitude to apply clinical knowledge to make appropriate clinical judgments and decisions (Thompson et al., 2013). The critical care

nurses' clinical judgments about the vital signs and decisions they make can assist the healthcare systems in allocating insignificant resources efficiently. It would subsequently promote health gain, benefiting the patients and averting harm.

There is ample empirical evidence in the literature on healthcare systems from all over the world that submits that the judgments and assessments that are made by healthcare professionals, particularly critical care nurses, could be improved, as suggested in several articles (Brabrand et al., 2018; De Meester et al., 2013; Giuliano, 2017; Jordan, 2000; U. Kyriacos et al., 2011; Lakkaraju & Lakkaraju, 2012; Ryan et al., 2004; Spangler et al., 2020; Tofino, 2003).

Research has established that approximately 50% of all adverse events have some error at the core of the healthcare system (Abuzeyad et al., 2018; Elliott & Coventry, 2012; Higgs et al., 2020; Jones & Johnstone, 2017; Milutinović et al., 2016; Mohammed et al., 2009; Odell et al., 2009; Rolfe & Paul, 2018). Therefore, the nursing profession should be able to contribute to raising health quality by way of improved judgments and quality assessments within the health systems. Knowledge of such treatments will most likely lead to interventions that increase the knowledge of these critical care nurses, which will have a good influence on their judgment, decision-making processes, and results.

The nursing process theory of Ida Jean Orlando guides this research study. Orlando's model revolves around five interrelated concepts: 1. function of professional nursing, finding out and meeting the patient's immediate need for help; 2. Presenting behaviour of the client, any observable verbal or nonverbal behaviour, persons become patients who require nursing care when they have needs for help that are not independently met; 3. immediate response of the nurse, Orlando emphasizes that it is vital for nurses to their perceptions, thoughts and feeling so they can determine if their inferences are congruent with patient's needs; 4. Nursing process discipline: the

reciprocal relationship between patient and nurse and the importance of the patient's participation in the nursing process;5. Improvements focus on how to produce improvements in the patient's behaviour (Alligood, M.R. (2018).

The Nursing Process Theory

Psychiatric nurse Ida Jean Orlando postulated the Nursing Process theory. The theory focuses on improving the patient's behaviour, induced by nurses' actions in responding to the patient's needs (Taylor, 1988). Such needs are met through effective interaction with the patient. Orlando suggests that when a human being cannot meet the desires that he or she has, they usually become anxious and usually end up wanting nursing care (Faust, 2002). However, in contrast, persons capable of meeting their own needs are usually not as distressed, subsequently; they do not need nursing care. Sometimes, patients may need more effective communication skills in expressing their needs. In some cases, this is compounded by the fact that nurses misinterpret the patients' behaviour, which can cause distress to the patient (Faust, 2002).

Orlando's nursing theory focuses on improving patient behaviour through activities based on a patient's requirements discovered through good engagement with the patient. As a result, those who can fulfil their requirements are not agitated and do not require nursing care. Observations of patient behaviour, both verbal and nonverbal, aid the nurse in determining the extent of the patient's distress and the need for assistance during treatment. Orlando emphasizes that, regardless of how valid or erroneous the nurse's opinions are, once conveyed to the patient, it creates an environment for conversation in which patients are more likely to share their point of view.

According to Orlando, nurses must aspire not only to meet the patient's needs but the actual needs of the patients must be well-known by the nurses; thus, first of all, find out what those needs are (Tanner, 2006). The nursing process is a widespread concept,

and it forms the foundation for the nursing practice in the world (Brasileira de Enfermagem Brasil de Almeida Lopes Monteiro da Cruz et al., 2016). The theory has been widely recognized as a scientific tool and used as the fundamental approach to guide nursing practice and promote quality nursing care (Jordan, 2000).

This theory suggests that those patients, who fail to deal with their health needs without being assisted, will become distraught and subsequently feel helpless. At the very elementary level, the nursing practice can contribute to this distress (Haapoja, 2014). The theory posits that there is a need to develop the relationship between the nurse and the patient, and both parties naturally decide on this relationship. Patients can only appropriately communicate their needs or fears by connecting closely with the nurse (Orem, 1988). Therefore, nurses are there to serve and offer patients a nurturing presence to relieve the patients of distress.

The Role of the Nurse

The nursing process theory postulates that the nurse's role is to establish the patient's immediate need for help and ensure that those needs are fulfilled (Rolfe & Paul, 2018). However, patients are only sometimes consistent in expressing their distress in a way that enables the nurses to precisely determine the nature of the help they may need. As a result, the nurses must use their insight and intuitive abilities to determine the patient's actual needs (Awadhalla et al., 2018). That repetitive process of scrutinizing the patient's behaviour and ascertaining its meaning enables the nurses to establish what the client needs.

The Major Dimensions of the Nursing Process theory

The four major dimensions of the nursing process theory are distress, the nursing role, nursing actions, and an outcome. Distress describes what a patient goes through

when they are sick, and it entails those experiences they feel when their needs as patients have not been met (Kamio et al., 2018b). The

Nursing Role describes what the nurse is expected of in their day-to-day interaction with the patients. It encompasses learning about the patient's immediate needs and meeting them (Sheehan, 1989). The third dimension describes nursing actions as nurses' direct and indirect approaches to providing for the patient's immediate needs. The fourth and last dimension, the outcome, is the transformation in the patient's behaviour, and this outcome depicts two forms, either relief or an unmet need (Elo & Kyngäs, 2008). These outcomes can be detected and interpreted in the patient through verbal and non-verbal means.

Understanding Patient Needs

The theory dictates that before a nurse can take action to attend to the patient, there is a need for the nurse to diagnose the current situation as a challenging one first (Given, 2008). That is, the nurse must comprehend that the actions being exhibited by the patient are a communication way to appeal for help, regardless of appearance. Therefore, these cues are supposed to be a stimulus for the nurse. Therefore, nurses acquainted with the theory will experience an automatic internal reaction to patient pleas (Awalkhan & Muhammad, 2016). Therefore, they are well informed, and they, in turn, reveal behavioural traits that elicit a response of relief from the patient.

Interacting with a Patient

Therefore, the theory dictates that it is instructive for nurses to understand that any observations shared and evaluated with a patient are relevant and valuable (Bliss-Holtz, 1996). Given the outcome of the evaluation, the nurse is then required to decide if the patient needs assistance or not. In whatever they do, the nurses should refrain from making assumptions about their actions and reactions as appropriate or helpful to the patient until the patient has confirmed. Nurses must also follow a habitual pattern of reconnoitering

patients' reactions to their actions. When the nurse halts identifying and deducing meaning from patient behaviors, communication between the nurse and the patient stops (Taylor, 1988). The bottom line is that the nursing process theory requires that the nurse stay focused on the patient's needs (Sheldon, n.d.). Hence, anyone studying or aspiring to become a nurse should remember that the patient always comes first before anything else.

The nursing process theory provides guiding principles for orderly reasoning in clinical health, and its primary goal is to provide quality individualized care in a holistic and organized manner (Gazari et al., 2020). A literature review on the perceptions of professional nurses on the Nursing Process theory indicates that it is a scientific approach as well as decisionmaking and a problem-solving and information-processing process as common perceptions of the nursing process.

The use of Orlando's theory provides a framework for understanding the role of critical nurses in monitoring patients' vital signs in intensive care units and responding appropriately to the deteriorating conditions of patients under their care. Fig 2 modified conceptual framework based on Ida Jean Orlando theory (1961).

Application of Nursing Process theory into current Research

The nursing process functions as a systematic guide to client-centered care with 5 sequential steps. these are assessment, diagnosis, planning, implementation, and evaluation as demonstrated in figure 2. Assessment is the first step and involves data collection; however, nurses will assess level of consciousness, (GCS) score, note urine output characteristics (quantity, frequency, and character of color, odor, & specific gravity), and assess pain (location, traits, onset, duration, frequency, quality, & severity of pain. Second step is planning, which includes outcome expected to achieve after interventions, like patient will maintain constant orientation to person, place, & time, patient will maintain adequate urine output, normal characteristics of urine, patient will

be pain-free, or tolerated the pain by providing analgesics & nonpharmacologic. Third step is interventions, it includes Provide constant orientation to person, place, & time, provide calm environment, limit napping during the daytime, catheterize if needed & measure urine, maintain catheter kink-free, observe the different of UTI, and provide analgesics & nonpharmacologic as ordered. Last step in nursing process is evaluation, and goal will be either met, partially met, unmet, also, if no changes, nurse will continue the process until improvement occurs.

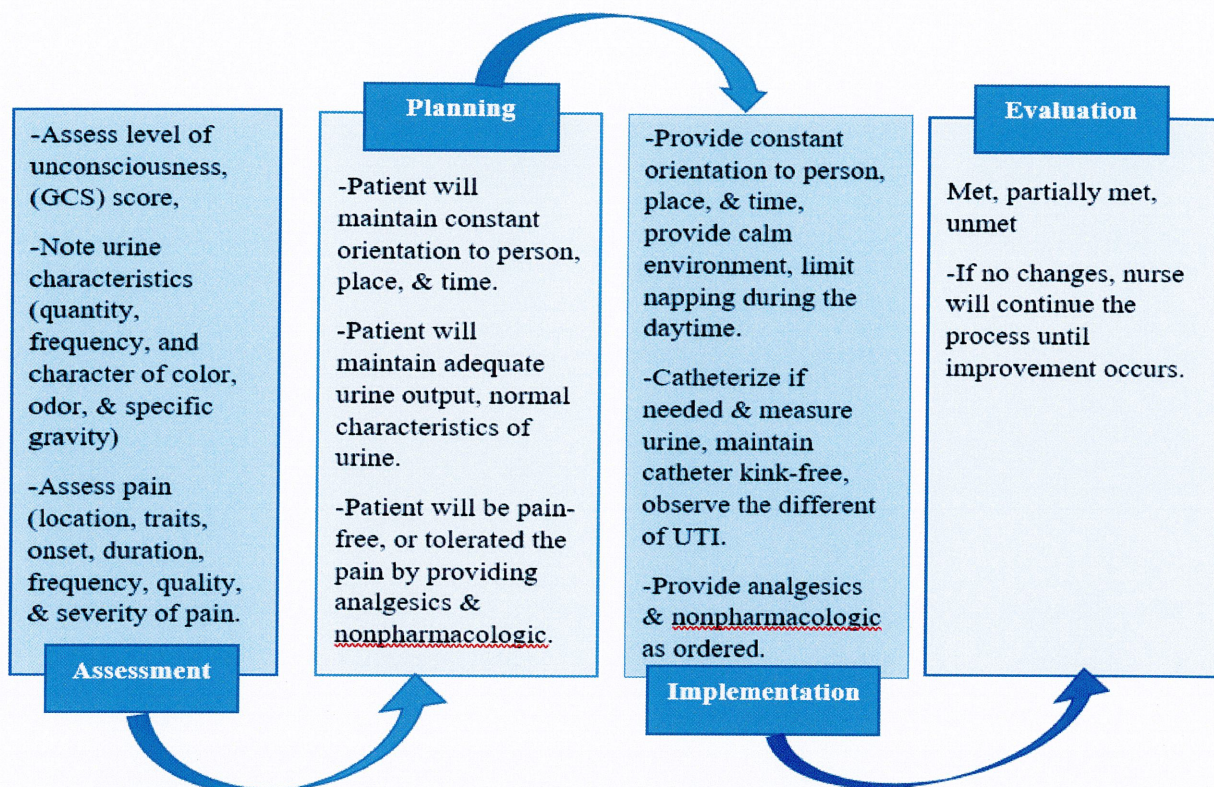


Fig 2. Modified Conceptual Framework Based on Ida Jean Orlando Theory (1961)

Summary:

A comprehensive summary was provided in this chapter, including five main themes, which are, vital signs, supplemental vital signs, attitude of nurses on supplemental vital signs, knowledge of nurses on supplemental vital signs, and lastly assessment of vital signs. However, it illustrated the gap between knowledge and attitude of nurses on monitoring vital signs from varies studies conducted worldwide.

The Role of APN (Core Competences)

As the healthcare system advances, new roles such as the Nurse Practitioner and Clinical Nurse Specialist are developed as they could benefit and improve the care of patients. Many types of research have demonstrated that integrating the role of clinical nurse specialists in clinical care areas has significantly contributed to patient care (Kleinpell R. M., 2007).

The advanced Nursing Practice Model developed by Hamric shows many core competencies: direct clinical practice, expert coaching and guidance, consultation, research skills, clinical and professional leadership, collaboration, and ethical decision-making (Hamric et al., 2013)

The advanced nursing practice core competencies provided the framework for this research. It is defined as follows:

1. “Direct clinical practice”: is demonstrated by gaining the knowledge and skills that help provide the best, high-standard care to the patient.
2. “Expert coaching and guidance” is illustrated by knowledge competence and the ability to assess patient and family needs and provide evidencebased educational interventions.
3. “Consultation” is demonstrated by collaborating with other healthcare specialties personnel such as social workers, physiotherapists, psychologists, and physicians to provide inclusive and complete teaching to patients and families.
4. “Research Skills”: is demonstrated by the capability of the APN to participate actively in conducting the research and utilizing the updated evidenced-based literature to benefit patient

5. “Clinical and professional leadership”: interacting with the healthcare team, providing feedback as needed, and acting as a role model.
6. “Collaboration”: is demonstrated by collaborating with all healthcare personnel to benefit patients and provide the best outcomes.
7. “Ethical Decision-Making skills”: by being the advocator for the patient and clarifying and addressing the patient's ethical concerns.

Chapter III

Materials and Methods

MATERIALS AND METHODS

Introduction:

This chapter of research methodology explains the research process utilized by the researcher. This encompasses detailed description about the research approach, its design, the setting, sample, population along with sampling technique, tools development and utilization, data collection procedure and the plan for data analysis.

Research Design

The research design used in this study was quantitative descriptive cross-sectional design was used to identify the knowledge and attitude on supplemental vital signs among critical care nurses.

Settings

The study is based on the field on which the researcher designed the study. This research study was conducted in the level II & level III critical care areas at tertiary Hospital in Bahrain. The data were collected in these units among critical care nurses.

Population

Population is the entire aggregate of cases in which a researcher is interested (Polit & Beck, 2017). The population for the study includes all the critical care nurses who are working in all Adult critical care units of KHUH were chosen for the study.

Sample

Sample consists of the elements selected from the target as well as accessible population. The sample that is being selected varies as per the hypothesis and the effect size of the study and on its feasibility. In this research, study subjects are critical care nurses working in all adult critical care units who fulfilled the inclusion criteria to participate in the study.

Sampling Technique

In this research, **non-probability convenience sampling** has been utilized because of sample dependency upon availability and fulfilment of inclusion criteria. A nonprobability convenience sampling technique was adopted to recruit the sample to participate in the research study based on their participants' willingness. In this type the participants are selected conveniently and depends on the ease of access and proximity to the researcher. The samples were approached with the help of nursing administration and nurse supervisors at KHUH in the adult critical care units.

Sampling Criteria

These criteria describe the characteristic of the sample that are an eligible to be a part of the study.

Inclusion Criteria

- Nurses who have experience of more than one year in a critical area in KHUH.
- Nurses who speaks and read English.

Exclusion Criteria

- Not giving consent to participate in the study.

Sample size

The sample size was estimated that 177 nurses are working in the Adult Critical Care settings in KHUH (Nursing Administration, KHUH, 2020). The sample from the population was estimated by using Sloven's formula. $n = N / (1 + N \times [0.05]^2)$. $n = 177 / (1 + 177 \times [0.05]^2)$.

$$n = 177 / 1 + 177 (0.0025)$$

$$n = 177 / 1 + 0.4425$$

$$n = 177 / 1.4425 \quad n = 122.7$$

$$= 123$$

Therefore, the sample size was estimated as $n = 123$

Measurement Tools

Tools are the devices that assist in collection of the data in research which is basically a primary type of data. The method of data collection determines tools that is utilized for the data collection process. A structured questionnaire about knowledge and attitude on supplemental vital signs was prepared by the researcher and used for the purpose of data collection. An extensive search of the literature was carried out Journal articles and related textbooks that are published were reviewed and this provided adequate content for the preparation of the questionnaire. The researcher reviewed various textbooks related to vital signs, supplemental vital signs, knowledge and attitude of critical nurse towards supplemental vital signs and related benefits. Discussion with guide and experts from the department of Medical

& surgical Nursing helped in the identification of areas that needs to be covered in the teaching program to include it in the preparation of tool. Extensive search of Medline, EBSCO, ProQuest, PubMed, Clinical Key, Cochrane library to understand the content and development of the tool.

It comprised of three sections: (Appendix A).

- **Section I** - Contained demographic characteristics of respondents seeking information such as gender, nationality, age, years of experience, qualification, working area, and job category.
- **Section II**- This section consisted of 16 questions related to knowledge on Nurses' knowledge of using eight vital signs in ICU. The knowledge scale consisted of 16 items.
- **Section III**- This section consisted of 8 items about Nurses' attitude likert scale towards utilization of new supplemental vital signs chart in ICU.

Scoring and Interpretation

Knowledge Score:

- Knowledge scale consisted of 16 items. All 16 items were on 5-points Likert scale. One score was assigned for the correct answer and zero score for the incorrect answer. Mean score of knowledge was found by adding the scores of the 16 items and divided by 16 and then multiplied by 100 to standardize the mean score of knowledge.
- The overall knowledge was categorized, using Bloom's cut-off point, as good if the score was between 80 and 100%, moderate if the score was between 60 and 79%, and poor if the score was less than 60%.

Poor	<60%
Moderate	60- <80%
Good	80-100%

Attitude score:

- Attitude score: Attitude scale consisted of 8 items. All 8 items were on 5 points Likert scale. zero score was assigned for strongly disagree, one score for disagree, two scores for neutral, three scores for agree, and four scores for strongly agree. Mean score of attitudes was found by adding the scores of the 8 items and divided by 32 and then multiplied by 100 to standardize the mean score of attitudes.
- Based on scores in attitude part in the tool, the maximum score is 4 for strongly agree response, and the number of attitude questions is 8, hence, $4 \times 8 = 32$. According to Bloom's cut-off point score, poor <60%, moderate 60 - <80% and good 80-100%, we can describe the attitude of the participants as follows, $(60/100 \times 32) = 19.2$, so, (0 to 19) is negative attitude, $(80/100 \times 32) = 25.6$, so, (20 to 26) is moderate attitude, and positive attitude will be (27 to 32).

Validity of the tool

The tool was finalized after the content validity was done. The content validity of the structured tool has been formed for all questions under the sections of demographic data, knowledge and attitude. The questionnaire was given to six experts for obtaining the suggestions for any modifications in the tool. The tool has been given to experts from Medical and surgical nursing and physicians from Medical and surgical field in KHUH. The tool was validated by the items in the tool were reorganized after the incorporation of the suggestions for improvement of the tool and made it more practicable.

Thus, the validated tool has been ready to ascertain the data from the participants.

Reliability of the tool

The reliability has been carried out by administering the structured questionnaire to 17 nurses. The reliability of the tool was established by using Cronbach's alpha. The Cronbach's alpha calculated for knowledge tool was $r=0.82$ and Attitude tool was $r = 0.89$. Thus, the tools were feasible for administration in the key research. Since the knowledge co-efficient for the scale $r > 0.70$, the tool has been found to be feasible as well as reliable. The statistically calculated coefficient clearly indicated that the tool prepared to measure the knowledge on was found to be reliable and suitable for further study.

Pilot Study:

The pilot study was carried out in the same study setting where the main study was planned to collect the data. This was carried out to determine the practicability, applicability of tools, feasibility to conduct and to determine any obstacles that might happen during the main data collection period. The samples who were participated in the pilot study were not included in the main study. After ensuring the tool validity as well as reliability, a pilot study has been developed and conducted which was like plan of the proposed study. Pilot study was conducted from the period of 9/12/2020 to 12/12/2020 with seventeen nurses. The questionnaire was completed within the time frame of 10 to 15 minutes. No modifications were made in the key analysis after introduction of the pilot study.

Ethical Considerations

Ethical approval was obtained from the College of Health & Sport Sciences, UOB (CHSS SRPC Recommendation No: 4/2020-21 dt. Oct 1, 2020.) & IRB, KHUH (20-384, December, 2020). The tool and objectives of the study were explained to staff nurses in the email content and returning the questionnaire was taken into consideration that they willing to participate in the study. Confidentiality was maintained during and after the study. The study has no risks to the staff nurses.

Data Collection Procedure

Data collection is the core to get outcome of the proposed study. For the data collection, formal written permission has been attained from concerned authorities for conducting the research. The study period has been between 13/12/2020 to 27/12/2020. The researcher contacted the Nursing Administration and then with the co-operation from the Nursing Supervisors of critical care units made possible for initiating and successful completion of the data collection. An electronic monkey survey link was distributed to the nurses in critical areas via E-mail; the estimated survey completion time per respondent was about 10-15 minutes. In the covering letter, the researcher introduced self; explained the purpose and procedure of the research and response to the mail from the researcher was considered as they are willing to participate in the study. The participants were assured of the anonymity as well as confidentiality of the collected data.

Data Analysis

SPSS 23 version will be used for data entry and analysis. Frequencies and percentages will be computed for the categorical variables. Mean, and

standard deviation will be computed for the quantitative variables. T-test will be used to determine whether there is a significant difference in mean scores between the two groups. ANOVA test will be used to determine whether there is a significant difference in mean score between more than two groups. The chi-Square test will be used to determine whether there is a significant relationship between two categorical variables. In all statistical tests, a p-value of less than 0.05 will be statistically considered significant.

Objectives	Name of the Test
1. To assess the level of knowledge of critical care nurses about supplemental vital signs, level of consciousness, pain, and urine output.	Frequency, percentage, mean, median, & standard deviation
2.To determine the attitude of critical care nurses towards utilizing supplemental vital signs in critical areas.	Mean, median, & standard deviation
3. To find out the correlation between knowledge and attitude among nurses towards utilizing supplemental vital signs in critical areas.	Spearman's correlation coefficient
4. To find out the relationship between the sociodemographic characteristics of critical care nurses and their knowledge and attitude towards utilizing supplemental vital signs.	Mann-Whitney test & Kruskal-Wallis test

Chapter IV

Results

RESULTS

In this study, the critical care nurses' attitude and knowledge towards utilizing the supplemental vital signs, namely, level of consciousness, pain, and urine output, are investigated. A questionnaire, which consists of three sections, is used to collect data from a sample size of 123 nurses in a tertiary hospital in Bahrain. The first section deals with the demographic information of critical care nurses. While the second section (Part 1) of the questionnaire focuses on knowledge toward utilizing supplemental vital signs, the last section (Part 2) deals with the critical care nurses' attitude of utilizing supplemental vital signs. SPSS 26.0 version was utilized to conduct all statistical analyses (Descriptive statistics, independent samples t-test, ANOVA test, nonparametric test called the Kruskal-Wallis test, and correlation analysis). Frequencies and percentages will be computed for the categorical variables. Mean, and standard deviation will be computed for the quantitative variables. In all statistical tests, a p-value of less than 0.05 will be statistically considered as significant.

Section 1: Analysis of Demographic Data

The results, including numbers and percentages of the demographical variables of the critical care nurses who participated in this research, are summarized in Table 1. The utilized demographic variables including nursing unit, gender, age, job category, education level, and years of working, are all categorical variables consisting of different number levels. The gender has two categories including, female and male, and the nursing units have four different categories, ICU-A, ICU Oncology, 3D, and ICU-B. For other variables, similar representations are utilized based on the sample size of 123 critical care nurses working in a tertiary hospital in Bahrain.

Table (1): Sociodemographic characteristics of the participants	
Socio-demographic Characteristics	n (%)
Age	
21–30 years	73 (59.3)
>30 years	50 (40.7)
Mean (SD)	29.9 (4)
Gender	
Male	44 (35.8)
Female	79 (64.2)
Education level	
Diploma	6 (4.9)
Bachelor/Master	117 (95.1)
Nursing Unit	
ICU (A)	42 (34.1)
ICU (B)	14 (11.4)
ICU Oncology	36 (29.3)
ICU (3D)	31 (25.2)
Job Category	
Staff Nurse	93 (75.6)
Senior Staff Nurse	19 (15.4)
Nurse Team Leader	11 (8.9)
Years of working in KHUH	
<5	101 (82.1)
5-10	22 (17.9)
Mean (SD)	3 (2.4)

When a comprehensive overlook is directed to the demographic variables of the critical care nurses, the following be presented as follows: the leading group of participants working for the ICU (A) unit consists of 34% of the critical care nurses followed by the group of the critical care nurses working for the ICU Oncology unit with the 29%. While the third group of critical care nurses working in the 3D unit accounts for 25% of the total, the ICU (B) unit, with almost 11%, employs the smallest group of them. It can be concluded that more than 60%, namely 63%, of the critical care nurses work for both ICU (A) and ICU Oncology units. When the demographic variable of

gender is under consideration, the leading group of nurses is called females, with almost 64%.

On the other hand, male nurses constitute approximately 36%. It can be concluded that most of the critical care unit nurses are females. Age is another demographic variable used in the analysis and shows that almost 60% of the critical care nurses have the age group of 21 and 30. It can be concluded that most critical care nurses are relatively young. On the other hand, the rest of the nurses have aged more significantly than 30.

When the variables of job category are a concern, the majority of critical care nurses are staff nurses, with almost 76%. While the senior nurses comprise of 15%, the group of a nurse called team leaders consists of almost 9%. It can be concluded that most of the critical care nurses are staff nurses. Regarding education, most of the critical care nurses have either a bachelor's degree or a master's degree as the maximum level of education, which comprises of 95%. Thus, it can be concluded that the majority of participants were staff nurses have a formal education at a university level. However, a minimum of 5% of the nurses have a Diploma level of education. Besides, when the years of work experience are a concern, the working experiences of the critical care nurses have less than five years, and their percentage is 82%. Thus, the majority of critical care nurses have relatively less work experience.

Section 2 (Part I): Assessment of the nurses' knowledge on utilization of supplemental vital Signs

Table (2): Number & Percentage of Nurses' knowledge towards utilization of the supplemental vital signs

No	n (%)	Yes
		n (%)

6. Blood pressure changes according to pain level.	24 (19.5)	99 (80.5)
7. Level of consciousness is influenced by cerebral perfusion.	9 (7.3)	114 (92.7)
8. Patient's level of consciousness is an indicator of the patient's clinical status.	3 (2.4)	120 (97.6)
9. Respiration rate changes according to the level of consciousness.	30 (24.4)	93 (75.6)
10. Pulse rate changes according to the level of consciousness.	97 (78.9)	26 (21.1)
11. Blood pressure changes according to the level of consciousness.	53 (43.1)	70 (56.9)
12. Urine output varies with renal perfusion.	1 (0.8)	122 (99.2)
13. Patient's urine output is an indicator of the patient's clinical status.	13 (10.6)	110 (89.4)
14. Pulse rate changes according to urine output.	77 (62.6)	46 (37.4)
15. Respiration rate changes according to urine output.	73 (59.3)	50 (40.7)
16. Blood pressure changes according to urine output.	34 (27.6)	89 (72.4)

1. There are three additional supplementary vital signs (level of consciousness, pain, and urine output)	10 (8.1)	113 (91.9)
2. Pain is subjective.	37 (30.1)	86 (69.9)
3. Patient's pain score is an indicator of the patient's clinical status.	19 (15.4)	104 (84.6)
4. Pulse rate depends on pain level.	21 (17.1)	102 (82.9)
5. Respiration rate changes according to pain level.	14 (11.4)	109 (88.6)

Table 2 depicts that the responses provided by the critical care nurses are generally aware of the supplemental vital signs since the “yes” responses given to practice based questions are very high such as urine output (99.2%), level of consciousness related to clinical status (97.6%), and level of consciousness related to cerebral perfusion (92.7%). However, when more specific questions are asked related to the utilization of supplemental vital signs, a sharp decrease was observed in response rate such as pulse rate related to level of consciousness (21.1%), pulse rate related to urine output (37.4%), and respiratory rate related to urine output (40.7%). The question related to “pulse rate changes according to urine output” is answered with 13 “yes” out of 123. On the other hand, observable conditions of the patients, such as level of consciousness, pain, and respiration changes, are quickly answered with “yes”, which implies that critical care nurses pay more attention to observable conditions of the patients than knowledge-based ones. Consequently, this confirms that the deficiency was observed in the knowledge levels of critical care nurses.

Table (3): Mean and standard Deviation of nurses' knowledge towards utilization of the supplemental vital signs

	Mean (SD)
1. There are three additional supplementary vital signs (level of consciousness, pain, and urine output)	85 (17.5)
2. Pain is subjective.	72.5 (22.5)
3. Patient's pain score is an indicator of the patient's clinical status.	77.5 (20)
4. Pulse rate depends on pain level.	80 (20)
5. Respiration rate changes according to pain level.	80 (17.5)
6. Blood pressure changes according to pain level.	75 (20)
7. Level of consciousness is influenced by cerebral perfusion.	85 (17.5)
8. Patient's level of consciousness is an indicator of the patient's clinical status.	87.5 (15)
9. Respiration rate changes according to the level of consciousness.	75 (22.5)
10. Pulse rate changes according to the level of consciousness.	67.5 (25)
11. Blood pressure changes according to the level of consciousness.	65 (25)
12. Urine output varies with renal perfusion.	87.5 (12.5)
13. Patient's urine output is an indicator of the patient's clinical status.	82.5 (17.5)
14. Pulse rate changes according to urine output.	50 (25)
15. Respiration rate changes according to urine output.	50 (25)
16. Blood pressure changes according to urine output.	72.5 (22.5)

Table 3 shows that the mean scores of knowledge on utilization of supplemental vital signs. When knowledge is a concern, we cannot observe a similar pattern among all the study participants since the lack of knowledge obscures the utilization of supplemental vital signs. Table 3 summarized the mean and standard deviation results are presented. The participants scored highest mean value of 87.5 (12.5) in the supplemental vital sign of urine output changes with renal perfusions. On the other hand, the smallest mean score of 50 (25) belongs to pulse rate and respiration alterations mean score of 50 (25) related to urine output. Additionally, the other aspects of knowledge denote

the mean scores of pain 72.5 (22.5), level of consciousness 85 (17.5) and blood pressure 72.5 (22.5).

Table (4): Level of knowledge towards utilization of the supplemental vital signs

Level of knowledge ¹	n (%)
Poor (<60)	12 (9.8)
Moderate (60 - <80)	55 (44.7)
Good (80 – 100)	56 (45.5)

1. Bloom's cut-off points of knowledge.

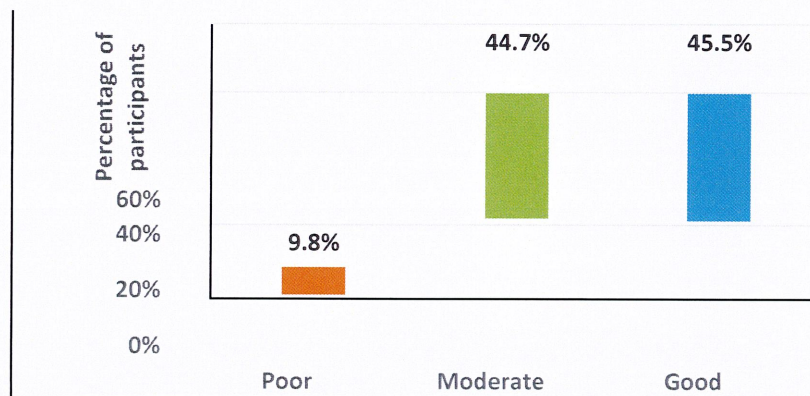


Fig 4: Level of knowledge towards utilization of the supplemental vital signs

When the knowledge level is categorized on self-assessment of the critical care nurses, their knowledge towards utilization of supplemental vital signs are categorized as poor, moderate, and good in Table 4.

Table 4 and Figure 2 depicts that the total percentage of the responses of “poor” category is (9.8%). The “good” category is (45.5%), and “moderate” category is (44.7%) is higher level denoting that the critical care nurses have almost complete knowledge of utilizing the supplemental vital signs.

Section 2 (Part II): Assessment of the Nurses attitude towards utilization of the supplemental vital signs

The Part II of the questionnaire comprises of 8 questions that are related to measuring the participants' attitudes toward utilizing the supplemental vital signs. Table 5 presents the categorized opinions, namely, negative, neutral, and positive responses in a 3-point Likert scale. The numbers and percentages are tabulated in the below table.

When interpreting the responses to the attitude questions presented in table 5, it is evident that the critical care nurses are having good attitude towards all the component of supplemental vital signs namely, urine output, level of consciousness, and pain are higher than (97%). Besides, a very few negative and neutral responses were elicited with a range of (0 to 2.4%), which implies that the attitudes of the critical care nurses to utilize the supplemental vital signs for the patients when needed are significantly confirmed.

Table (5): Number and percentages of the participants' attitude towards utilization of the supplemental vital signs

	Negative	Neutral	Positive
	n (%)	n (%)	n (%)
Do you think that aside from usually utilized vital signs (pulse, respiration rate, BP, temperature, oxygen saturation), the level of consciousness, pain, and urine output are significant indicators of patient's condition?	(0.8)	(1.6)	(97.6)
Is it significant to measure the supplemental vital signs?	(0)	(1.6)	(98.4)
Do you believe assessing pain is important in establishing appropriate care?	(0)	(2.4)	(97.6)
Do you believe assessing level of consciousness is important in establishing appropriate care?	(0.8)	(0.8)	(98.4)
Do you believe monitoring urine output is important in establishing appropriate care?	(0)	(2.4)	(97.6)
Pain level changes requires active intervention.	(1.6)	(0.8)	(97.6)
Level of consciousness variations requires active intervention.	(0)	(0.8)	(99.2)
Urine output variations requires active intervention.	(0.8)	(1.6)	(97.6)

Note: Mean (SD) were computed out of 100.

Table (6): Mean and standard deviation of participants' attitude towards utilization of the supplemental vital signs

Attitude questionnaire	Mean (SD)
1. Do you think that aside from usually utilized vital signs (pulse, respiration rate, BP, temperature, oxygen saturation), the level of consciousness, pain, and urine output are significant indicators of the patient's condition?	92.5 (15)
2. Is it significant to measure the supplemental vital signs?	90 (12.5)
3. Do you believe assessing pain is important in establishing appropriate care?	90 (12.5)
4. Do you believe assessing the level of consciousness is important in establishing appropriate care?	95 (12.5)
5. Do you believe monitoring urine output is important in establishing appropriate care?	92.5 (12.5)
6. Pain level changes require active intervention.	87.5 (15)
7. Level of consciousness variations requires active intervention.	95 (10)
8. Urine output variations require active intervention.	90 (15)

Note: Mean (SD) were computed out of 100.

Table 6 presents the mean scores of attitude responses of the supplemental vital signs. The maximum mean scores of 95 (10) on level of consciousness variation requires interpretation and assessing the level of consciousness is important in establishing appropriate care 95 (12.5) and the utilization of supplemental vital signs including level of consciousness, pain, and urine output are significant indicators of patient condition 92.5 (15). and monitoring urine output is important in establishing appropriate care 92.5(12.5). And lowest mean score was elicited in the aspects of pain level changes requires active intervention 87.5 (15) significant to measure supplemental vital signs 90 (12.5), pain is important in establishing appropriate care 90 (12.5) and urine output requires active intervention.

Table (7): Level of attitude towards utilization of the supplemental vital signs

Level of attitude ¹	n (%)
Negative (<60)	2 (1.6)
Moderate (60 - <80)	8 (6.5)
Positive (80 – 100)	113 (91.9)

1. Bloom's cut off points of attitude.

Table 7 depicts the participants' responses towards the level of attitude towards the supplemental vital signs. The positive attitude of (91.9%) denotes higher than moderate (6.5%) and negative attitude of (1.6%), implying that the critical care nurses have higher level of attitude towards utilization of the supplemental vital signs

Table (8): Overall mean score of knowledge and attitude towards utilization of the supplemental vital signs

	Mean (SD)
Attitude	91.9 (8.7)
Knowledge	73.8 (11.5)

Note: Mean (SD) and median were computed out of 100.

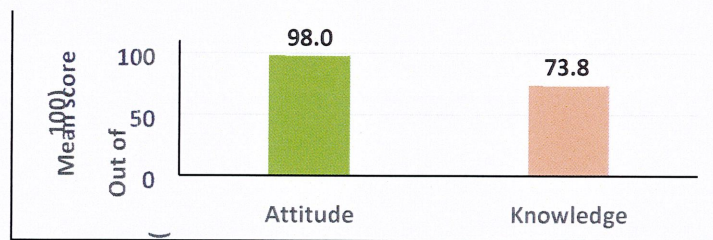


Fig 5: Mean score of attitude and knowledge towards utilization of the supplemental vital signs

Table 8 and Figure 3 suggest that while the average attitude toward the utilization of supplemental vital signs is very high, which implies that critical care nurses have a higher tendency to practice among the patients, the mean knowledge score towards utilization of supplemental signs is much lesser than the attitude in average, which implies that the lack of knowledge is the most crucial obstacle among the critical care nurses to implement it in practice. The variability of knowledge is lower than the variability of attitude, which implies that critical care nurses experience varying degrees of knowledge deficiency towards utilization of the supplemental vital signs.

Table (9): Spearman's correlations between knowledge and attitude towards utilization of the supplemental vital signs

		Attitude
Knowledge	Correlation Coefficient	0.207
	P-value	0.021

Table 10 indicated that there is a significant weak correlation ($r_s = 0.207$, $p\text{-value} = 0.021$) between attitude and knowledge towards utilization of the supplemental vital signs.

Table (10): Associations between sociodemographic variables and knowledge and attitude towards utilization of the supplemental vital signs

	Attitude		P-value	Knowledge		P-value
	Mean (SD)	Median		Mean (SD)	Median	
Age						
21-30 years	92.5 (7.5)	93.8	0.958	74 (12.2)	75.0	0.731 ^b
>30 years	91.2 (10.3)	93.8		73.6 (10.4)	75.0	
Gender						
Male	92.2 (9.3)	95.3	0.517	70.3 (13.2)	75.0	0.038 ^b
Female	91.8 (8.5)	93.8		75.8 (10)	75.0	
Education level						
Diploma	93.8 (6.2)	93.8	0.747	78.1 (7.7)	81.3	0.264 ^b
Bachelor/Master	91.9 (8.8)	93.8		73.6 (11.6)	75.0	
Nursing Unit						
ICU A	92.5 (7.4)	93.8	0.837	75.1 (11.8)	72.3	0.525 ^a
ICU B	94 (6.8)	93.8		(11.2)	75.0	
ICU Oncology	91.9 (8.5)			73.4 (13.3)		
ICU 3D	90.3 (11.2)	93.8		73.2 (9.2)	75.0	
Job Category						
Staff Nurse	91.9 (8)	93.8	0.597	73.9 (11.1)	75.0	0.243 ^a
Senior Staff Nurse	91 (12.8)	96.9		71.7 (13.7)	75.0	
Nurse Team Leader	94.3 (6.2)	96.9		77.3 (11.3)	81.3	
Years of working in KHUH						
<5	92 (8.9)	93.8	0.827	73.9 (11.4)	75.0	0.957 ^b
5-10	91.8 (8.2)	93.8		73.3 (12.1)	78.1	

Note: Mean (SD) and median were computed out of 100. a. P-value was computed by using Kruskal-Wallis Test. b. P-value was computed by using Mann-Whitney Test.

Regarding demographic data, like age, gender, years of working, and education level, were found to be not statistically significant at a 0.05 level. In relation to the attitude toward utilization of the supplemental vital signs under consideration, which means that age, gender, years of working and education level of the critical care nurses are not associated with the attitudes. However, when all these variables are under consideration for the knowledge toward utilization of the supplemental vital signs, it is found that gender is the only variable that makes a difference in the knowledge. Besides, the average knowledge value of females is greater than that of males. Nevertheless, this does not mean critical care nurses have no knowledge deficiency. Therefore, comprehensive practical training is urgently needed. Other variables are not statistically significant at the 0.05 significance level.

For the variables of the job category and the nursing unit, we utilize a non-parametric ANOVA test to investigate the relationship based on attitude and knowledge at a 0.05 significance level. For the variable of job category, instead of running the ANOVA test, the Kruskal-Wallis test is implemented to find whether there are any statistically significant differences between job categories based on attitude and knowledge. The results suggest no statistically significant differences among job categories based on attitude and knowledge at a 0.05 significance level.

For the variable of nursing unit variables, we utilize the ANOVA test to investigate the relationship based on the variables of attitude and knowledge at a 0.05 significance level. It is concluded that there is no difference between

the mean scores of the nursing units when both attitude and knowledge are a concern.

Table (11): Spearman's correlations between knowledge and attitude towards utilization of the supplemental vital signs and each age and year of experience

		Attitude	Knowledge
Age	Correlation Coefficient	0.078	0.020
	P-value	0.388	0.823
Years of working in KHUH	Correlation Coefficient	-0.059	-0.022
	P-value	0.519	0.813

While the correlation coefficients between age and attitude and between age and knowledge are found to be 0.078 and 0.020, respectively, which means that they are not statistically significant at the 0.05 significance level, besides, the correlation coefficients between years of working and attitude and between years of working and knowledge are found to be -0.059 and -0.022, which means that they are not statistically significant at a 0.05 significance level.

Summary of the Results

SPSS 26 was used for data entry and analysis. Frequencies and percentages were computed for the categorical variables. Mean, standard deviation, and median were computed for the quantitative variables. An Independent sample t-test was used to determine whether the two independent groups had a significant difference in means. Kruskal Walli's test and ANOVA test were used. Spearman's Correlation Coefficient was used to measure the correlation between two quantitative variables. In all statistical tests, a p-value of less than 0.05 was statistically significant.

Supplemental vital signs, which are called level of consciousness, pain, and urine output, are essential patient outcomes that need to be utilized by critical care nurses to monitor patients' clinical status. Utilizing supplemental vital signs requires critical care nurses to acquire attitudes and knowledge about them. Hence, measuring knowledge and establishing attitudes towards the utilization of supplemental vital signs have been a research area that is expected to contribute to education and practical training of the critical care nurses and novice health staff as well to say how the significance of prioritizing them and helping in developing research and evidence-based practices to monitor patients' clinical status.

Chapter V

Discussion

The present study aimed to assess the knowledge and attitude of critical care nurses on supplemental vital signs, which are level of consciousness, pain, and urine output in KHUH in Bahrain. Additionally, it aimed to determine the impact of nurses' baseline characteristics on their knowledge and attitudes toward the examined supplemental vital signs.

The results of the present study showed variable levels of knowledge and attitudes toward the assessment of supplemental vital signs, which were the level of consciousness, pain, and urine output among the participants. After comparing the participants' knowledge and attitudes toward the supplemental vital signs, data showed that the overall mean knowledge of the participants was lower than their attitudes (73.8 % and 98.0 %, respectively).

Of all the three examined supplemental vital signs in the present study, the attitude toward pain management was lower than that toward the level of consciousness and urine output. In the knowledge part, nurses' knowledge of utilization of the urine output in assessing the patient's conditions was lower than the level of consciousness and pain severity.

Furthermore, the association between participants' attitudes and knowledge towards utilization of the supplemental vital signs and their sociodemographic characteristics showed no differences except in the knowledge level among males and females. Specifically, female nurses had significantly higher knowledge about the additional vital signs compared to male nurses.

Consistent with the findings in the current study, several previous studies found gaps in knowledge, attitudes, and practices toward supplementary vital signs.

The current study findings revealed that the critical care nurses had good level (45.5%) and moderate level (44.7%) of knowledge towards supplemental vital signs. These findings are supported by the other published studies, a descriptive cross-sectional study conducted by Bayoumi et al., 2018, and involved 45 nurses from intensive care units between 2015 and 2017 in Egypt. The study aimed to assess nurses' perception of using a new eight-vital signs chart at ICUs. The study found that as high as 68.9% of the nurses agreed to use eight vital signs, and 84.4% had adequate knowledge regarding the assessment of pain, level of consciousness, and urine output. In addition, more than half of the participants (55.6%) reported that assessing the additional three vital signs with basic vital signs was extremely important. (Bayoumi et al., 2018).

Furthermore, Alshehry et al. conducted a study among 529 baccalaureate nursing students in two universities in Saudi Arabia to assess the perceived knowledge, competence, and attitude toward vital signs monitoring among nursing students in Saudi. The study found that the overall attitudes of the nursing students towards vital signs were poor to modest, specifically towards the use of technology in monitoring the assessed vital signs. (Alshehry et al., 2020).

The current study findings revealed that there is no correlation between knowledge and attitude towards utilization of supplemental vital signs among critical care nurses, the correlation coefficients between age and attitude and between age and knowledge are found to be 0.078 and 0.020, respectively, correlation coefficients between years of working and attitude and between years of working and knowledge are found to be -0.059 and -0.022, which means that they are not statistically significant at a 0.05 significance level.

These findings are supported by the other published studies. The studies are incongruent regarding the impact of the patient's demographic characteristics on the knowledge level, practices, and attitudes toward vital signs monitoring in clinical practice. On the one hand, some studies found that males had a more negative attitude towards 'communication' and 'knowledge' than female nurses (P value = .006). (Alshehry et al., 2020). On the other hand, some studies revealed no sex-related difference in practices and attitudes toward vital signs assessment and management. The present study showed that only nurses' sex impacted the knowledge and attitudes toward monitoring vital signs and management.

Although pain assessment and management are crucial components in nursing care, multiple studies found low levels of knowledge and negative attitudes toward managing patients' pain. AL-Sayaghi et al., for instance, conducted a recent cross-sectional study to assess nurses' knowledge and attitudes regarding pain assessment and management at King Fahad Hospital among 291 registered nurses. The researcher found that the majority of the participants (70.1%) had a poor level of knowledge and attitudes (score < 50%) toward pain assessment and management. The authors concluded that nurses continue to under-assess and undertreat patients' pain symptoms. (AlSayaghi et. al., 2022). Similarly, Alnajjar et al. conducted a descriptive crosssectional design study to investigate intensive care unit nurses' pain assessment and management practices, perceptions of influencing factors, and related educational needs. The study, conducted in all hospitals in the four main sectors of the Jordanian healthcare system, found that nurses' performance in pain assessment and management for intensive care unit patients was suboptimal. The data revealed that nurses accorded sedated

patients the lowest priority for pain assessment and management while discussing pain management during medical rounds was the least frequent practice. (Alnajar et. al., 2021).

Furthermore, pain assessment and management are essential components of quality of life and outcomes in critically ill patients. Several reports revealed poor pain management in intensive care and other clinical settings. For instance, Ufashingabire et al. conducted a study among 69 nurses working in the intensive care unit to assess their knowledge and attitudes toward pain management of intensive care unit patients in Rwanda. The study showed that nurses had poor attitudes and lacked adequate pain management knowledge. In addition, the researchers concluded that an inappropriate attitude toward pain management might lead to mistreatment and underestimation of pain. (Ufashingabire et. al., 2016).

Similarly, Samarkand et al. conducted a cross-sectional study among 247 Saudi nurses to explore Saudi nurses' knowledge and attitudes toward pain management. The study showed lower pain knowledge and attitudes levels than nurses from other regions and worldwide. The authors recommended including pain management in continuous education and nursing undergraduate curricula. (Samarkandi et. al., 2018)

Determining the urine output level is crucial among critically ill patients, but the standards for monitoring and reporting differ widely between different clinical associations. Monitoring of urine output can detect acute kidney injuries earlier, help in fluid management, and lead to a better clinical outcome. The current study shows that the critical care nurses got the lowest mean score of 50 (25) belongs to pulse rate and respiration alterations related

to urine output. Multiple studies found that urine output was not assessed even among patients with renal failure. For instance, the report from the National Confidential Enquiry into Patient Outcomes and Death from the United Kingdom found that in 30% of patients who died of acute kidney injury, many patients did not have measurement or calculation of urine output. (MacLeod, 2009).

According to Jin et al., continuous monitoring of urinary output among critically ill patients was associated with lower 30-day mortality in patients diagnosed with acute kidney injury, lower fluid overload, and better detection of acute kidney injury. This conclusion was obtained based on a retrospective cohort study that included 15,724 adult patients who were admitted to intensive care units in the United States. The authors also found that the assessment of urine output was done in around 26% (n= 4,049) of the patients. In general, urine output is not only used as a marker of acute renal injury but also to guide fluid resuscitation in critically ill patients. (Jin et al., 2017).

The importance of continuous recording and monitoring of vital signs among admitted patients, particularly those admitted in intensive care units, should be emphasized. Studies found a significant association between abnormal vital signs, intensive care unit admissions, morbidity, and overall mortality of the patients. For instance, a study by Barfod et al. in 2012 found a strong association between abnormal vital signs and patients' adverse outcomes. The assessed vital signs in that study included saturation of peripheral oxygen, respiratory rate, systolic blood pressure, Glasgow Coma Score, and level of consciousness. In that study, an altered level of consciousness was associated with more than 10% in-hospital mortality. (Barfod et. al., 2012).

The ability of early warning system scores, including vital signs, including the assessment of urinary output and level of consciousness, to determine the risk of clinical deterioration, health outcomes, and resource utilization were examined in previous studies. For example, a systematic review design study was conducted by Smith et al. It involved 21 studies that concluded that early warning system scores (which included vital signs) were predictive of cardiac arrest and mortality within 48 hours of admission. (Smith et al., 2014).

Several tools were recommended to predict mortality and morbidity outcomes among critically ill patients. These tools include The Acute Physiology and Chronic Health Evaluation (APACHE II) score, Sequential Organ Failure Assessment (SOFA) severity of illness score for in-hospital mortality, and Simplified Acute Physiology Score (SAPS) II score. These tools include the assessment of vital signs as well as other laboratory and clinical measures. For instance, the SOFA severity of illness score predicts patient morbidity and mortality by assessing organ dysfunction. These organs are respiratory, coagulatory, hepatic, cardiovascular, renal, and neurologic. The renal function is assessed by daily urine output and creatinine levels, while Glasgow Coma Score assesses the neurologic function. (HO, 2007).

Similar to the SOFA score, the SAPS II score estimates the mortality in patients admitted to intensive care units. SAPS II score uses heart rate, blood pressure, temperature, age, chronic diseases, and electrolytes to determine mortality risk. In addition, the daily urine output and Glasgow Coma Score are also assessed in SAPS II. (Le Gall, 1993).

This study shows that the majority of critical care nurses are aware of supplemental vital signs especially in level of consciousness as an indicator of

the patient's clinical status (97.6%), and urine output variations with renal perfusion. Additionally, the highest mean score (87.5) was for knowledge about level of consciousness on clinical condition and this is essential especially in critical areas. The Glasgow Coma Scale is a tool that can be used to objectively describe the extent of impaired consciousness in all acute medical conditions. The Glasgow Coma Scale assesses patients' overall consciousness according to three aspects of responsiveness which are eyeopening, motor responses, and verbal responses. Thus, assessing the supplementary vitals is crucial for predicting the morbidity and mortality of admitted patients, particularly those critically ill. (Sternbach, 2000).

Due to poly-morbidity, polypharmacy, and complex pathologies among individuals, patients admitted to hospitals nowadays are sicker and tend to have poorer prognoses than before (Elliott et. al., 2012). This coupled with the rapidly increasing demand for beds in general wards and intensive care units, has necessitated prompt detection and reporting of any abnormalities in the vital signs to prevent and minimize further clinical deterioration. Thus, additional assessment of the level of consciousness, pain severity, and urine output during the routine patient assessment is more critical than ever before. (Elliott et. al., 2012).

Vital signs monitoring is one of the easiest, simplest, and most critical forms of assessment performed on patients in any healthcare setting. (Kellett & Sebat, 2017). This is why understanding the reasons and barriers to not assessing the pain level, urine output, and level of consciousness is essential to address these barriers and enhance the knowledge as well as the practices of nurses in evaluating supplementary vital signs. A systematic review was done by Rababa et al. in 2021 and involved 20 studies. The review aimed to

examine nurses' perceived barriers to pain assessment and management in adult critical care patients. The review found four main barriers: nurse-related, patient-related, physician-related, and system-related factors. The review also revealed that nurses' lack of knowledge of pain assessment tools was the most frequently reported barrier. In contrast, the other common reasons were the absence of standardized guidelines and protocols for pain evaluation, patients' inability to communicate, and physicians' prescription of analgesics being independent of pain scores evaluation. Ongoing education and professional training related to pain assessment and management, patients' ability to self-report pain, effective communications between physicians and nurses, and productive discussion of patients' pain scores during nurse-to-nurse handovers are recommended. (Rababa et al., 2021)

Additionally, a study by Kamio et al. found that measuring respiratory rate, level of consciousness, and urinary output were the least assessed vitals and most troublesome ones among all vital signs. The study also revealed that a poor understanding of the importance of these measures and signs was a common cause of not measuring and assessing them. (Kamio et al., 2018). Moreover, insufficient time and resources, multi-tasks, and shifts were among the common reason for not assessing and registering the vital signs, as determined by Elizabeth et al. (Elizabeth et al., 2015).

Alnajar et al. also assessed the possible barriers to pain assessment. A descriptive cross-sectional study was conducted using a valid self-reported questionnaire, and 171 nurses were included. Workload and lack of guidelines were reported as the most common barriers to pain assessment and management. The authors also found that inappropriate workload, lack

of related guidelines, and lack of education/familiarity with assessment tools were among the most commonly reported barriers. The study concluded that the nurses' reported performance of pain assessment for intensive care unit patients was suboptimal. (Alnajjar et. al., 2021).

As reported in the literature, other possible barriers to effective management and assessment of vitals, especially pain assessment, included physician reluctance and refusal to give analgesic orders, nursing staff reluctance to contact a physician for analgesic orders, and patient history of alcohol abuse or other substance addiction. These factors were reported in a descriptive cross-sectional design to explore nurses' knowledge and attitudes regarding pain assessment and the barriers to managing pain. The study was conducted by D'emeh et al. among 439 nurses from different hospitals representing different healthcare sectors in Jordan. (D'emeh et. al. 2016).

In general, the barriers to assessing additional vital signs, including the pain assessment, can be classified into four main categories: nurserelated barriers including lack of knowledge, patient-related barriers and it may include inability to communicate, or history of substance abuse, physician-related barriers, and system-related barriers for instance, absence of standardized guidelines and protocols for pain evaluation and control, inadequate training and education (Rababa et. al., 2021).

Quality improvement projects targeted the improvement of vital signs knowledge and attitudes. For example, Shamsi N. conducted a quality improvement project in Bahrain to improve vital sign documentation during the triage process. In the preintervention period, the completion of vital sign documentation was less than 1% (0.27%) of the records, which increased to around 10% (10.29%) in the post-intervention period. It was found that

multidisciplinary teamwork and implementation of quality improvement projects had improved the documentation of the vital signs during the triage process. Moreover, the author also found that the education and training improved turning compliance with vital signs documentation. (Shamsi et. al., 2018).

In addition, Innab et al. conducted a quasi-experimental study to evaluate the effectiveness of a 12-hour structured education program on nurses' knowledge and attitudes toward pain management. The study included 124 registered nurses working in intensive care or inpatient units in Saudi Arabia. The study's results determined that nurses had moderate knowledge and attitudes regarding pain before pain management education, which were significantly higher after the intervention, $p < .01$. The researchers concluded that regular pain education programs could improve nurses' knowledge and attitudes. (Innab et al., 2022).

Another study was done by Issa et al. aimed to evaluate the impact of pain management educational programs on the knowledge and attitudes of intensive care unit staff nurses toward pain assessment and management. After delivering a pain management education program, the results showed significant improvement in knowledge and attitudes about pain assessment and management among ICU nurses. Thus, the researchers concluded that the deficits and preconceptions in pain assessment and management could be improved by implementing pain management educational programs. (Issa et al., 2019).

Thus, continuous professional education and training and improving the work environment are essential to improve the knowledge, attitudes, and practices toward vital signs assessment and management.

Interventions to improve the performance and monitoring of all vital signs at strategic and administrative levels were also studied. A recent systematic review was conducted by Bunting & Klerk in 2021 and included 76 articles to assess nurses' compliance with the guidelines. Some studies changed or created new guidelines to improve the attitudes and achieved a meaningful compliance rate. Other studies utilized administrative or system changes as strategies to improve compliance. All the studies that used system changes revealed improved nursing performance; some demonstrated improvement to a meaningful degree. (Bunting & Klerk, 2021)

Based on the above, the role of intensive care unit nurses should include early recognition of signs of deterioration and periodically and appropriately monitoring and managing vital signs, including urine output, level of consciousness, and pain assessment. In addition, nurses should improve their practices and attitudes toward the eight vital signs monitoring by conducting teaching sessions and programs. The importance of additional vital signs should be emphasized periodically. As shown in the previous studies, program-led interventions could be utilized, and linking the performance of vital signs to the annual appraisals of the employees might be effective. Such interventions should be assessed and evaluated periodically to determine their effectiveness in enhancing nurses' knowledge and attitudes toward vital signs assessment and management.

Strength of the study

This research has several strengths.

First, it is the first research to assess the knowledge and attitudes of critical care nurses about supplemental vital signs in a tertiary hospital in Bahrain.

- Secondly, the study assessed the attitudes as well as the knowledge of nurses toward supplemental vital signs. Different aspects of participants' characteristics were measured, and a good sample size was obtained.

Limitations of the study

- Firstly, the study was limited to one tertiary hospital in Bahrain, so the findings may not be generalizable to all healthcare facilities in Bahrain.
- Secondly, the evaluation of the knowledge and attitude may not always reflect the practices of the nurses. Thus, an objective assessment of the practices is needed.
- Thirdly, the study did not study the possible barriers that may affect the attitudes and knowledge of critical care nurses toward vital signs assessment, like the number of patients encountered, the presence of continuous educational programs, and the barriers to assessing the additional vital signs.

Chapter VI

Conclusion, Limitations and Recommendations

Conclusion, Limitation, and Recommendations

Conclusion

The purpose of the research was to evaluate the knowledge and attitudes of critical care nurses about supplemental vital signs in a tertiary hospital in Bahrain. These vital signs are level of consciousness, pain, and urine output. This research concludes that critical care nurses at Bahrain tertiary hospitals generally have variable knowledge about the relationship between the usual vital signs and the proposed additional three vital signs: level of consciousness, urine output, and pain. In the general assessment of the knowledge about the level of consciousness, the general remarks obtained ranged between "Yes and No." Interestingly, the responses provided by the critical care nurses are generally aware of the supplemental vital signs since the "yes" responses given to practice based questions are very high such as urine output (99.2%), level of consciousness related to clinical status (97.6%), and level of consciousness related to cerebral perfusion (92.7%). However, a sharp decrease was observed in response rate such as pulse rate related to level of consciousness (21.1%), pulse rate related to urine output (37.4%), and respiratory rate related to urine output (40.7%). The question related to "pulse rate changes according to urine output" is answered with 13 "yes" out of 123. On the other hand, observable conditions of the patients, such as level of consciousness, pain, and respiration changes, are quickly answered with "yes", which implies that critical care nurses pay more attention to observable conditions of the patients than knowledge-based ones. Therefore, it is concluded that the critical care nurses in a tertiary hospital in Bahrain know the supplementary vital signs, but this knowledge is variable.

The research concluded that there is a significant relationship between the attitude of critical care nurses towards supplementary vital signs and their subsequent usage of those vital signs. There was an averagely moderate level of attitude towards the vital supplementary signs. As a result, the research can conclude that critical care nurses have a variable attitude toward the vital supplementary signs.

In general, the research indicated that there is a significant weak correlation between attitude and knowledge towards utilization of the supplemental vital signs. Additionally, the research concludes that average attitude toward the utilization of supplemental vital signs is higher than average knowledge toward the utilization of supplemental vital signs, which implies that critical care nurses have a higher tendency to practice among the patients. Therefore, the research can conclude that lack of knowledge is the most crucial obstacle among the critical care nurses to implement it in practice, and critical care nurses experience varying degrees of knowledge deficiency towards utilization of the supplemental vital signs

Generally, the research also concluded that the socio-demographic variables of the critical care nurses at the tertiary hospital in Bahrain were not statistically significant in attitude and knowledge. The correlation coefficients of Pearson and Spearman between attitude and knowledge evidenced this. The research concluded that the most recognized supplemental vital sign was urine output, followed by pain and level of consciousness. Therefore, as a research subject and tools, they need to be utilized in the education of critical care nurses.

Limitations

There are some limitations in this study. The first relates to the small sample size to identify significant relationships in the data. The second limitation concerns the limited number of researches conducted on the same topic,

Recommendations

Therefore, based on the research results and conclusions, the following recommendations are made:

- There is a need for embedding and revitalizing the curriculum of critical care nurses to equip them with the knowledge of supplemental vital signs as it will enable the nurses to recognize and act on patients' clinical deterioration effectively.
- There may also be a need for refresher courses for critical care nurses who are already in the field of operation on the importance and use of supplementary vital signs.
- The recruitment and selection of nurses should consider the attitudinal attributes of the candidates, it requires a knowledgeable nurse with a positive attitude to use their insight, perceptual power, and intuition abilities to figure out the patient's actual needs.

For further study:

Future researchers can conduct the research using a more significant sample covering different research sites. Other researchers may consider conducting research comparing different hospitals in different countries for cross-country analysis. Other researchers may consider conducting the research using a qualitative approach or mixed methods.

Chapter VII

Summary

Five classical vital signs are used among nurses worldwide to assess patients' stability and may not be sufficient to detect patient deterioration. Thus, other vital signs such as consciousness, pain level, and urine output are frequently assessed together with the classical signs. Hence, this research sought to determine the knowledge and attitude of critical care nurses on supplemental vital signs, level of consciousness, pain, and urine output in a tertiary hospital, in Bahrain. This study was conducted in the adult critical care settings at King Hamad University Hospital in Bahrain. It was concluded that there is a significant relationship between the attitude of critical care nurses towards supplementary vital signs and their subsequent usage of those vital signs. Moreover, the research concluded that the most recognized supplemental vital sign was urine output, followed by pain and level of consciousness. Therefore, as a research subject, they need to be utilized in the education of critical care nurses.

ملخص البحث:

يتم استخدام العلامات الحيوية كلاسيكية بين الممرضين في جميع أنحاء العالم لتقييم وضع المريض الصحي وقد لا تكون كافية بالشكل المطلوب للكشف عن تدهور حالة المريض. وبالتالي، كثيراً ما يتم تقييم العلامات الحيوية الأخرى مثل مستوى الوعي ومستوى الألم ومخرجات البول جنباً إلى جنب مع العلامات الكلاسيكية الخمس. ومن ثم، سعى هذا البحث إلى تحديد معرفة وموقف ممرضي الرعاية الحرجة بشأن العلامات الحيوية التكميلية، ومستوى الوعي والادراك، والألم، وإخراج البول في مستشفى حكومي في البحرين. أجريت هذه الدراسة في مرافق الرعاية الحرجة للبالغين في مستشفى الملك حمد الجامعي في البحرين. تم التوصل إلى أن هناك علاقة كبيرة بين موقف ممرضي الرعاية الحرجة تجاه العلامات الحيوية التكميلية واستخدامهم لها. علاوة على ذلك، خلص البحث إلى أن أكثر العلامات الحيوية التكميلية المعروفة هي إخراج البول، يليه الألم ومستوى الوعي والادراك. لذلك، يجب استخدامها في تعليم ممرضات الرعاية الحرجة.

References

REFERENCES

- A 59-Year-Old Woman with Type 1 Diabetes Mellitus and Obtundation. *New England Journal of Medicine*, 383(20), 1974–1983. <https://doi.org/10.1056/nejmcpc2002412>
- Abuzeyad, F., Alqasem, L., Al Farras, M. I., Al Jawder, S. S., Al Qasim, G., & Alghanem, S. (2018). Emergency Medicine in the Kingdom of Bahrain. *International Journal of Emergency Medicine* (2018). <https://doi.org/10.1186/s12245-018-0163-1>
- Aird, T., & McIntosh, M. (2004). Nursing tools and strategies to assess cognition and confusion. In *British journal of nursing (Mark Allen Publishing)* (Vol. 13, Issue 10, pp. 621–626). <https://doi.org/10.12968/bjon.2004.13.10.13055>
- Al Sabei, S. D., Labrague, L. J., Miner Ross, A., Karkada, S., Albashayreh, A., Al Masroori, F., & Al Hashmi, N. (2020). Nursing Work Environment, Turnover Intention, Job Burnout, and Quality of Care: The Moderating Role of Job Satisfaction. *Journal of Nursing Scholarship*, 52(1), 95–104. <https://doi.org/10.1111/jnu.12528>
- Al-Alawi, A. I. (2006). Investigating the strategies for successful development of health information systems: A comparison study. *Information Technology Journal*, 5(4), 626–647. <https://doi.org/10.3923/itj.2006.626.647>
- Alam, N., Hobbelink, E. L., van Tienhoven, A. J., van de Ven, P. M., Jansma, E. P., & Nanayakkara, P. W. B. (2014). The impact of the use of the Early Warning Score (EWS) on patient outcomes: A systematic review. In *Resuscitation* (Vol. 85, Issue 5, pp. 587–594). Elsevier Ireland Ltd. <https://doi.org/10.1016/j.resuscitation.2014.01.013>
- Al-Kalidi, F., Elphick, H., Saatchi, R., & Burke, D. (2015). Respiratory rate measurement in children using a thermal camera. *International Journal of Scientific and Engineering Research*, 6(4), 1748–1756.
- Alnajar, M. K., Shudifat, R., Mosleh, S. M., Ismaile, S., N'erat, M., & Amro, K. (2021). Pain assessment and management in Intensive Care Unit: Nurses' practices, perceived influencing factors, and educational needs. *The Open Nursing Journal*, 15(1), 170–178. <https://doi.org/10.2174/1874434602115010170>

- Al-Sayaghi, K. M., Fadlalmola, H. A., Aljohani, W. A., Alenezi, A. M., Aljohani, D. T., Aljohani, T. A., Alsaleh, S. A., Aljohani, K. A., Aljohani, M. S., Alzahrani, N. S., Alamri, A. A., Alhousah, A. H., & Khan, M. F. (2022). Nurses' Knowledge and Attitudes Regarding Pain Assessment and Management in Saudi Arabia. *Healthcare (Basel, Switzerland)*, 10(3), 528. <https://doi.org/10.3390/healthcare10030528>
- Alshehry, A. S., Cruz, J. P., Bashtawi, M. A., Almutairi, K. O., & Tumala, R. B. (2021). Nursing Students' Knowledge, Competence and Attitudes towards Vital Signs Monitoring during Clinical Practice. *Journal of clinical nursing*, 30(5-6), 664–675. <https://doi.org/10.1111/jocn.15586>
- Alligood, M.R. (2018). Nursing theorists and their work (9th ed.) St. Louis: Elsevier. ISBN: 978-0-323-40224-8
- Annum, G. (2014). *Research Instrument for Data Collection*. 1–4.
- Assembly, G. (2015). Sustainable development goals. *SDGs, Transforming Our World: The, 2030*.
- Australian Resuscitation Council and the New Zealand Resuscitation Council. (2011). Acute coronary syndromes: Reperfusion strategy. ARC and NZRC guideline 2011. *EMA - Emergency Medicine Australasia*, 23(3), 312–316. https://doi.org/10.1111/j.1742-6723.2011.01422_20.x
- Awadhalla, M., Al-Mohandis, B., & Al-Darazi, F. (2018). Transformation of nursing education: The experience of Bahrain. *Eastern Mediterranean Health Journal*, 24(9), 959–964. <https://doi.org/10.26719/2018.24.9.959>
- Awalkhan, A., & Muhammad, D. (2016). Application of Nightingale Nursing Theory to the Care of Patient with Colostomy. *European Journal of Clinical and Biomedical Sciences*, 2(6), 97. <https://doi.org/10.11648/j.ejcb.20160206.17>
- Barfod, C., Lauritzen, M. M., Danker, J. K., Sölétormos, G., Forberg, J. L., Berlac, P. A., Lippert, F., Lundstrøm, L. H., Antonsen, K., & Lange, K. H. (2012). Abnormal vital signs are strong predictors for intensive care unit admission and in-hospital mortality in adults triaged in the emergency department - a prospective cohort study. *Scandinavian journal of trauma, resuscitation and emergency medicine*, 20, 28. <https://doi.org/10.1186/17577241-20-28>

- Bayoumi, M. M., Murshid, B., Sayed, A., & Mosa, A. (2017). Nurses perception toward using a new eight vital signs chart at ICUS. *Journal of Nursing & Care*, 07(01). <https://doi.org/10.4172/2167-1168.1000445>
- Bliss-Holtz, J. (1996). Using Orem's theory to generate nursing diagnoses for electronic documentation. *Nursing Science Quarterly*, 9(3), 121–125. <https://doi.org/10.1177/089431849600900311>
- Brabrand, M., Hallas, P., Folkestad, L., Lautrup-Larsen, C. H., & Brodersen, J. B. (2018). Measurement of respiratory rate by multiple raters in a clinical setting is unreliable: A cross-sectional simulation study. *Journal of Critical Care*, 44, 404–406. <https://doi.org/10.1016/j.jcrc.2017.12.020>
- Brasileira de Enfermagem Brasil de Almeida Lopes Monteiro da Cruz, A., Souza Guedes, de, dos Santos, A., de Sousa, C., Márcia, R., Natalia Teresa, R., Maria, M., & Neves Araújo, A. (2016). Revista Brasileira de Enfermagem. *Revista Brasileira de Enfermagem*, 69(1), 183–189. <https://doi.org/10.1590/0034-7167.2016690126i>
- Bratt, M. M., Broome, M., Kelber, S., & Lostocco, L. (2000). Influence of stress and nursing leadership on job satisfaction of pediatric intensive care unit nurses. *American Journal of Critical Care*, 9(5), 307–317. <https://doi.org/10.4037/ajcc2000.9.5.307>
- Brink, P. J. (1993). Reliability Validity Issues. *Western Journal of Nursing Research*, 15(4), 401–402. <https://doi.org/10.1177/019394599301500401>
- Bunting J, de Klerk M. Strategies to Improve Compliance with Clinical Nursing Documentation Guidelines in the Acute Hospital Setting: A Systematic Review and Analysis. *SAGE Open Nursing*. 2022;8. doi:10.1177/23779608221075165
- Caplan, D. N., Rapalino, O., Karaa, A., Rosovsky, R. P., & Uljon, S. (2020). Case 35-2020:
- Cardona-Morrell, M., Prgomet, M., Turner, R. M., Nicholson, M., & Hillman, K. (2016). Effectiveness of continuous or intermittent vital signs monitoring in preventing adverse events on general wards: a systematic review and metaanalysis. In *International Journal of Clinical Practice* (Vol. 70, Issue 10, pp. 806–824). Blackwell Publishing Ltd. <https://doi.org/10.1111/ijcp.12846>
- Cardona-Morrell, M., Prgomet, M., Lake, R., Nicholson, M., Harrison, R., Long, J., ... & Hillman, K. (2016). Vital signs monitoring and nurse–patient

- interaction: A qualitative observational study of hospital practice. *International journal of nursing studies*, 56, 9-16.
- Choudhry, N. K., Avorn, J., Glynn, R. J., Antman, E. M., Schneeweiss, S., Toscano, M., Reisman, L., Fernandes, J., Spettell, C., Lee, J. L., Levin, R., Brennan, T., & Shrank, W. H. (2011). Full Coverage for Preventive Medications after Myocardial Infarction. *New England Journal of Medicine*, 365(22), 2088–2097. <https://doi.org/10.1056/nejmsa1107913>
- Connor, N., McArthur, D., & Camargo Plazas, P. (2020). Reflections on vital sign measurement in nursing practice. *Nursing Philosophy*. <https://doi.org/10.1111/nup.12326>
- Cooper, C. M., & Baron, J. M. (2015). Case 4-2015. *New England Journal of Medicine*, 372(5), 465–473. <https://doi.org/10.1056/nejmcpc1410940>
- Currie, J., Bond, R. R., McCullagh, P., Black, P., Finlay, D. D., & Peace, A. (2018). Eye Tracking the Visual Attention of Nurses Interpreting Simulated Vital Signs Scenarios: Mining Metrics to Discriminate between Performance Level. *IEEE Transactions on Human-Machine Systems*, 48(2), 113–124. <https://doi.org/10.1109/THMS.2017.2754880>
- D'emeh, W. , Yacoub, M. , Darawad, M. , Al-Badawi, T. and Shahwan, B. (2016) Pain-Related Knowledge and Barriers among Jordanian Nurses: A National Study. *Health*, 8, 548-558. doi: [10.4236/health.2016.86058](https://doi.org/10.4236/health.2016.86058).
- Da Silva, D. B., Schmidt, D., da Costa, C. A., da Rosa Righi, R., & Eskofier, B. (2021). DeepSigns: A predictive model based on Deep Learning for the early detection of patient health deterioration. *Expert Systems with Applications*, 165. <https://doi.org/10.1016/j.eswa.2020.113905>
- De Meester, K., Verspuy, M., Monsieurs, K. G., & Van Bogaert, P. (2013). SBAR improves nurse-physician communication and reduces unexpected death: A pre and post intervention study. *Resuscitation*, 84(9), 1192–1196. <https://doi.org/10.1016/j.resuscitation.2013.03.016>
- Drayer, D. E. (1976). Pharmacologically Active Drug Metabolites: Therapeutic and Toxic Activities, Plasma and Urine Data in Man, Accumulation in Renal Failure. *Clinical Pharmacokinetics*, 1(6), 426–443. <https://doi.org/10.2165/00003088-197601060-00003>
- Ebrahim, A. H., & Ganguli, S. (2017). Strategic priorities for exploiting

- Bahrain's medical tourism potential. *Journal of Place Management and Development*, 10(1), 45–60. <https://doi.org/10.1108/JPMD-03-2016-0011>
- Elliott, M., & Coventry, A. (2012). Critical care: The eight vital signs of patient monitoring. *British Journal of Nursing*, 21(10), 621–625. <https://doi.org/10.12968/bjon.2012.21.10.621>
- Elliott, M., & Coventry, A. (2012). Critical care: The eight vital signs of patient monitoring. *British Journal of Nursing*, 21(10), 621–625. <https://doi.org/10.12968/bjon.2012.21.10.621>
- Elo, S., & Kyngäs, H. (2008). The qualitative content analysis process. *Journal of Advanced Nursing*, 62(1), 107–115. <https://doi.org/10.1111/j.1365-2648.2007.04569.x>
- Faust, C. (2002). Orlando's deliberative nursing process theory: a practice application in an extended care facility. *Journal of Gerontological Nursing*, 28(7), 14–18. <https://doi.org/10.3928/0098-9134-20020701-05>
- Fishbain, D. A., Cole, B., Lewis, J., Rosomoff, H. L., & Rosomoff, R. S. (2008). What percentage of chronic nonmalignant pain patients exposed to chronic opioid analgesic therapy develop abuse/addiction and/or aberrant drug-related behaviors? a structured evidence-based review. In *Pain Medicine* (Vol. 9, Issue 4, pp. 444–459). Blackwell Publishing Inc. <https://doi.org/10.1111/j.1526-4637.2007.00370.x>
- Flegel, K. (2015). Tertiary hospitals must provide general care. In *CMAJ* (Vol. 187, Issue 4, p. 235). Canadian Medical Association. <https://doi.org/10.1503/cmaj.150056>
- Fridman, G. Y., Tang, H., Feller-Kopman, D., & Hong, Y. (2015). MouthLab: A Tricorder Concept Optimized for Rapid Medical Assessment. *Annals of Biomedical Engineering*, 43(9), 2175–2184. <https://doi.org/10.1007/s10439015-1247-1>
- Fu, L. H., Schwartz, J., Moy, A., Knaplund, C., Kang, M. J., Schnock, K. O., Garcia, J. P., Jia, H., Dykes, P. C., Cato, K., Albers, D., & Rossetti, S. C. (2020). Development and validation of early warning score system: A systematic literature review. In *Journal of Biomedical Informatics* (Vol. 105). Academic Press Inc. <https://doi.org/10.1016/j.jbi.2020.103410>
- Ganesh Raam, K., Jeelani, A., Preejith, S. P., Nagaiyan, S., Joseph, J., & Sivaprakasam, M. (2017). Design, development and clinical validation of a

novel urine output monitor. *2017 IEEE International Symposium on Medical Measurements and Applications, MeMeA 2017 - Proceedings*, 188–192. <https://doi.org/10.1109/MeMeA.2017.7985873>

Ganeshkumar, P., & Gopalakrishnan, S. (2013). Systematic reviews and metaanalysis: Understanding the best evidence in primary healthcare. *Journal of Family Medicine and Primary Care*, 2(1), 9. <https://doi.org/10.4103/22494863.109934>

Gazari, T., Apiribu, F., Dzomeku, V. M., Bema Boama, A., & Adoliwineamooba, P. (2020). Application of the Nursing Process: A Phenomenological Study of Registered Nurses Experiences at a District Hospital in Ghana. In *International Journal of Science and Healthcare Research (www.ijshr.com)* (Vol. 5). www.ijshr.com

Giuliano, K. K. (2017). Improving patient safety through the use of nursing surveillance.

Giusti, G. D., Rogari, C., Gili, A., & Nisi, F. (2017). Cuff pressure monitoring by manual palpation in intubated patients: How accurate is it? A manikin simulation study. *Australian Critical Care*, 30(4), 234–238. <https://doi.org/10.1016/j.aucc.2016.10.001>

Given, L. M. (2008). *The Sage encyclopedia of qualitative research methods*. Sage Publications.

Gourlay, D., & Heit, H. A. (2010). The art and science of urine drug testing. In *Clinical Journal of Pain* (Vol. 26, Issue 4, p. 358). Lippincott Williams and Wilkins. <https://doi.org/10.1097/AJP.0b013e3181ca90de>

Government of Bahrain. (2021). *Kingdom of Bahrain - eGovernment Portal*. <https://www.bahrain.bh/wps/portal!/ut/p/a1>

Grant, C., & Azadeh Osanloo. (2014). Understanding, Selecting, And Integrating A Theoretical Framework In Dissertation Research: Creating The Blueprint For Your “HOUSE.” <https://doi.org/10.5929/2014.4.2.9>

Haapoja, A. (2014). *The Nursing Process, a Tool to Enhance Clinical Care-a Theoretical Study Thesis for a Health Care (Bachelor of Nursing) Degree Programme in Nursing Vaasa 2014*.

Hair, T. A. & B. (1998). *Multivariate Data Analysis*. <https://www.pearson.com/uk/educators/higher-education->

educators/program/Hair-Multivariate-Data-Analysis-International-
Edition5th-Edition/PGM547615.html

Hamric, A. B., Hanson, C. M., Tracy, M. F., & O'Grady, E. T.
(2013). *Advanced practice nursing-E-Book: An integrative approach*. Elsevier
Health Sciences.

Henneman, E.A., Gawlinski, A., Giuliano, K.K., 2012. Surveillance: A
strategy for improving patient safety in acute and critical care units. *Crit. Care
Nurse* 32, 9–18. <https://doi.org/10.4037/ccn2012166>.

Higgs, M., Fernandez, R., Polis, S., & Manning, V. (2020). Similarities and
differences in nurse-reported care rationing between critical care, surgical, and
medical specialties. *Journal of Patient Safety*, 16(3), E162–E168.
<https://doi.org/10.1097/PTS.0000000000000295>

Hill, B., & Annesley, S. H. (2020). Monitoring respiratory rate in adults.
British Journal of Nursing, 29(1), 12–16.
<https://doi.org/10.12968/bjon.2020.29.1.12>

In *Biomedical Instrumentation and Technology* (Vol. 51, Issue Horizons, pp.
34–43). Association for the Advancement of Medical Instrumentation.
<https://doi.org/10.2345/0899-8205-51.s2.34>

Innab, A., Alammar, K., Alqahtani, N., Aldawood, F., Kerari, A., & Alenezi,
A. (2022). The impact of a 12-hour educational program on nurses' knowledge
and attitudes regarding pain management: a quasi-experimental study. *BMC
nursing*, 21(1), 250. <https://doi.org/10.1186/s12912-022-01028-4>

Introduction to Critical Care Nursing6: Introduction to Critical Care Nursing
- Mary Lou Sole, Deborah G. Klein, Marthe J. Moseley - Google Books.
(n.d.). Retrieved January
10, 2021, from https://books.google.co.zw/books?hl=en&lr=&id=Ye4MKBOOV7YC&oi=fnd&pg=PP1&dq=Importance+of+Knowledge+and+Attitude+of+Critical+Care+Nurses+about+Supplemental+Vital+Signs%3B+Level+of+Consciousness,+Pain,+and+Urine+Output+in+Critical+Care+Units+in+a+Tertiary+Hospital+&ots=BJPv-kf76c&sig=aEtJJWWv65Fjd3NY05EfO0egTvA&redir_esc=y#v=onepage&q&f=false

Issa, M. R., Awajeh, A. M., Khraisat, F. S., Rasheed, A. M., Amirah, M. F.,
Hussain, A., & Alharthy, A. (2019). Impact of an Educational Program on the
Knowledge and Attitude About Pain Assessment and Management Among

- Critical Care Nurses. *Dimensions of critical care nursing: DCCN*, 38(5), 271–277. <https://doi.org/10.1097/DCC.0000000000000375>
- Jin, K., Murugan, R., Sileanu, F. E., Foldes, E., Priyanka, P., Clermont, G., & Kellum, J. A. (2017). Intensive Monitoring of Urine Output Is Associated With Increased Detection of Acute Kidney Injury and Improved Outcomes. *Chest*, 152(5), 972–979. <https://doi.org/10.1016/j.chest.2017.05.011>
- John C Marshall, et.al.,(2017) What is an intensive care unit? A report of the task force of the World Federation of Societies of Intensive and Critical Care Medicine. *J Crit Care*; 37:270-276. doi: 10.1016/j.jcrc.2016.07.015. Epub 2016 Jul 25.
- Jones, A., & Johnstone, M. J. (2017). Inattention blindness and failures to rescue the deteriorating patient in critical care, emergency and perioperative settings: Four case scenarios. *Australian Critical Care*, 30(4), 219–223. <https://doi.org/10.1016/j.aucc.2016.09.005>
- Jordan, S. (2000). Educational input and patient outcomes: Exploring the gap. *Journal of Advanced Nursing*, 31(2), 461–471. <https://doi.org/10.1046/j.1365-2648.2000.01279.x>
- Kamio, T., Kajiwarra, A., Iizuka, Y., Shiotsuka, J., & Sanui, M. (2018). Frequency of vital sign measurement among intubated patients in the general ward and nurses' attitudes toward vital sign measurement. *Journal of multidisciplinary healthcare*, 11, 575–581. <https://doi.org/10.2147/JMDH.S179033>
- Kayambankadzanja, R. K., Schell, C. O., Nsanjama, G., Mbingwani, I., Kwazizira Mndolo, S., Rylance, J., & Baker, T. (2019). Inability to Walk Predicts Death among Adult Patients in Hospitals in Malawi. *Emergency Medicine International*, 2019, 6586891. <https://doi.org/10.1155/2019/6586891>
- Kellett, J., & Sebat, F. (2017). Make vital signs great again - A call for action. *European journal of internal medicine*, 45, 13–19. <https://doi.org/10.1016/j.ejim.2017.09.018>
- Kesavadev, J., Misra, A., Saboo, B., Aravind, S. R., Hussain, A., Czupryniak, L., & Raz, I. (2021). Blood glucose levels should be considered as a new vital sign indicative of prognosis during hospitalization. In *Diabetes and Metabolic*

- Syndrome: Clinical Research and Reviews* (Vol. 15, Issue 1, pp. 221–227). Elsevier Ltd. <https://doi.org/10.1016/j.dsx.2020.12.032>
- Kleinpell R. M. (2007). APNs: invisible champions? *Nursing management*, 38(5), 18–22. <https://doi.org/10.1097/01.LPN.0000269815.74178.de>
- Koyama, S., Fujimoto, A., Yasuda, Y., & Satou, Y. (2020). Verification of the propagation range of respiratory strain using signal waveform measured by FBG sensors. *Sensors (Switzerland)*, 20(24), 1–17. <https://doi.org/10.3390/s20247076>
- Kumar, R. (2011). *Research methodology : a step-by-step guide for beginners*. SAGE.
- Kyriacos, U., Jelsma, J., & Jordan, S. (2011). Monitoring vital signs using early warning scoring systems: A review of the literature. *Journal of Nursing Management*, 19(3), 311–330. <https://doi.org/10.1111/j.13652834.2011.01246.x>
- Kyriacos, Una, Burger, D., & Jordan, S. (2019). Testing effectiveness of the revised Cape Town modified early warning and SBAR systems: A pilot pragmatic parallel group randomised controlled trial. *Trials*, 20(1), 809. <https://doi.org/10.1186/s13063-019-3916-0>
- Kyriacos, Una, Jelsma, J., & Jordan, S. (2014). Record review to explore the adequacy of post-operative vital signs monitoring using a local modified early warning score (mews) chart to evaluate outcomes. In *PLoS ONE* (Vol. 9, Issue 1, p. e87320). Public Library of Science. <https://doi.org/10.1371/journal.pone.0087320>
- Kyriacos, Una, Jelsma, J., James, M., & Jordan, S. (2014). Monitoring vital signs: Development of a Modified Early Warning Scoring (Mews) system for general wards in a developing country. *PLoS ONE*, 9(1). <https://doi.org/10.1371/journal.pone.0087073>
- Lakkaraju, S., & Lakkaraju, S. (2012). Mobile Device Application in Healthcare. *Cases on Healthcare Information Technology for Patient Care Management*, 276–278. <https://doi.org/10.4018/978-1-4666-6339-8.ch032>
- Laura M. Cascella, M. (n.d.). *Clinical Judgment: What Is It, and How Does It Contribute to Diagnostic Errors?* | MedPro Group. Retrieved February 11, 2021, from <https://www.medpro.com/clinical-judgment-cah>

- Le Gall, J. R., Lemeshow, S., & Saulnier, F. (1993). A new Simplified Acute Physiology Score (SAPS II) based on a European/North American multicenter study. *JAMA*, 270(24), 2957–2963. <https://doi.org/10.1001/jama.270.24.2957>
- Le Lagadec, M. D., & Dwyer, T. (2017). Scoping review: The use of early warning systems for the identification of in-hospital patients at risk of deterioration. In *Australian Critical Care* (Vol. 30, Issue 4, pp. 211–218). Elsevier Ireland Ltd. <https://doi.org/10.1016/j.aucc.2016.10.003>
- Leenen, J. P. L., Leerentveld, C., van Dijk, J. D., van Westreenen, H. L., Schoonhoven, L., & Patijn, G. A. (2020). Current evidence for continuous vital signs monitoring by wearable wireless devices in hospitalized adults: Systematic review. In *Journal of Medical Internet Research* (Vol. 22, Issue 6). JMIR Publications Inc. <https://doi.org/10.2196/18636>
- Leenen, J. P. L., Dijkman, E. M., van Hout, A., Kalkman, C. J., Schoonhoven, L., & Patijn, G. A. (2022). Nurses' experiences with continuous vital sign monitoring on the general surgical ward: a qualitative study based on the Behaviour Change Wheel. *BMC nursing*, 21(1), 60. <https://doi.org/10.1186/s12912-022-00837-x>
- MacLeod A. (2009). NCEPOD report on acute kidney injury-must do better. *Lancet* (London, England), 374(9699), 1405–1406. [https://doi.org/10.1016/S0140-6736\(09\)61843-2](https://doi.org/10.1016/S0140-6736(09)61843-2)
- Manuele Cesare. (2022) The role of the ICU nurse. Press Release by International Medical University in Rome.
- Martin Hensher, M. P. and S. A. (2003). Range of Clinical Services Provided.
- McCarberg, B. H. (2011). A critical assessment of opioid treatment adherence using urine drug testing in chronic pain management. *Postgraduate Medicine*, 123(6), 124–131. <https://doi.org/10.3810/pgm.2011.11.2502>
- McLeod, A. (2004). Intra- and extracranial causes alteration in level of consciousness. In *British journal of nursing* (Mark Allen Publishing) (Vol. 13, Issue 7, pp. 354–361). <https://doi.org/10.12968/bjon.2004.13.7.12678>
- Mohammed, M., Hayton, R., Clements, G., Smith, G., & Prytherch, D. (2009). Improving accuracy and efficiency of early warning scores in acute care. *British Journal of Nursing* (Mark Allen Publishing), 18(1), 18–24. <https://doi.org/10.12968/bjon.2009.18.1.32072>

- Mok, W. Q., Wang, W., & Liaw, S. Y. (2015). Vital signs monitoring to detect patient deterioration: An integrative literature review. *International journal of nursing practice*, 21, 91-98.
- Mok, W., Wang, W., Cooper, S., Ang, E. N. K., & Liaw, S. Y. (2015). Attitudes towards vital signs monitoring in the detection of clinical deterioration: scale development and survey of ward nurses. *International Journal for Quality in Health Care*, 27(3), 207-213.
- Morasco, B. J., Duckart, J. P., & Dobscha, S. K. (2011). Adherence to clinical guidelines for opioid therapy for chronic pain in patients with substance use disorder. *Journal of General Internal Medicine*, 26(9), 965–971. <https://doi.org/10.1007/s11606-011-1734-5>
- Morton, P.G., Fontaine, D.K. (Eds.), 2018. Critical Care Nursing: a Holistic Approach. Wolters Kluwer, Philadelphia
- Mutula, S. M. (2015). The African Journal of Information Systems Factors Influencing Perceptions and Attitudes of Nurses Towards the Use of ICT in Patient Care in KwaZulu Natal Province, South Africa. *The African Journal of Information Systems*, 8(1). <http://digitalcommons.kennesaw.edu/ajis>
- Nabil Hewahi, Abdul Fattah, Amine Mahjoub, & Khaled Zehar. (2018). *A Proposed Framework for Health Care System in Bahrain*. https://www.researchgate.net/publication/328829828_A_Proposed_Framework_for_Health_Care_System_in_Bahrain
- Nilsson, C. (2012). *Information and Communication Technology as a Tool for Support in Home Care*.
- Odell, M., Victor, C., & Oliver, D. (2009). Nurses' role in detecting deterioration in ward patients: Systematic literature review. In *Journal of Advanced Nursing* (Vol. 65, Issue 10, pp. 1992–2006). J Adv Nurs. <https://doi.org/10.1111/j.1365-2648.2009.05109.x>
- Orem, D. E. (1988). The Form of Nursing Science. *Nursing Science Quarterly*, 1(2), 75–79. <https://doi.org/10.1177/089431848800100208>
- Palinkas, L. A., Horwitz, S. M., Green, C. A., Wisdom, J. P., Duan, N., & Hoagwood, K. (2015). Purposeful Sampling for Qualitative Data Collection and Analysis in Mixed Method Implementation Research. *Adm. Policy Ment. Health*, 42(5), 2–4. <https://doi.org/10.1007/s10488-013-0528-y>. Purposeful

- Palmer, R., & Knight, J. (2006). Assessment of altered conscious level in clinical practice. In *British journal of nursing (Mark Allen Publishing)* (Vol. 15, Issue 22, pp. 1255–1259). <https://doi.org/10.12968/bjon.2006.15.22.22566>
- Passik, S. D., Kirsh, K. L., Donaghy, K. B., & Portenoy, R. K. (2006). Pain and aberrant drug-related behaviors in medically ill patients with and without histories of substance abuse. *Clinical Journal of Pain*, 22(2), 173–181. <https://doi.org/10.1097/01.ajp.0000161525.48245>.
- Perumal, T. (2014). Research Methodology. <https://doi.org/http://dx.doi.org/10.5210/fm.v8i1.1023>
- Pesce, A., West, C., Egan City, K., & Strickland, J. (2012). Interpretation of urine drug testing in pain patients. In *Pain Medicine (United States)* (Vol. 13, Issue 7, pp. 868–885). Blackwell Publishing Inc. <https://doi.org/10.1111/j.1526-4637.2012.01350.x>
- Rababa, M., Al-Sabbah, S., & Hayajneh, A. A. (2021). Nurses' Perceived Barriers to and Facilitators of Pain Assessment and Management in Critical Care Patients: A Systematic Review. *Journal of pain research*, 14, 3475–3491. <https://doi.org/10.2147/JPR.S332423>
- Rababa, M., Bani-Hamad, D., & Hayajneh, A. A. (2022). The effectiveness of branching simulations in improving nurses' knowledge, attitudes, practice, and decision-making related to sepsis assessment and management. *Nurse Education Today*, 110, 105270.
- Rockinson-Szapkiw, A. J., & Knight, A. (n.d.). *Step 2: Build a Literature Review and Identify a Theoretical or Conceptual Framework Written and Compiled*.
- Rolfe, S., & Paul, F. (2018). Oxygen therapy in adult patients. Part 2: Promoting safe and effective practice in patients' care and management. *British Journal of Nursing*, 27(17), 988–995. <https://doi.org/10.12968/bjon.2018.27.17.988>
- Romare, C., Hass, U., & Skär, L. (2018). Healthcare professionals' views of smart glasses in intensive care: A qualitative study. *Intensive and Critical Care Nursing*, 45, 66–71. <https://doi.org/10.1016/j.iccn.2017.11.006>

- Ryan, H., Cadman, C., & Hann, L. (2004). Setting standards for assessment of ward patients at risk of deterioration. *British Journal of Nursing (Mark Allen Publishing)*, 13(20), 1186–1190. <https://doi.org/10.12968/bjon.2004.13.20.17008>
- Rylance, J., Baker, T., Mushi, E., & Mashaga, D. (2009). Use of an early warning score and ability to walk predicts mortality in medical patients admitted to hospitals in Tanzania. *Transactions of the Royal Society of Tropical Medicine and Hygiene*, 103(8), 790–794. <https://doi.org/10.1016/j.trstmh.2009.05.004>
- Saenubol, P., Akatvipat, A., Pleumsamran, A., & Chankrachang, S. (2020). Correlation between bispectral index value and modified Glasgow Coma Scale score in dogs with altered level of consciousness. *Journal of Veterinary Emergency and Critical Care*. <https://doi.org/10.1111/vec.13014>
- Samarkandi O. A. (2018). Knowledge and attitudes of nurses toward pain management. *Saudi journal of anaesthesia*, 12(2), 220–226. https://doi.org/10.4103/sja.SJA_587_17
- Santoso, D., Setiaji, F. D., & Prasetya, A. (2018). Integrated Demonstration Module for Basic Biomedical Signal Processing. *2018 Electrical Power, Electronics, Communications, Controls and Informatics Seminar, EECCIS 2018*, 108–113. <https://doi.org/10.1109/EECCIS.2018.8692804>
- Schmidt, T., & Wiil, U. K. (2015). Identifying patients at risk of deterioration in the Joint Emergency Department. *Cognition, Technology and Work*, 17(4), 529–545. <https://doi.org/10.1007/s10111-015-0327-1>
- Seagull, F.J., Xiao, Y., Mackenzie, C.F., Wickens, C.D., 2000. Auditory Alarms: From Alerting to Informing. Proceedings of the Human Factors and Ergonomics Society Annual Meeting 44, 223–226. <https://doi.org/10.1177/154193120004400160>.
- Sekaran, U. and Bougie, R. (2010). *Research Methods for Business: A skill building approach*. (Fifth edit). Wiley India (Pvt) Ltd., <http://www.sciepub.com/reference/153627>
- Shamsi, Najla Mahmud. 2018. Improving vital signs measurement and documentation in the triage room : a quality improvement project. *Bahrain Medical Bulletin* ,Vol. 40, no. 3, pp.171-173. <https://search.emarefa.net/detail/BIM-865856>

- Sheehan, J. (1989). The Nature of The “*Nursing Process*” As A Central Concept In The Current Education Of Nurses.
- Singhania, N., Bansal, S., & Singhania, G. (2020). *An Atypical Presentation of Novel Coronavirus Disease 2019. January.*
- Smith, G. B., Redfern, O., Maruotti, A., Recio-Saucedo, A., Griffiths, P., & The Missed Care Study Group. (2020). The association between nurse staffing levels and a failure to respond to patients with deranged physiology: a retrospective observational study in the UK. *Resuscitation*, 149, 202-208.
- Smith, M. E., Chiovaro, J. C., O'Neil, M., Kansagara, D., Quiñones, A. R., Freeman, M., Motu'apuaka, M. L., & Slatore, C. G. (2014). Early warning system scores for clinical deterioration in hospitalized patients: a systematic review. *Annals of the American Thoracic Society*, 11(9), 1454–1465. <https://doi.org/10.1513/AnnalsATS.201403-102OC>
- Spangler, D., Edmark, L., Winblad, U., Colldén-Benneck, J., Borg, H., & Blomberg, H. (2020). Using trigger tools to identify triage errors by ambulance dispatch nurses in Sweden: an observational study. *BMJ*, 10(3). <https://doi.org/10.1136/bmjopen-2019-035004>
- Starrels, J. L., Becker, W. C., Weiner, M. G., Li, X., Heo, M., & Turner, B. J. (2011). Low use of opioid risk reduction strategies in primary care even for high risk patients with chronic pain. *Journal of General Internal Medicine*, 26(9), 958–964. <https://doi.org/10.1007/s11606-011-1648-2>
- Sternbach G. L. (2000). The Glasgow coma scale. *The Journal of emergency medicine*, 19(1), 67–71. [https://doi.org/10.1016/s0736-4679\(00\)00182-7](https://doi.org/10.1016/s0736-4679(00)00182-7)
- Tanner, C. A. (2006). Thinking like a nurse: A research-based model of clinical judgment in nursing. In *Journal of Nursing Education* (Vol. 45, Issue 6, pp. 204–211). Slack Incorporated. <https://doi.org/10.3928/0148483420060601-04>
- Taylor, S. G. (1988). Nursing Theory and Nursing Process: Orem's Theory in Practice. *Nursing Science Quarterly*, 1(3), 111–119. <https://doi.org/10.1177/089431848800100306>
- Thomas, J. R., Nelson, J. K., & Silverman, S. J. (2011). *Research Methods in Physical Activity*. Human Kinetics.
- Thompson, C., Aitken, L., Doran, D., & Dowding, D. (2013). An agenda for clinical decision making and judgement in nursing research and education. In

- International Journal of Nursing Studies* (Vol. 50, Issue 12, pp. 1720–1726). *Int J Nurs Stud.* <https://doi.org/10.1016/j.ijnurstu.2013.05.003>
- Trofino, J. (2003). Power sharing. A transformational strategy for nurse retention, effectiveness, and extra effort. *Nursing Leadership Forum*, 8(2), 64–71. <http://www.ncbi.nlm.nih.gov/pubmed/14997687>
- Ufashingabire, C. M., Nsereko, E., Njunwa, K. J., & Brysiewicz, P. (2016). Knowledge and attitudes of nurses regarding pain in the intensive care unit patients in Rwanda. *Rwanda Journal*, 3(1), 21. <https://doi.org/10.4314/rj.v3i1.4f>
- Van Bogaert, P., Clarke, S., Roelant, E., Meulemans, H., & Van de Heyning, P. (2010). Impacts of unit-level nurse practice environment and burnout on nurse-reported outcomes: A multilevel modelling approach. *Journal of Clinical Nursing*, 19(11–12), 1664–1674. <https://doi.org/10.1111/j.1365-2702.2009.03128.x>
- Vindenes, V., Yttredal, B., Øiestad, E. L., Waal, H., Bernard, J. P., Mørland, J. G., & Christophersen, A. S. (2011). Oral fluid is available alternative for monitoring drug abuse: Detection of drugs in oral fluid by liquid chromatography-tandem mass spectrometry and comparison to the results from urine samples from patients treated with methadone or buprenorphine. *Journal of Analytical Toxicology*, 35(1), 32–39. <https://doi.org/10.1093/anatox/35.1.32>
- Von Naso, L., & von Naso, L. (2018). Research design and methodology. *The Media and Aid in Sub-Saharan Africa*, 98–117. <https://doi.org/10.4324/9781351271806-5>
- West, R., Pesce, A. J., Crews, B., Mikel, C., Rosenthal, M., Almazan, P., Latyshev, S., & West, C. (2011). Determination of illicit drug cutoff values in a pain patient population. *Clinica Chimica Acta*, 412(17–18), 1589–1593. <https://doi.org/10.1016/j.cca.2011.05.004>
- WHO. (2007). *Health Systems Profile-Bahrain Regional Health Systems Observatory-EMRO*.
- Wu, T., Wu, F., Qiu, C., Redoute, J. M., & Yuce, M. R. (2020). A Rigid-Flex Wearable Health Monitoring Sensor Patch for IoT-Connected Healthcare

Applications. *IEEE Internet of Things Journal*, 7(8), 6932–6945. <https://doi.org/10.1109/JIOT.2020.2977164>

Yamamoto, K., Yonekura, Y., & Nakayama, K. (2022). Healthcare providers' perception of advance care planning for patients with critical illnesses in acute-care hospitals: a cross-sectional study. *BMC Palliative Care*, 21(1), 112.

Yin, R. K. (2006). Case Study Reserach - Design and Methods. *Clinical Research*, 2, 8–13. <https://doi.org/10.1016/j.jada.2010.09.005>

Zohrabi, M. (2013). Mixed Method Research: Instruments, Validity, Reliability and Reporting Findings. *Theory and Practice in Language Studies*, 3(2), 254–262. <https://doi.org/10.4304/tpls.3.2.254-262>

APPENDICES

Appendix I

Tool

Appendix A: Critical Care Nurses' Knowledge and Attitude Towards the Supplemental Vital Signs Survey Tool

Date of Survey: <u>day/month/Year</u>				☐ Gender: ☐ Male ☐ Female	
☐ ICU A	☐ ICU B	☐ ICU Oncology	☐ ICU 3D	Years of experience: 1 – 3 years 3 – 5 years 5 – 7 years ≥ 7 years above	Years of experience: Diploma BSc\BNS Masters PhD
Job ☐ Senior Staff Nurse ☐ Staff Nurse ☐ Team Leader		Age in Years: _____ & months: _____			
Category:					
Part 1. Nurses' knowledge towards utilization of the supplemental vital signs: * tick a box <i>based on the above selections</i>					
There are three additional supplementary vital signs (level of consciousness, pain, and urine output)				☐ Yes ☐ No	
Pain is subjective.				☐ Yes ☐ No	
Patient's pain score is an indicator of the patient's clinical status.				☐ Yes ☐ No	
Pulse rate depends on pain level.				☐ Yes ☐ No	
Respiration rate changes according to pain level.				☐ Yes ☐ No	
Blood pressure changes according to pain level.				☐ Yes ☐ No	
Level of consciousness is influenced by cerebral perfusion.				☐ Yes ☐ No	
Patient's level of consciousness is an indicator of the patient's clinical status.				☐ Yes ☐ No	
Respiration rate changes according to the level of consciousness.				☐ Yes ☐ No	
Pulse rate changes according to the level of consciousness.				☐ Yes ☐ No	
Blood pressure changes according to the level of consciousness.				☐ Yes ☐ No	
Urine output varies with renal perfusion.				☐ Yes ☐ No	
Patient's urine output is an indicator of the patient's clinical status.				☐ Yes ☐ No	
Pulse rate changes according to urine output.				☐ Yes ☐ No	
Respiration rate changes according to urine output.				☐ Yes ☐ No	
Blood pressure changes according to urine output.				☐ Yes ☐ No	

Responses: Strongly Disagree (0) Disagree (1) Neither agree nor disagree (2) Agree (3) Strongly Agree (4)

Part 2. Nurses' attitude towards utilization of the supplemental vital signs:

based on the above selections

*** tick a box

Do you think that aside from usually utilized vital signs (pulse, respiration rate, BP, temperature, oxygen saturation), the level of consciousness, pain, and urine output are indicators of a patient's condition?	☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4
Is it significant to measure the supplemental vital signs	☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4
Do you believe assessing pain is important in establishing appropriate care?	☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4
Do you believe assessing the level of consciousness is important in establishing appropriate care?	☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4
Do you believe monitoring urine output is important in establishing appropriate care?	☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4
Pain level changes require active intervention.	☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4
Level of consciousness variations requires active intervention.	☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4
Urine output variations require active intervention.	☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4

Appendix II

Ethical Approval Letter

APPENDICES



09 December 2020

TO: **Hesham Mohamed Muqbel**
CO-INVESTIGATOR: **Asharaj Sudha and Dr. Fairouz Alhourani**
FROM: Institutional Review Board
PROJECT TITLE: Knowledge and Attitude of Critical Care Nurses about Supplemental Vital Signs; Level of Consciousness, Pain, and Urine Output in Critical Care Units in a Tertiary Hospital in Bahrain
REFERENCE #: **20- 384**
ACTION: **APPROVED**
APPROVAL DATE: 09 December 2020
EXPIRATION DATE: 08 December 2021
REVIEW TYPE: Expedited Review

This is to inform you that your research proposal has been reviewed by the Institutional Review Board, King Hamad University Hospital. Your application is approved as submitted. Approval is for a period of one year from 09 December 2020. If you would like to continue this research after this period, please submit for an extension (use status update form) one month prior to your expiration date of 08 December 2021.

1. Kindly note that you are expected to complete a status update report on your study every three months.
2. The Head of Scientific Research & Development should be informed in writing (email is acceptable) within twenty-four hours of any adverse event in the conduct of research involving human subjects. Please include the nature of the adverse event, the names of the persons affected, the extent of the injury or breach of security, if any, and any other information material to the situation.
3. Any aspect of your research procedure should not be changed without permission from the Head of Scientific Research & Development. Please use the status update form to request any changes.
4. Maintain all research records as detailed in the protocol.
5. Ensure that each consent form is dated and duly signed by the participant and the investigator or the designated person obtaining consent. All informed consents should also be provided to the Research Department upon completion of the study. Indicate in the header or footer of each page of your approved Informed Consent form the approval and expiration dates of the protocol as follows: "Approved from 09 December 2020 to 08 December 2021 by the KHUH IRB" (if relevant).
6. Kindly note that the KHUH IRB has the right to withhold publication of a study and/or withdraw ethical approval of a research if judged necessary.

We can assist you with data analysis and provide guidance for process of publication. Should you have any questions about the conduct of your research under this protocol, particularly about obtaining informed consent, please email: research3@khu.org.bh.

We wish you the best of success in your research.

Yours Sincerely,

Luma E. Bashmi, MA
Head of Scientific Research & Development
Chairperson, KHUH IRB

الملخص:

يتم استخدام العلامات الحيوية كلاسكية بين الممرضين في جميع أنحاء العالم لتقييم وضع المريض الصحي وقد لا تكون كافية بالشكل المطلوب للكشف عن تدهور حالة المريض. وبالتالي، كثيراً ما يتم تقييم العلامات الحيوية الأخرى مثل مستوى الوعي ومستوى الألم ومخرجات البول جنباً إلى جنب مع العلامات الكلاسيكية الخمس. ومن ثم، سعى هذا البحث إلى تحديد معرفة وموقف ممرضي الرعاية الحرجة بشأن العلامات الحيوية التكميلية، ومستوى الوعي والادراك، والألم، وإخراج البول في مستشفى حكومي في البحرين. أجريت هذه الدراسة في مرافق الرعاية الحرجة للبالغين في مستشفى الملك حمد الجامعي في البحرين. تم التوصل إلى أن هناك علاقة كبيرة بين موقف ممرضي الرعاية الحرجة تجاه العلامات الحيوية التكميلية واستخدامها. علاوة على ذلك، خلص البحث إلى أن أكثر العلامات الحيوية التكميلية المعروفة هي إخراج البول، يليه الألم ومستوى الوعي والادراك. لذلك، يجب استخدامها في تعليم ممرضي الرعاية الحرجة.

جامعة البحرين

قسم التمريض



كلية العلوم الصحية والرياضية

معرفة وموقف ممرضي الرعاية الحرجة حول العلامات الحيوية
التكميلية: مستوى الوعي والألم و اخراج البول في المستشفيات
الحكومية في مملكة البحرين

اطروحه مقدمه كجزء من متطلبات الحصول على درجة الماجستير في التمريض

إعداد الطالب:

هشام محمد البدوي

الرقم الجامعي: ٢٠١١٧٠٧١

اشراف:

الدكتورة غياثيبريا نارايانان

استاذ مساعد

جامعة البحرين

مشرف مساعد

الدكتورة فاريبا الدرازي

استاذ مساعد

جامعة البحرين

مملكة البحرين

مارس ٢٠٢٣