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Influence of Nurses' Burnout and Workload on Medication Errors Knowledge in Pediatric Critical Care Units

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by

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بسم الله الرحمن الرحيم

يَا أَيُّهَا الَّذِينَ آمَنُوا إِذَا قِيلَ لَكُمْ تَفَسَّحُوا فِي الْمَجَالِسِ فَافْسَحُوا يَفْسَحِ اللَّهُ لَكُمْ ۖ وَإِذَا قِيلَ انْشُزُوا فَانْشُزُوا يَرْفَعِ اللَّهُ الَّذِينَ آمَنُوا مِنْكُمْ وَالَّذِينَ أُوتُوا الْعِلْمَ دَرَجَاتٍ ۚ وَاللَّهُ بِمَا تَعْمَلُونَ خَبِيرٌ ﴿١١﴾

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سورة المجادلة - الآية 11

Supervisor Certification

I certify that this thesis, which is entitled **(Influence of Nurses' Burnout and Workload on Medication Errors Knowledge in Pediatric Critical Care Units)** was prepared under my supervision at the College of the Nursing/ University of Kerbala in partial fulfillment of the requirements for the Masters' Degree of Science in Nursing.

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Dedication

To the first teach who implanted the ambition and made me the imperturbability. My parent Allah guard you.

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ABSTRACT

Background: Pediatric nurses in critical care units frequently face burnout due to the demanding nature of their work, heavy workloads, strenuous shifts, high productivity expectations, and insufficient acknowledgment of their contributions. These stressors can negatively impact the quality of care provided to critically ill children and may result in a higher incidence of medication errors within pediatric critical care units.

Objective: This study aims to evaluate the influence of burnout and workload on nurses' knowledge of medication errors in Pediatric critical care units.

Methodology: The study utilized a descriptive correlation design focused on pediatric critical care units from September 25th, 2023, to June 2nd, 2024. Data were collected using questionnaires including the Nursing Workload Questionnaire, Maslach Burnout Inventory, and the Knowledge of Medication Errors Questionnaire. A non-probability (Convenience) sampling technique was utilized, involving 98 nurses out of a total of 134 nurses working in Pediatric critical care units.

Results: The study found that (55.1%) of the nurses perceived their workload as high. Additionally, (61.2%) of nurses experienced a moderate level of burnout. Despite this, (74.5%) demonstrated the good knowledge of medication errors among nurses in Pediatric critical care units.

Conclusion: There were significant statistical correlations between workload on nurses' knowledge about medication errors in the critical care units. There were no significant statistical correlations between burnout on nurses' knowledge about medication errors at the critical care .

Recommendations: Training programs about burnout its causes, risk factor, effect on critical care nurses' performance and its overcoming techniques should be carried usually. The present study recommends continuous education program for all nursing staff in deferent level of education in all my country’s hospitals to decrease medication errors to

reduce patient risk of harm and promote the patient safety and increase the number of nursing staff employed by the General Directorate of Health and Ministry of Health to treat the problem of nursing staff shortage in health institutions.

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List of Abbreviation

Symbols	Meaning
ADEs	Adverse drug events
ADEs	harmful drug events
AHU	Artificial Kidney unit
AMA	American Medical Association
BOS	burnout syndrome
CBI	Copenhagen Burnout Inventory
CCSC	Critical Care Societies Collaborative
CCUs	critical care units
EMAR	Electronic Medication Administration Record
ICU	Intensive care units
IV	intravenous
KAB	Knowledge, Attitude, and Behavior
MAEs	medication administration errors
MBI	Maslach Burnout Inventory
MEs	medication errors

NASA-TLX	The NASA Task Load Index
NCC MERP	National Coordinating Council for Medication Error Reporting and Prevention
NICU	Neonatal intensive care units
NW	nurse's workload
PCCU	pediatric critical care units
PCS	patient classification system
PEDs	pediatric emergency departments
PEDs	pediatric emergency departments
PPE	Personal Protective Equipment
RNs	registered nurses
SOPs	Standard Operating Procedures
SPSS	statistical package of social sciences
WHO	World Health Organization

List of statistical Symbol

Symbols	Meaning
<	Less than
>	More than
&	And
d. f.	Degree of Freedom
F	Frequency
H.	High
H.S	Highly Significant
L.	Low
M.S	Mean of Score

N.S	Not Significant
No	Number
P.	Probability
SD	Standard Deviation
t.	t-test
χ^2	chi-square

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Chapter One
Introduction

Chapter One

1.1. Introduction:

The critical care units include Intensive Care Unit (ICU), Neonatal Intensive Care Unit (NICU) and Critical Care Unit (CCU) which are one of the essential and vital pillars of hospitals that accommodates critically ill patients who are at risk of death. These units can be effective in restoring health to critically ill patients by providing proper medical services as well as optimal use of modern medical equipment and using experienced and qualified staff and group decision-making about the patients (Hulin, 2015).

Medication errors provide a significant and complex risk of healthcare practice, especially in critical care settings where children patients may experience potentially catastrophic complications due to the severity of their illness. Medication errors account for about 25% of all medical errors and can occur at any stage of the medication handling process, including prescription, transcribing, dispensed medication operation, and monitoring (Kainat et al., 2022).

The most susceptible demographic patient in hospitals and clinics is children. Because of this, more safety concerns should be taken into account when they are hospitalized for treatment and care. Errors, particularly those involving medication, happen frequently in the busy and stressful environment of children's wards. As a result, pediatric ward nurses must be adequately knowledgeable and skilled to manage medical care (Massah et al., 2021).

Burnout is a type of occupational stress that occurs as a result of long-term exposure to stress, and is particularly linked to psychosocial factors at work. Critical care nurses are considered one of the most likely to report high levels of burnout. CCU nurse burnout is linked to a high rate of bed closures due to direct nursing care duties and a shortage of nursing staff (Mohamed et al., 2022).

Burnout is composed of three distinct elements that are widely acknowledged: emotional weariness, depersonalization, and a sense of personal (professional) inadequacy. Emotional depletion among nurses' precipitates depersonalization, leading to a sense of detachment and cynicism, particularly in their interactions with pediatric patients. Concurrently, dissatisfaction with the quality of care provided manifests as diminished personal accomplishment (Buckley et al., 2020).

There is growing consensus that burnout is a major problem that affects the mental and physical well-being of healthcare professionals. Health care workers in high-risk settings are at heightened risk because to variables such as increased workload, lack of sleep, inadequate self-esteem, and fear of getting the pandemic or infecting others. discovered that burnout is a consequence of nurses' rising workloads (Aljanfawi, 2022).

Reis et al., (2023) reported that the nursing workload assessment is widely discussed and implemented to qualify, plan, and evaluate critical care units, an increase in nursing workload results in a reduced patient survival rate, which in turn may be attributable to the increased suboptimal care for some patients. As a result, it may affect the overall required care for some of the patients. Moreover, the nursing workload required by patients in intensive care was identified as a risk factor for the occurrence of adverse events, mostly derived from pressure ulcers and medication errors.

The primary reason for the significance of this topic lies in its impact on human life and health. Deliberate or inadvertent errors pose a significant risk to human life. The suspension of practices, knowledge, and skill deficiencies among healthcare personnel, incorrect practices, excessive workload, insufficient patient care, and lack of communication among team members are attributed to medical problems (Bölükbaş et al., 2020).

1.2. Importance of the Study:

Nurses are the largest group working in the health care system constituting roughly 40% of all employees per hospitals and 55% of the total employee expenses. Therefore, they have an important role in the health care system (Bakhshi et al., 2019)

Annual deaths from medication errors account for 7000 out the total number of 48000 - 98000 deaths due to drug-induced complications. Medication errors are listed as one of the five medical error categories classified by the American Institute of Medicine. It is Also, estimated that 55000 medical errors occur each year, resulting 10500 deaths and 23000 physical disabilities. The results of a study about medication error in 2 teaching hospitals in Boston showed that, 1% of the incidents are fatal, 12% life-threatening, 30% serious and 57% significant and dangerous. Forty-two percent of classified incident serious were preventable (Mirsadeghi et al., 2019).

The incidence of medication errors in the world is very high. The results from the research in England, Sweden and Brazil showed that the average incidence of medication errors was 1.4% - 16.9%. Another study stated that 6% to 39% of this incidence occurred more than once, and out of 397 nurses, 57.4% reported cases of medication errors. Other research works reported that there were errors in drug administration from 8.5 to 16.9 per 100 operations. The most frequent errors made by nurses were 87.5% during documentation, 73.1% when administering a drug and 53.6% due to late administration (Hariyati et al., 2021).

In Iran, 29.8% to 47.8% of medication errors happen during the prescribing stage. During the transcribing stage, 10.0% to 51.8% of errors occur. In the dispensing stage, 11.3% to 33.6% of errors happen, and during the administration stage, 14.3% to 70% of errors occur. Medication errors in the administrative stage are the most common medical in clinical

settings (53%). In the Italian context, 16.5% of medication errors occur during the prescribing stage. 11% of medication errors occur during transcribing and 13.5% of medication errors occurs during the dispensing stage (Giannetta et al., 2023). In Egypt, a study at NICU in Benha University Hospital; detected 3819 errors that affected 97% of neonate (Elsayed et al., 2020).

The prevalence of burnout has been found to be higher in medical professionals who work in critical care environments, with burnout prevalence being reported in up to 47% of critical care practitioners, the nature of critical care work necessitates that providers are exposed to high acuity, complex ethical dilemmas, and death, all of which are implicated in negative health impacts and provider burnout (Buckley et al., 2020).

Emotional exhaustion is a reoccurring factor that causes burnout in nurses, which can be especially prevalent among paediatric nurses because of the emotionally challenging work with children. There are 76.41% of nurses feel as though they are emotionally exhausted at work, which leads to burnout. Distinctively, emotional exhaustion as a result of dealing with grief in paediatric nurses is a cause for suffering burn out syndrome (Braun, 2023).

There are 771 nurses belonging to the American Association of Critical Care Nurses to ascertain the impact of various workplace interventions on psychological and physical well-being. They found that critical care nurses frequently experience mental health problems; among these problems, anxiety symptoms were reported by 53.2%, depressive symptoms by 39.5%, and stress by 42.2% of the participants (Al-Osaimi et al., 2023).

A study in Spain found lower rates of burnout syndrome: 16% of nurses, 14% of resident doctors, 13% of physicians, and 10% of nursing assistants reported experiencing burnout (Rodríguez et al., 2019).

A recent study from Saudi Arabia showed that 25% to 33% of critical nurses manifested symptoms of burnout syndrome. In Egypt, there is a shortage of critical nurses resulting from high instances of burnout which negatively affects care provided to patients and there are few studies assessing the relationship between emotional intelligence and burnout among nurses, especially those working in critical areas (Fattah et al., 2023).

In 2018, Iraq had two nurses for every 1,000 people, which is a key factor contributing to burnout and job stress. Although many studies have looked into this issue, very few, if any, have focused on hospitals in the Kurdistan region of Iraq. This region has a unique situation due to the impact of the low socio-economic status of the local population, which affects patient experiences differently (Hajibabaee et al., 2023).

Reported was shows that 40% of nurses in the hospitals experience burnout and about every five hospital nurses there is one of them think of quit work over the next year, nurses suffered from burnout because they have a wide range of tasks and long working hours, and contacts with doctors, other co-workers, the patients, and patients' families (Tuama et al., 2020).

According to the National Nurses Association in 2006 as many as 50.9% of Indonesian nurses experienced work stress, they often felt dizzy, tired, less friendly, lacked rest due to too high workloads and inadequate income (Aprilia et al., 2019).

The workload of nurses working at general, coronary and cardiovascular surgery intensive care units of a private hospital. As a result, it was reported that nurses spent 37% of their time on direct patient care procedures in the day shifts, whereas they spend 34% of their time on direct patient care procedures in the night shifts. On the other hand, they spent 15% of their time on duties out of their responsibility in the day

shifts, and spent 19% of their time on duties out of their responsibility in the night shifts (Mersin et al., 2018).

The World Health Organization, states that there are approximately 27 million nurses worldwide, accounting for 50% of all health workers, and projects that this number will increase by 9 million by 2030 (Babamohamadi et al., 2023).

Workload may also affect the quality of nursing care by causing emotional exhaustion in nurses. The results of a study revealed that 55.4% of Canadian nurses suffered from emotional exhaustion. The high workload in this study was a predictor of emotional exhaustion and there was a positive and significant correlation between workload and emotional exhaustion (Maghsoud et al., 2022).

Workload factors, burnout, and intent to leave have been widely studied among nurses working in emergency department and intensive care settings. There is a sizable gap in the literature regarding medical–surgical nurses. With an estimated 31% of hospital nurses employed in medical–surgical areas, determining the relationships among workload perception, burnout, and intent to leave among these nurses is of crucial importance (Phillips et al., 2020).

1.3. Problem Statement:

It is one of the major concerns for patient safety around the world as highlighted by the WHO in their report presented in 2001, medication errors are affecting the revenue of healthcare originations. The key to developing positive conduct to omit the chances of medication errors is to understand how and why they happen. Therefore, this study sought to determine the knowledge, of nurses regarding medication errors.

One avoidable cause of death particularly in youngsters, is medication errors. Due to factors such as variances in growth and development, as well as physiological and psychological traits that differ

from adults, children are more vulnerable to injury and more likely to experience medication errors.

A study conducted by American nurses found that the risk of adverse medication events in pediatric patients was three times higher than in adults. Therefore, compared to adults, children are at a larger risk of MEs, and these complications are more likely to be severe or even fatal. Because of the high prevalence and damage rates among all MEs, situations involving pediatric patients garner particular attention.

Medication errors significantly impact the wellbeing of individuals, organizations, and healthcare systems. According to an NCCMERP report, medication errors are ranked the sixth cause of mortality in the United States, with 5–10% of the reported medication errors classified as harmful. Recently, medication errors have become a challenge facing healthcare systems and are directly linked to hospital mortality and morbidity rates.

There is a high risk of burnout among health workers, and nurses are no exception. There are numerous effects of nurse burnout, the most significant of which are detrimental to the health and happiness of the affected nurses. Furthermore, one of the most significant obstacles that puts nurses at risk of burnout is the variability of their work shifts.

Factors contributing to healthcare worker burnout include long hours, heavy workloads, juggling multiple departments, ambiguous job descriptions, potentially hazardous work environments, inadequate PPE, overuse of PPE, and the constant threat of harm, which is particularly acute during epidemics and other catastrophic events.

Nurse burnout increases the risk of work-related accidents and missed workdays, which in consequence negatively impacts patient satisfaction, safety, and the quality of care provided by the nurses. Job satisfaction and turnover rates among nurses are also impacted. Not only

does burnout endanger the health and well-being of nurses, but it also lowers the standard of care that patients get.

Low levels of motivation, work satisfaction, and organizational commitment, along with high levels of employment instability, are consistently associated with burnout at the organizational level. Reduced productivity, staff turnover, and absenteeism are some of the counter-productive work behaviors that these factors induce, ultimately lowering the organization's overall effectiveness.

There are numerous factors that affect the workload of nurses, such as an ageing population (including nurses themselves), the emergence of new diseases and treatments, the volume of patients, the duration of their hospital stays, and the frequency of work interruptions. Delays in work, poor team spirit, low morale among staff nurses, and noncompliance with regulations all contribute to staff burnout, which in turn impacts the organization's effectiveness. Nurses report lower levels of job satisfaction as their workload increases.

There is a growing worry about the harmful effects of increased workload on both patients and nurses in healthcare facilities, particularly in intensive care units (ICUs). Patient safety and the standard of nursing care are affected by workload, among other things.

Changes in behavior such as burnout and diminished performance are possible. Performance can be observed in a decline in nursing care performance, which may affect patients' satisfaction, and a decrease in documenting nursing care performance. Burnout resulting from a high mental workload is characterized by behaviors such as delaying or speeding up work, assigning tasks to others, and frequently using non-work related applications on mobile phones.

The workload is typically defined as the ratio of needs to resources. Workload encompasses both objective and subjective measures. Subjective

workload, in turn, refers to the mental or emotional strain that operators may feel when carrying out activities in a certain setting. Factors such as worker cognition, prior experience, task demand, external support, and subjective processes all contribute to what is known as mental workload, which is the amount of mental effort needed to finish a task.

The workload of nurses in a hospital depends on the care needs of pediatric patients and the level of care planned for them. How much work a nurse has to do also depends on factors like the size of the nursing team.

1.4. Objectives of the study:

1. To assess the burnout in nurses at the pediatric critical care units.
2. To assess the nurses' workload at critical care units.
3. To identify medication error knowledge among nurses at critical care units.
4. To determine the influence of burnout and workload on nurses' knowledge about medication errors at the critical care units.
5. To find out the relationship between burnout, workload and medication errors knowledge with nurses' sociodemographic characteristics.

1.5. Research questions:

Is the influence of nurse’s burnout and workload on their knowledge of medication errors in pediatric critical care units?

1.6. Definition of Terms:

1.6.1. Medication error

Theoretical Definition: Medication errors refer to avoidable incidents that result in improper medication usage or injury to the patient. These errors may happen during the process of prescribing, dispensing, or administering medication (Shen et al., 2023).

Operational Definition: Instances where pediatric patients may be harmed or subjected to improper drug administration while under the care of nurses at Karbala Teaching Hospital for Children.

1.6.2. Burnout

Theoretical Definition: Burnout, as described by the World Health Organization, is a syndrome resulting from prolonged exposure to work-related stress that has not been well managed (Mohamed and Hariedy, 2022).

Operational Definition: Due to prolonged exposure to stressful work conditions, staff nurses in CCU may develop burnout, characterized by reduced energy levels, detachment from work, and a sense of ineffectiveness.

1.6.3. Workload

Theoretical Definition: Nursing workload is determined by multiplying the average daily number of patients seen by the level of dependence and type of care required, and the average time spent assessing each patient (Reis et al., 2023).

Operational Definition: When nurses face an overwhelming workload that exceeds their capacity to efficiently manage, they may experience burnout due to prolonged exposure to stressful work conditions. Burnout is characterized by diminished energy, disengagement from work, and a sense of ineffectiveness.

Chapter Two
Literature Review

Chapter Two

Literature Review

2.1.1. Burnout

Burnout is a major issue, according to research conducted on a global scale, a significant number of hospital staff nurses are experiencing high levels of burnout. This condition, which manifests as emotional and physical exhaustion due to prolonged exposure to emotionally taxing situations, is particularly common in people-oriented professions like education, health care, and human services (Montgomery et al., 2021).

Burnout refers to a state of exhaustion that workers experience after enduring high levels of emotional and interpersonal stress on the job for an extended length of time without taking breaks to recharge (Chuang et al., 2016).

Nurse personality characteristics put heavy emotional strain on the involved healthcare workers and can lead to burnout, a condition that develops when people are exposed to stressful situations at work for an extended period of time. Getting trouble sleeping is another possible symptom of nursing mistake, Nurses are under continual pressure to work longer shifts and more days than necessary to meet pediatric patient demand and cover shifts; yet, this has led to an increase in stress, exhaustion, and disturbed sleep (Betsiou et al., 2022).

Pediatric critical care unit’s workers face an extremely difficult atmosphere filled with trauma, constant change, and stressful situations. They also witness the suffering of children and their families (Rodríguez-Rey et al., 2019).

Burnout has been extensively researched for the past four decades, with considerable efforts dedicated to understanding its origins, effects, and methods for alleviation. Burnout among pediatric nurses may differ from that of adult care nurses due to the specialized nature of caring for children,

who are generally considered a vulnerable population. Additionally, the high likelihood of empathetic involvement and the inherent complexities in relationships with families contribute to the unique nature of burnout in this context (Buckley et al., 2020).

2.1.2. Level of Burnout

The effects of burnout on employees, their families and clients, as well as on the workplace and businesses as a whole, may be devastating. When healthcare workers experience significant levels of burnout, the quality of their care and services may decline, which can have negative effects on patient safety. Poor performance, discontent with one's job, increased absenteeism, and employee turnover are all possible outcomes (Madinah et al., 2021).

There are three distinct but interconnected aspects to burnout syndrome: Emotional exhaustion, which includes mental and physical tiredness, depersonalization, which leads to emotional insensitivity; and diminished professional accomplishment, which causes discontent with job tasks, poor self-esteem, less peer interaction, and feelings of incompetence (Olaleye et al., 2022).

Delivering specialized care to critically ill and highly dependent pediatric patients amidst managing a demanding workload requiring intricate multitasking poses significant challenges for nurses. Consequently, the elevated stress levels within the workplace can lead to burnout, subsequently fostering dissatisfaction with one's job and contributing to high turnover rates (Alzailai et al., 2021).

Burnout syndrome presents a significant challenge across various professions, with healthcare workers being particularly susceptible. In hospital settings, burnout can lead to increased infection rates, prolonged hospitalizations, and interruptions in treatment. Effective interventions have been described to mitigate the adverse effects of burnout. Therefore, early identification of burnout and implementation of appropriate therapies

are crucial to enhance both qualities of life and quality of care for pediatric patients (Teksam et al., 2021).

The phenomenon known as burnout syndrome (BOS) was initially observed in non-medical professions, particularly in major corporations, where the alarming rate of suicides has recently become a cause for worry. This syndrome, known as workaholic, is characterized by an individual being completely absorbed by their work. It primarily affects those who have made a conscious decision to dedicate themselves to serving others in their profession (Malaquin et al., 2017).

Nurses experience burnout when they are overwhelmed by the demands of their jobs as a result of emotional and environmental stresses. Professional tiredness syndrome, or burnout, is a result of long-term exposure to stressful situations at work (Christianson et al., 2022).

Nurse burnout is directly associated with the practice environment, which encompasses more than just the physical surroundings. It also includes peer interaction and institutional policies. Based on the findings of the current study, the practice environment serves as an external factor for nurses. If the working environment is favorable, it will lead to a decrease in job dissatisfaction and burnout, an increase in the intention to remain in the hospital, and an improvement in the quality of patient care (Dordunoo et al., 2021).

The Pediatric Critical Care Unit Societies Collaborative brought attention to the negative effects of burnout in PCCUs and urged additional efforts to address this issue. High rates of burnout (33–70%) are common among critical care unit (CCU) nurses in Western nations (See et al., 2018).

Occupational stress, which develops from sustained exposure to both internal and external sources of stress, can worsen emotional weariness and depersonalization, as well as diminish professional success. Workplace stress can manifest in many forms, including but not limited to: long hours for little income, conflict with coworkers, complicated

procedures, and insufficient personal and material resources (Vasconcelos and Martino, 2018).

Burnout is a disorder that arises from the specific conditions of the workplace, particularly the occupational stress experienced by health and education workers who frequently contact with others. Consequently, this illness is extensively examined in these professions. Health professionals are at risk of exhaustion during work hours, which can hinder their ability to provide appropriate care and potentially impair both patients and the whole health service (Garcia et al., 2019).

Increasing our understanding of occupational risks requires a focus on healthcare workers' experiences with burnout syndrome as it pertains to direct contact with critically ill patients, patients' families, emergencies, and death (Alvares et al., 2020).

Pediatric critical care unit burnout is on the rise due to the high stress levels experienced by pediatric nurses who treat children with opioids, deal with anxious parents, and deal with tragic events like a child's death. These situations are inevitable for pediatric nurses and must be handled appropriately to prevent burnout (Braun, 2023).

High burnout rates in critical care settings can be attributed to factors such as heavy workloads, rapid technological and guideline changes, efforts to provide high-quality treatment, and the emotional problems of caring for critically ill patients and their families (Tawfik et al., 2017).

A safety culture lessens the likelihood of burnout and sickness among health professionals by enhancing organizational climate and daily health services. Perceptions of safety culture are poorer and patient safety concerns are larger in Burnout Syndrome (Ramos, 2019).

The field of critical care is inherently demanding due to the constant presence of severely ill patients and the frequent encounter with mortality. The job necessitates proficient technical expertise, precise

abilities, intense focus, rapid cognition, and emotional regulation to address matters concerning patients and their families. Furthermore, it demands a constant pursuit of scientific advancements in light of the specialty's ongoing technical and scientific progress in recent years. These factors can burden professionals and heighten their susceptibility to burnout development (Aragão et al., 2021).

Burnout not only impacts nurses but also affects pediatric patients and the overall efficiency of healthcare facilities. This is evident considering the challenges faced by burned-out nurses in establishing rapport with pediatric patients and delivering high-quality care. The prevalence of burnout among healthcare workers imposes significant costs on organizations due to decreased work quality, elevated employee turnover, and increased absenteeism (Simonetti et al., 2021).

Physical signs of burnout include lethargy, headaches, poor energy levels, low motivation, a negative attitude towards others, social isolation, and chronic exhaustion. It also causes behavioral symptoms such a lack of self-confidence, a lack of initiative, tardiness, sick days, resignation, aversion to feedback, decreased output, isolation, negative attitudes towards work, and dissatisfaction with one's employment (Erdoğan & İnan, 2018).

Burnout poses significant financial burdens for both organizations and employees due to its various symptoms, such as diminished physical and psychological energy, sleep disturbances, headaches, fatigue, and depression. These manifestations contribute to higher rates of absenteeism and employee turnover, ultimately impacting the quality of care provided (Mudallal et al., 2017).

Green & Kinchen, (2018) highlighted the evidence indicating that burnout negatively impacts personal relationships and domestic life, and is associated with an elevated risk of physical ailments such as hypertension, cardiovascular disease, sleep disturbances, and susceptibility to influenza.

Higher prevalence of burnout among nurses who work in critical care environments. 47% of critical care practitioners have reported experiencing burnout. High acuity, complicated ethical challenges, and death are inherent to critical care employment, putting providers at risk of poor health effects and fatigue (Buckley et al., 2020).

Nursing staff in PCCUs are confronted with children facing life-threatening illnesses or injuries, traumatic events, complex psychological and social circumstances, chronic conditions with long-lasting implications, ethical dilemmas, palliative care, and even death. Consequently, employees in PCCUs may experience significant levels of burnout (Crowe et al., 2021).

Nursing staff in pediatric critical care are more likely to experience burnout than healthcare workers in other fields. This is because they are constantly exposed to high-risk circumstances. The work is intense, and they are witness to the physical and mental toll that newborn and child fatalities take. Reducing a feeling of personal achievement can lead to a loss of motivation, which in turn lowers productivity and performance at work (Butcher al., 2023).

Živanović et al., (2019) indicated that burnout, particularly its primary component of emotional exhaustion, is closely linked to the frequent exposure of critical care unit nurses to moral distress, leading them to feel inadequate in their patient care roles. Additionally, a significant factor contributing to burnout in critical care units is the high level of direct responsibility for patients' lives and health, coupled with a comparatively low level of autonomy in making professional judgments.

A professional experiencing burnout feels spent and depleted, and they rarely want to go back to work the next day. This issue is exclusive to the work environment. Critical care nurses are commonly believed to be at a high risk of experiencing burnout due to their frequent involvement in life-threatening situations. Thus, it is recommended that nurses are the

group that encounters the highest level of stress and burnout among health workers (Mohamed et al., 2016).

Workplace stressors include heavy workloads, long hours, inadequate resources, and interpersonal conflicts among coworkers were found to contribute to burnout, along with sociodemographic factors like gender, age, and years of experience (Shahin et al., 2020).

Burnout in nurses can be analyzed based on four factors: individual, managerial, organizational, and work-related. They contend that these traits may affect nurses' capacity to care for patients, and that the result of burnout syndrome is a sharp rise in nurse turnover as well as poor job performance (Manullang et al., 2021).

When health professionals deal with burnout syndrome on a regular basis, it can trigger intense emotional reactions that, if left unchecked, can harm their physical and mental well-being. Children are at higher risk of morbidity and mortality as a result of burnout-related declines in performance and increases in healthcare-associated mistakes (Ramírez et al., 2021).

The lower number of pediatric nurses compared to general service nurses and the overall population of healthcare workers may explain why this subset of nurses has received less attention from researchers. The specialization required to care for children, who are often viewed as a vulnerable population, the great opportunity for empathic engagement, and the inherent complexity of the relationships with families may make pediatric nurse burnout distinct from adult care nurse burnout (Buckley et al., 2020).

2.1.3. Nursing and Burnout

Nurses, as part of their job, interact with a variety of individuals, such as patients, families, and colleagues, which exposes them to the risk of burnout. Nurses may be particularly susceptible to burnout due to factors such as the additional time required to address patients and families'

demands, a lack of respect, teamwork, and collaboration among nurses and other healthcare professionals, as well as nurses' inadequate coping mechanisms to manage these sources of stress (Khatatbeh et al., 2022).

Healthcare executives are worried about the effects of burnout on nurse retention, work happiness, performance, and even patient safety especially child. Reduced attention, extension, poor performance on the job, are possible effects of burnout on nurses. Medication errors have been linked to subpar work performance (Montgomery et al., 2021).

Working in a CCU is a hard job that involves caring for children patients in severe condition, long work hours, and sometimes requires quick decisions. The emotional strain these traits place on the healthcare workers engaged can lead to burnout, a syndrome associated with prolonged exposure to work-related pressures (Betsiou et al., 2022).

Alotni & Elgazzar, (2020), reported that CCU nurses are more prone to experiencing higher levels of burnout and job dissatisfaction compared to nurses in other wards.

Nurses have a significant role in delivering treatment in critical care units as part of inter-professional teams, where the care they give is more intricate compared to other areas of the hospital. CCU nurses are frequently required to meet the numerous responsibilities allocated to them, necessitating regular and prompt responses (Alzailai et al., 2021).

High nurse burnout contributes to job unhappiness and high nurse turnover, which results in a staffing shortage and increased stress (Cishahayo et al., 2017).

Critical care personnel are obligated to handle mortality, suffering, family sentiments, as well as the cessation and discontinuation of life-sustaining interventions, all of them necessitate substantial technical and human resources. These challenging circumstances and their consequential emotional effects necessitate a significant ability to adjust and adapt (Malaquin et al., 2017).

Compared to other healthcare professionals, nurses are more likely to experience burnout due to the demanding work environment they work in and their frequent interaction with critically sick patients who have differing prognoses and levels of suffering (Vasconcelos & Martino, 2018).

It causes unsuitable psychological and physical effects, including decreased performance and job satisfaction, depression, and serious family issues, as well as unfit physical conditions that lead to physical exhaustion, motivation loss, depression, and anxiety among healthcare practitioners suffering with conditions such as cardiovascular diseases (Alotni & Elgazzar, 2020).

Nursing burnout is correlated with the mental and physical difficulties encountered in the workplace. The mental obstacles associated with nursing burnout encompass managing patients, their families, a wide range of conditions, therapies, and various forms of treatment and drugs. Physical issues arise from the prolonged work hours resulting from a heavy workload imposed by insufficient staffing, leading to reduced sleep duration and limited leisure time. This can give rise to interpersonal conflicts and psychological issues due to insufficient leisure time for recuperation. These circumstances, in conjunction with understaffing and the demanding physical nature of the job, can contribute to burnout. An essential aspect of nursing involves promptly addressing patients' demands, which becomes unattainable when a nurse suffers from burnout. The quality of care is impacted by this (De la Fuente-Solana et al., 2020).

Pediatric nurses were found to have low levels of personal accomplishment along with moderate to high degrees of emotional exhaustion and depersonalization. Hence, nurses were either already experiencing burnout or were very likely to experience it in the future (Kaya & İşler, 2021).

The nursing profession requires a high degree of social responsibility. Day-to-day issues that may occur include job overload, a

lack of autonomy or decision-making authority, and challenges in balancing work and family obligations. These elements can all lead to burnout syndrome, which can result in symptoms like irritation, depression, anxiety, sleep disturbances, exhaustion, memory issues, and substance misuse (Pradas-Hernández et al., 2018).

Healthcare workers, particularly nurses, are significantly affected by burnout, which is exacerbated by several personal and work-related factors that contribute to the development of this syndrome. This susceptibility has a direct impact on the quality of care provided, leading to a decrease in nurses' productivity and attentiveness towards their patients. The reason for this is the intricate dynamics of the working environment for these professionals, which involves frequent encounters with death, as well as the anguish and distress experienced by patients and their families (De la Fuente et al., 2020).

Pediatric nurses may face stress-inducing circumstances in their professional environment, including the responsibility of caring for patients across various age groups, a demanding workload, concerned parents, and potential exposure to abuse and violence. Stress has a significant role in the fatigue and job discontent experienced by pediatric nurses (Kaya et al., 2021).

Nurses who work in a critical care environment, such as an ICU, encounter a challenging daily work routine, elevated rates of illness and mortality, distressing situations, and persistent ethical dilemmas. The combination of these pressures, together with insufficient staffing, limited resources, and an inability to cope, contributes to the high prevalence of Burnout Syndrome among critical care providers (Mohamed et al., 2022).

Among healthcare workers, especially nurses, burnout is a widespread occurrence. Nursing is acknowledged as one of the most taxing professions. The everyday struggle to maintain empathy in a work setting

full of several obligations causes burnout in nurses, which impacts their capacity to deliver care successfully (IA Filho & Meneses, 2023).

2.1.4. Management of Nurses Burnout

Health care workers in Arab nations are more likely to experience burnout because their healthcare systems and funding are insufficiently developed, overburdened, or expanding quickly in response to changing illness patterns and population health. Many Arab nations suffer from a severe lack of employment obligations, which makes people vulnerable to burnout (Alotni & Elgazzar, 2020).

Strategies that target professionals typically aim to mitigate chronic organizational stressors, such as unfavorable work environments, insufficient personnel leading to increased workloads, and inadequate resources for optimal working conditions (Simonetti et al., 2021).

Burnout arises from moral distress, necessitating the establishment of a favorable work environment to mitigate the likelihood of moral distress and burnout. Additionally, fostering support and trust among all members of the care team are crucial to bolster self-assurance and prevent the triggers of moral distress and burnout (Siswoyo et al., 2021).

In order to develop effective strategies for treating and preventing burnout, it is crucial to possess in-depth knowledge of the variables associated with this syndrome, accurately estimate the prevalence of each of its dimensions, and have a comprehensive understanding of the professional context in which it occurs (Mansour & Hussien, 2020).

To effectively avoid and intervene in burnout within this nursing group, it is essential to understand the unique elements associated with it. Consequently, the purpose of this narrative review is to compile and evaluate the existing literature on prehospital emergency care nurses' risk of burnout syndrome (IA Filho & Meneses, 2023).

The frequency of burnout in nurses can be attributed to several factors, including a scarcity of nursing staff, insufficient workplace

support, the demanding task of caring for severely ill patients, perceived disputes with patients or colleagues, and a heavy workload. Moreover, the significant level of burnout is correlated with dissatisfaction about salary, chances for career progression, availability of study leave, inadequate staffing and resources in the workplace, and the exclusion of nurses' involvement in hospital management (Mahmoudi et al., 2020).

When nurses, particularly those working in intensive care units, are under too much pressure, patient care suffers and quality drops. Therefore, it is imperative for health services to prioritize the mental and physical well-being of nurses. It is advisable to explore structured interventions that incorporate spiritual elements in order to reduce stress and improve the overall well-being of nurses (Al-Osaimi et al., 2023).

It is still difficult to find a workable, long-term solution to the problem of burnout in the workplace, despite the fact that its awareness has grown in recent years. There is a dearth of strong data to back any particular intervention that targets BOS (Nolan et al., 2020).

2.2. Nurses Workload

A nurse's productivity can be enhanced by combining the physical and mental aspects of their workload. In order to increase nurses' productivity and prevent physical, emotional, and social difficulties brought on by excessive stress and a demanding workload, it is important to accurately and promptly assess nurses' psychological health (Sobhani et al., 2023).

The mental strain that comes with being a professional nurse for twenty-four hours a day would be overwhelming. It could be the result of constant adjustments to provide round-the-clock nursing care, unclear task requirements, restrictions on nurses' abilities while giving care, a lack of drive, and the psychologically burdened state of mind of the nurse (Destiani et al., 2020).

Nurses work around the clock and have a direct impact on pediatric patients' quality of care, it is crucial to accurately forecast the number of nurses needed, manage their workload, and improve work design (Othman et al., 2022).

Nurses are more passionate about their work when they have a greater sense of benefit. The turnover rate can be effectively decreased, nurses can enhance their professional identity as nursing staff, become more engaged in their work, and provide pediatric patients with higher-quality care when they had a positive experience, met professional expectations, and improved their sense of professional benefits during the clinical nursing experience (Li et al., 2023).

Compared to other units, critical care units feature a larger nurse-to-patient ratio; also, nursing professionals spend more time with patients in critical care units and handle all aspects of patient care. The unique circumstances of the patients admitted to these units show how crucial moral judgement is while providing care for patients (Zahednezhad et al., 2021).

Depending on the degree of patient care required, the workload for nurses can be broadly divided into three categories: light, medium, and heavy. Pediatric patients with mid-clinical severity typically require longer hospital stays, and they score highly on nurse workload evaluation methods. A higher workload directly affects nurse retention since it makes nurses feel as though they can't give their patients the kind of care they need, which raises the turnover rate (Khanade & Sasangohar, 2017).

Understaffing and a high workload for nurses lead to low hand hygiene compliance, which in turn results in subpar treatment for infection prevention and control (Nieri et al., 2018).

A lower pediatric patient survival rate is the outcome of an increase in nursing workload, and this lower pediatric patient survival rate may be related to more patients receiving subpar treatment. The greater amount of

work required for each pediatric patient demonstrated how it may affect overall in-hospital mortality (Almenyan et al., 2021).

Critical care units are experiencing a rise in the influx of patients requiring admission. Within CCUs, nursing duties are constantly evolving and dynamic, posing growing challenges in managing nurses' workloads (Sardo & Príncipe, 2023).

The great complexity and intensity of pediatric patient care, PICU frequently have high workloads with few pediatric patients per nurse. PICU are more susceptible to burnout due to their heavy workload and lack of highly trained colleagues. Depending on a nurse's level of experience, caring for these challenging pediatric patients might have varying effects (Hoogendoorn et al., 2021).

A higher workload for nurses leads to a worse patient survival rate, which may be related to more pediatric patients receiving subpar treatment. Consequently, it can have an impact on the total amount of treatment that certain patients need (Reis et al., 2023).

Unhealthy work circumstances were cited by registered nurses as a contributing factor to the present nursing shortage. Workplace quality has a significant impact on nurse turnover; increased workloads impact nursing turnover rates and compromise pediatric patient safety and quality of treatment. Nurses who labor in unfavorable circumstances may become overworked and exhausted. This can lead to shorter reaction times, a higher frequency of medication errors, and a decreased ability of nurses to recognize changes in pediatric patients' conditions all of which put pediatric patients at danger (Qureshi, 2020).

The difference in professional tasks, driven by environmental or inherent variables, can result in excessive workload, which undermines the quality of care and jeopardizes patient safety (Fagondes et al., 2016).

The Number of inadequate nurses in hospitals is increasing, and they are given unreasonably heavy workloads. 55% of hospital nurses said

they don't have enough time to spend with patients especially pediatrics, and 33% said they were prepared to leave their current employment, according to a recent job satisfaction poll (Phillips, 2020).

It can affect the quality of nursing care when nurses are unable to deliver complete care in line with professional standards. Workload may also have an impact on nursing care quality by making nurses emotionally exhausted (Maghsoud et al., 2022).

There is a higher likelihood of death and illness in newborns when there is a greater workload and fewer staff members available. Neonatal intensive care units (NICUs) are different from adult and paediatric intensive care units because they provide care to patients with a wide range of needs, from very intense care to almost normal maternity care. This poses difficulties in terms of unit personnel (Ohnstad et al., 2023).

Nurses make up the majority of those who directly care for hospitalized pediatric patients; in addition to giving treatments, they work to improve the quality of care for both pediatric patients and family cares. As the number of nurses declines, it becomes harder to provide patients with high-quality bedside care, and adverse outcomes like nosocomial infections and falls increase (Racy et al., 2021).

The turnover of patients impacts this excessive workload since it requires significant physical and cognitive exertion, leading to unsatisfactory outcomes in terms of work performance, diminished communication, and reduced team engagement. The impact of movements has a direct effect on the workload of the nursing staff, which in turn determines the number of professionals required to provide the care needs of patients (Trovó et al., 2020).

2.2.1. Dimensions of Nursing Workload.

Hoogendoorn et al., (2021) documented that nursing workload encompasses two primary dimensions: The first dimension pertains to the physical effort required to execute patient care tasks and its impact on the

nurse, measured by the duration needed to complete nursing duties. This aspect, termed "objective workload," is quantifiable and objective. The second dimension focuses on the cognitive or mental strain experienced by nurses while performing their tasks.

2.2.2. Levels of Nurses Workload

Unit workload depends on nurse-patient ratio, staffing, and skill mix. Compare unit patient outcomes to nursing staffing using the nurse-patient ratio. Unit-level nurse workloads harm patient outcomes. Job-level nursing workload includes the amount of work done in a day, its difficulty, and the degree of concentration or attention needed ICU nurses versus operation nurses. Workload varies by nursing specialty or employment. This level includes time to finish work, rest breaks, and human (e.g., unlicensed active people) or technical resources. Interruptions disrupt task-level nursing burden, lowering performance and increasing patient adverse events such medication errors (Rashed et al., 2022).

The workload of nurses encompasses not just physical chores, but also complex cognitive tasks that are integral to the nursing profession. The concept of workload is primarily linked to an individual's cognitive capacities and the manner in which information is absorbed, processed, and ultimately translated into decisions and actions (Yusefi et al., 2019).

An excessive workload may affect all aspects of nursing practiced in the NCCU, including inadequate hand cleanliness, poor device insertion and handling, and poor communication. A reduced nurse-to-patient ratio would result from facilitating an acceptable working level, freeing up staff members to concentrate on the current task. This would reduce the possibility of infections unintentionally spreading from one pediatric patient to another (Küng et al., 2019).

The condition of pediatric patients under treatment, patient volume, and nursing assignments all contribute to the workload nurses face. Nurses in intensive care units and emergency rooms may experience heightened

stress due to the condition of their pediatric patients. Mental strain is influenced by workload expectations, additional responsibilities, and performance objectives. Individual factors such as marital status, work experience, and gender also play a role (Aprilia et al., 2019).

Most nurses find it challenging to articulate their responsibilities and acknowledge that their workloads have grown. Nurses often end their shift with unfinished nursing tasks because they deal with time-consuming non-nursing tasks. Some of these non-nursing tasks, like carrying food trays, checking the medication refrigerator thermometer, and delivering samples to the laboratory, don't even require the skills of a registered nurse laboratory (Ihorindeba, 2017).

In critical care settings, there is a correlation between the amount of work nurses do and the quality of care they provide. Research indicates that heavy nursing workloads have a detrimental impact on nurse and patient outcomes. In the context shortage of nurse, there is a limited allocation of nurses to critical care areas, maybe due to a lack of prioritizing or interest in critical care (Banda et al., 2022).

Rasooly et al., (2021) documented that elevated mortality rates, hospital-acquired harm, nurse-patient misunderstandings, and compromised nursing care delivery are all associated with high nurse workloads and adverse patient outcomes. Nursing workload is defined as the level of performance required to fulfill nursing responsibilities, often described as the ratio of physical and cognitive demands to an individual's available resources.

Emergency room overcrowding is a serious issue that still has to be resolved; to make matters worse, burnout among nurses who feel unworthy can lead to an excessive workload and a decline in their general well-being. According to a WHO assessment, there will be major consequences if the scarcity of healthcare personnel is not addressed right away, including

disruptions in the care and treatment of chronic diseases and a lack of healthcare access for billions of people worldwide (Kaya & İşler, 2022).

Dye & Wells, (2017) observed that the work environment, time pressure, and individual experiences significantly influence one's subjective perception of workload burden. They delineated an exogenous and endogenous variable paradigm for nursing workload, with exogenous variables being external factors such as patient complexity, staffing ratios, and disruptions, while endogenous variables encompass internal factors like a nurse's coping ability, knowledge, experience, energy level, and organizational skills.

Küng et al., (2019) noted that the frequency of adverse pediatric patient events may be influenced by nurses' workload, defined as their direct patient supervision. When nurses face high pediatric patient loads and heavy workloads, the likelihood of adverse pediatric patient events increases. Adverse incidents in hospitals not only harm pediatric patients directly but also result in significant costs for the healthcare system. Previous research utilized three indicators to gauge nurses' workload: the nurse to bed ratio, nurse-to- pediatric patient ratio, and pediatric patient acuity level.

2.2.3. Workload in Nursing

Nurses employed in technologically advanced and intricate settings, such as intensive care units, bear a significant level of accountability while experiencing limited autonomy. The requirement to address the needs of patients and their families, as well as address their emotional concerns, along with the necessity of making prompt decisions in some circumstances, results in a significant amount of physical and mental burden (Mohammady et al., 2020).

Nurses who are in charge of the NCCUs have a different workload and work assignments compared to other units. Evidence suggests that higher nurse workloads will increase the risk of missed nursing care.

Missed nursing care in the NCCU will eventually worsen the neonatal prognosis. This is a major problem in developing countries, which currently still have a high neonatal mortality rate (Utomo et al., 2022).

Workload is a multidimensional and complex construct which is affected by external task demands, environmental, organizational and psychological factors, perceptive and cognitive abilities; nursing workload at hospital is related to care needs of patients and to standard of care intended. A range of factors and the size of professional team contribute to workload (Elsayad et al., 2017).

The nursing workload is determined by the duration of time that the staff spends on their tasks, which is directly impacted by the requirements of the patients. The patient's level of reliance, the severity of the condition, the institution's atmosphere, the characteristics of the work, the physical space, and the profile of the team's workers can all impact these activities. An imbalance in professional activity, caused by external reasons or inherent to the profession, can result in excessive workload, which impairs the quality of service and expose to danger patient safety (Fagondes et al., 2016).

Several factors contribute to the shortage of nurses, including dissatisfaction with one's job, lack of motivation, and an increase in retirements caused by the country's failure to prioritize new hires. This puts more strain on the profession and makes it harder to attract young workers (Asghar et al., 2022).

Nurses encounter a range of stresses, such as unfavourable work conditions, persistent exhaustion, difficult interpersonal dynamics, occupational risks, and high workloads, which can have an adverse effect on their professional competence (Babamohamadi et al., 2023).

One of the most difficult problems in health care around the world is the scarcity of nurses. The treatment patients receive isn't the only thing it impacts; nurses' motivation plummets, and their experience issues

including forgetfulness, impatience, exhaustion, overwork, overlapping duties, stress with shifts, and burnout (Momennasab et al., 2018).

Nursing workload is the time spent caring for children patients, whether directly or indirectly. Factors such as patients' level of dependence, disease complexity, professional profile, and institution characteristics influence this workload. Nursing workloads cannot be adequately measured by examining typical patient visits due to the multifaceted nature of patient care (Somensi et al., 2018).

The nursing profession is a vital one because of the many one-on-one interactions that take place between nurses and their patients, as well as the fact that nurses make up the largest demographic of healthcare workers (Yusefi et al., 2019).

Nurses frequently confront challenging and emotionally charged circumstances, such as the demise of patients. Furthermore, the requirement to provide exceptional care to patients with greater risk factors adds to the complexity of the workload. In addition to the physically demanding nature of nursing job, the mental demands also play a significant role in the overall workload of this occupational group (Bakhshi et al., 2019).

Nurses face excessive workloads in healthcare systems globally as a result of a shortage of nurses. This prevalent problem disrupts the quality of hospital care in all countries. To enhance safety and quality in hospital care and increase patient satisfaction, it is imperative to address the improvement of hospital work environments, including patient-to-nurse ratios, nurse participation in decision-making, and fostering positive doctor-nurse relationships (Ihorindeba, 2017).

Nurses have numerous difficulties as a result of the ambiguous job description and the excessive and inequitable nursing burden they bear. The inequitable allocation of workload among nurses has a detrimental effect on both the quality of patient care and the extent of motivation among

nurses. Hence, it is crucial to undertake research to analyses the workload of nurses. Workload can become excessive when workers are expected to carry out a large number of tasks within a restricted timeframe and with inadequate resources (Mersin et al., 2018).

Ensuring pediatric patient safety is a mission critical for nurses. Level of nurse staffing, workload, and education are the most critical organizational characteristics related with patient safety results (Bagheri et al., 2017).

Kaya & İşler, (2022) reported that the nurses working in paediatric emergency departments (PEDs) have demanding and challenging responsibilities, which subject them to exceptionally heavy workloads, both physically and mentally. Approximately 20% of all consultations are attributed to visits to the PED. There has been a significant continuous rise in the number of patients attending the PED. This has resulted in a higher workload in PEDs.

2.2.4. Management of Nurses Workload

Efficient management of workloads will lead to better work designs, which in turn improves job satisfaction, employee emotion, organizational performance, and the hospital's overall mission (Othman et al., 2022).

Research on nursing workload in various hospital units has demonstrated that employing a patient classification system (PCS) to assess the level of patient dependency in nursing care allows for quantifying the amount of nursing workload required for patients of different age groups (Rossetti et al., 2014).

Ensuring sufficient nursing staffing is now a crucial factor in upholding and delivering higher standards of care, leading to increased patient satisfaction and enhanced clinical results. An escalation in nursing workload leads to a decline in patient survival rate, which can be attributed

to the heightened provision of poor care for certain patients (Almenyan et al., 2021).

Improved documentation of service quality, higher levels of professional satisfaction among nurses, and lower rates of stress and burnout can all be achieved through the establishment of nursing workload monitoring and assessment systems (Fasoi et al., 2021).

Nurses play a crucial role in the healthcare system and ensure that health services are efficient and effective. When it comes to the success and improvement of pediatric patient health, health organizations are completely dependent on their nurses. Nurses are the major human resource in hospitals and play a crucial part in this. The nursing administration is confronted with the issue of an overwhelming workload due to the rise in the number of patients being referred to hospitals (Ebrahimi et al., 2017).

The assessment of nursing workload has been the focus of numerous research, particularly in recent years, as healthcare providers strive to minimize nursing expenses while enhancing the quality of healthcare. It is imperative to establish nursing workload monitoring and measurement methods in order to accurately record the quality of health services rendered, enhance nurses' professional contentment, and mitigate the frequent occurrence of stress and burnout (Fasoi et al., 2021).

In order to ensure long-term health, safety, comfort, and efficiency in nursing work, it is reasonable to arrange labor needs such that nurses are not given more or less work than what is necessary (Bakhshi et al., 2019).

When providing care to inpatients, it is crucial to consider both the amount of time required for nursing tasks and the necessary technical abilities. Patient reliance, patient acuity, and nursing workload have a direct impact on the quality of nursing care. Nurses who work in healthy working environments are less likely to experience high workload burnout and job dissatisfaction. Instead, they are able to cultivate strong nurse-patient

relationships and deliver high-quality patient care. Consequently, patients are more inclined to recommend the hospital (Goh et al., 2018).

The analysis of nurses' workload can be examined from various perspectives, including the tasks performed based on their primary functions and additional tasks, the number of patients requiring treatment, the work capacity determined by their level of education, the time allocated for their work within the daily work hours, and the overall availability of facilities that facilitate their efficient completion of tasks (Noprianty et al., 2020).

Subjective workload perceptions among nurses can serve as valuable indicators of work system dysfunction. These perceptions can provide a deeper knowledge of the impact of nursing workload on patients, going beyond the traditional focus on patient-to-nurse staffing ratios. Additionally, they can offer fresh insights for research on interventions to address these issues. In order to make progress in this field of science, it is necessary to have accurate and reliable methods for measuring the subjective workload (Tubbs et al., 2018).

The number of employees required to provide safe patient care is ascertained through the use of workload measurement methods. Different systems classify workload differently. For instance, some may classify patient transport as an indirect form of patient care, while others may group it under the heading of "other activities." When models have different definitions, it is challenging to compare effort, staffing, and results (Swiger et al., 2016).

2.3. Medication Error Nurses Knowledge

Children in critical condition in the PCCU are highly susceptible to experiencing Medication Errors (MEs) due to the administration of numerous medications, the severity of their sickness, the presence of other medical conditions, and the limited safety margin of particular medication errors. The WHO initiated a global campaign on March 29th, 2017, with a

duration of 5 years, aimed at tackling the issue of medication errors. The objective of this program is to achieve a 50% reduction in severe and preventable harm caused by Medication errors in all countries (Kumar et al., 2022).

Medication errors have serious repercussions on patient safety and can result in patient harm, impairment, and even fatality as a result of deficiencies in healthcare establishments. One of the main explanations for the rise in MEs is the process of corporatization, which has negatively impacted health systems, in addition to the influence of human factors. Furthermore, errors frequently stem from not only a single element, but rather a sequence of events that can surpass all measures implemented to prevent harm or pain to the patient (Dionisi et al., 2022).

Critically sick children, especially neonates and preterm infants treated in these settings, are at a higher risk of MEs due to the high-stakes scenarios that surround them, such as weight-based medication errors and the prompt delivery of medications. Adult patients have a medication error rate that is two to three times lower than that of children (Brennan-Bourdon et al., 2020).

Prescription errors, dosage-related errors, look-alike-sound-alike medications, employee exhaustion, knowledge gaps, and environmental factors that impact healthcare workers' productivity are some of the main factors that contribute to medication errors. Any step in the medication administration process, from receiving prescription orders from doctors to preparing dosages, transporting medications from the pharmacy to the unit, and finally giving patients their medications, is susceptible to medication errors (Awan et al., 2023).

Several variables impact the secure administration of medication. There are differing opinions regarding the adequacy of knowledge and skills possessed by registered nurses (RNs) in ensuring safe medication management. Some argue that this inadequacy may be due to normalization

of risky behavior and interruptions, reliance on technology with design flaws, time constraints, poor communication, lack of leadership, and out of date policies and guidelines (Fathy et al., 2018).

The high frequency and harm rates of medication errors involving pediatrics patients warrant special attention. It is the nurse's responsibility to assess the therapeutic and potential adverse events of each patient's medication, as well as the patient's dosage, route of administration, timing, and correctness (Al-Otaibi et al., 2018).

Several variables contribute to medication errors in critical care units. Inadequate attention to medication safety principles by the health care team, environmental factors like insufficient lighting and noise in the ward, management factors like the absence of a clinical pharmacist in CCUs, and medications agents like visual, auditory, and written similarities of medication are all factors that contribute to this problem (Awan et al., 2023).

They are considered the primary sources of patient harm that may be easily avoided, and they significantly contribute to the occurrence of adverse medication events in hospitalized patients. Additionally, they are frequently the main cause for hospital readmissions. Preventable medication errors result in adverse drug events, which can cause extended hospitalization substantial escalation in healthcare expenses, and, in some cases, even death (Umoh & Opue, 2021).

The factors that contribute to the complexity of drug administration include the quantity of drugs given, the frequent alteration of prescriptions, the necessity to adjust drug dosage based on the patient's weight, the potential for incompatibility between intravenous (IV) drugs, and the rate at which prescriptions are issued. Errors can arise at any point in the medication management process, hence affecting the entire medication management process (Di Muzio et al., 2016).

Patients in the ICUs are administered a greater quantity of medications compared to patients in other units. ICU patients, who may experience drowsiness or unconsciousness, are unable to monitor and report drug side effects. As a result, these patients are particularly susceptible to medication errors in the ICU due to the complex nature of their care, severe illness, and the administration of life-sustaining treatments (Abukhader & Abukhader, 2020).

Emergency and intensive care services have also reported a greater prevalence of medication errors. Children, including newborns and premature infants, are more susceptible to MEs in these environments due to the high-risk circumstances associated with critically ill children. This includes errors in calculating prescription dosages based on weight and ensuring timely administration of medications (Brennan-Bourdon et al., 2020).

Medication errors are a significant health issue that can happen at any stage of drug therapy. This problem is particularly critical in the pediatric population, as they are at a higher risk of experiencing ill effects from medication errors compared to adults. When it comes to the administration stage, the main causes of mistakes in pediatrics are forgetfulness or lapses, which are then followed by errors resulting from a lack of awareness of pediatric procedures (Ruano et al., 2016).

Administering medication during at work, extended shifts provide a challenge due to the need for thorough communication among registered nurses in order to prevent errors and ensure the safety of the neonate. It is anticipated that their practices will be diligent and well-structured in order to work in accordance with the fundamental principles of medicine administration (Soomar et al., 2019).

Children with more intricate healthcare needs, particularly those in the ICU, have a higher likelihood of encountering preventable and potentially harmful drug events ADEs if they need a larger quantity of

prescriptions in comparison to pediatric patients with fewer medication needs. While there is substantial research about drug delivery protocols involving RNs, our comprehension of these protocols and the interventions that can enhance patient safety is often deficient (Muroi et al., 2017).

Most infants are not born prematurely and they not need a large amount of medicine in the first month of life. However, newborns hospitalized to the NICU are particularly susceptible to medication errors due to their need for several drugs, small stature, and physiological immaturity. Furthermore, they may have deficiencies in their capacity to counterbalance the consequences of these errors and are incapable of effectively communicating with their healthcare providers (Pawluk et al., 2017).

Medication errors occur as a consequence of certain identifiable conditions in healthcare environments. These factors can be widely categorized as; Increased RN workload from several admissions, shifts, and tasks makes them forget to examine medicines before administering. Staff expertise varies with practice and experience; a beginner nurse may make more mistakes than a veteran RN. Experience doesn't mean senior RNs can't disclose medicine preparation or administration errors. Many healthcare facilities administer drugs by uncertified, dangerous, and unlawful personnel (Soomar et al., 2019).

Some additional factors that can increase the likelihood of errors in the CCU include: the patient's illness severity and complexity, the availability of their chronic medication list, the use of sedation and mechanical ventilation, the patient's age as children, the inexperience of the provider, the lack of communication and supervision among junior staff, the high patient to nurse ratio, the difficulty of the working conditions, the frequency and complexity of medication changes, the lack of standardization in dosing, the inaccurate estimation of the patient's weight, the necessity of life-saving interventions, the number and complexity of

medical interventions, the duration of the patient's stay in the CCU, and the use of novel treatments (Laher et al., 2021).

Administering medication in busy long shifts is challenging as this requires a comprehensive communication among RNs to break the chain of error and protect neonate's life. Their practices are expected to be vigilant and organized to operate by following the fundamental principles to perform medication process. However, medication errors are the end results of some known factors in healthcare settings. These factors can be categorized commonly as, increased workload of RNs dealing with multiple admissions, shifts and assignments, making themselves inattentive to review drugs before administrating, the level of staff expertise varies with the practice and experience, for example the major errors might happen from a novice nurse rather from a senior RN. Although, experience doesn't guarantee, in any case that senior RNs can never admit errors in medications preparation or administration. Many healthcare facilities offer medication administration via uncertified professionals that are unsafe and illegal. These facilities have no proper administration record or no any filing for medication prescription and administration. EMAR is a huge Information technology support in this case, which keeps a track of doctor, nurse and pharmacist at a similar time making a loop of medication safety and It has been found that often staff's practice medicine through different techniques in different steps as they lack expert training in neonatal management, which ultimately fails to follow the medication administration safety policies in professional practice intended to ensure greater impact on lives (Soomar et al., 2019).

The medication-use procedure in NCCU is notably intricate due to the extensive utilization of intravenous (IV) administration routes, weight-based tiny dosages, numerous calculations and dilutions, frequent off-label use, and the utilization of unlicensed drugs. Due to the increased risk of harm associated with high-alert medications when used incorrectly, it is

important to employ proactive risk management measures to optimize the medication-use processes (Kuitunen et al., 2022).

One key factor in addressing medication errors for nurses is the miscalculation of medication dosages. Dosage miscalculations arise through a range of causes from simple math errors to inadequate training and proficiency with more high- risk medications such as heparin, insulin and vasopressors. Miscalculations of drugs can come down to clerical mistakes, such as numbers containing trailing zeros or even an improperly placed decimal point (Karim, 2022).

Pediatric patients in a critical care setting receive treatment that could save their lives. Due to the increasing complexity of the interfaces among pediatric patients, medical technology, and interdisciplinary teams providing treatment, there is a high potential for adverse events and major mistakes (Adly et al., 2020).

The American Medical Association (AMA) classifies medical errors into five categories; the most prevalent of these is medication administration errors, which happen when patients receive a different substance than what was recommended to them. Prescription, delivery, availability, patient, and reporting were the categories used to classify medication errors (Kazemkhanloo et al., 2020).

They are right patient, right drug, right dose, right time, and right route. Errors associated with these Five Rights may be grouped differently, from Five Rights to 15 Rights however, based on the data collected, we added documentation errors and wrong technique, along with the Five Rights, to create a total of Seven Rights (Kim et al., 2018).

The last phase in the medication administration process begins with the prescription of medication by a physician and ends with its storage and delivery by pharmacists. Nursing is the last link in the chain of care that can lead to medication administration errors, but this is true for all medical professions (Alrabadi et al., 2020).

The most common administration errors include incorrect timing of injections, administering medication to the wrong patient, using an incorrect dosage in the injection, administering the wrong drug, and administering the drug through an incorrect route (such as administering intravenous injections instead of intramuscular injections). Additional medication delivery errors commonly observed include the omission of drug orders, absence of a drug form, and failure to administer the prescribed medication (Fathi et al., 2017).

Medication errors are a persistent issue linked to nursing practice, particularly the process of drug delivery. The human aspect linked to drug errors is attributed to a deficiency of understanding. In addition, the lack of attention and proper care in nursing is the mindset that leads to a mistake in administering medication (Ben et al., 2023).

Medication errors can cause a lot of problems, like less effective treatment, more effort and money, legal issues, and most importantly, harmful impacts on patients. Therefore, in order to start a successful therapy process and lessen the pediatric patient's injury, causes or circumstances related to these mistakes should be eliminated (Ponnusankar et al., 2017).

2.3.1. Nurse Knowledge about Medication Errors

Nurses are regarded as vital members of the medical team in clinics. One of the primary responsibilities of nurses is the administration of medications to patients. It is important for individuals to be aware of the need of organized prescription recognition in order to avoid potential dangers and possible complications that may arise from medication errors (Alrabadi et al., 2020).

The vast majority of pediatric patients' drugs are given by RNs. Therefore, their involvement in safe drug administration procedures is crucial to maintaining inpatient medication safety through high-quality medication management. Despite the fact that the medication-use technique

involves multiple disciplines, all drugs are administered and monitored by RNs (Muroi et al., 2017).

Nurses are unavoidably responsible for the administration of medications and therapies in critical care or intensive care units (ICUs) and thus are more likely to experience medication administration errors (MAEs) (Santos et al., 2020).

The work of nurses in the hospital setting is physically and psychologically demanding, which can result in burnout, stress, and mistakes. Highly demanding work situations might exacerbate stress levels in individuals, hence heightening the likelihood of medication errors (Sabzi et al., 2019).

The responsibilities of a neonatal nurse at NCCU involve identifying and reporting of any medication errors, as well as the assessment of their performance to ensure the safe and precise production of medication for neonates. To mitigate the likelihood of medication preparation errors, nurses can engage in discussions regarding the risks associated with incompatible medication, as well as the safe methods for preparing and administering medications. One crucial duty of nurses that demands careful focus is the task of medicine preparation. Nurses must maintain their focus throughout this procedure (Fathy et al., 2018).

Nurses, as the largest group of health service providers, play a key role in the continuity of primary care, promoting and maintaining health at different levels of the health care delivery system. In this regard, nurses are expected to provide the highest level of primary care based on scientific findings and acquire the needed capability and skill in making clinical decisions in providing the care by reviewing the care methods (Azami et al., 2020).

Nurses must consistently adhere to the Standard Operating Procedures (SOPs) for drug administration, which are written guidelines that outline the specific details of organizational operations, including

when, where, by whom, and how they should be carried out. The administration of drugs follows a set of SOPs which are based on six key concepts. These principles, which are the responsibility of nurses, include ensuring the correct patient, the correct drug, the correct timing, the correct route of administration, and the correct documentation (Lalujan & Musharyanti, 2021).

Depending on the type of ward and health information system used, nurses spend around 27% of their time on medication-related duties. Many different types of healthcare providers are involved in the complicated process of medication delivery to inpatients. The medication process can be impacted by staff-related factors like knowledge and experience, patient-related factors like medical condition, and system-related problems like workload and communication failures (Savva et al., 2022).

Medication errors was also identified that better nursing work conditions lead to a lower frequency of medication errors and providing proper organizational conditions and work environment can help nurses provide high-quality care based on professional standards. Nurses' activity in the hospital environment is physically and psychologically difficult and can lead to burnout, stress, and error. Busy work environments can contribute to stress in employees, which increases the risk of medication errors (Sabzi et al., 2019).

Nurses have a crucial role in preventing medication errors. Hence, it is crucial to furnish them with ample information on the matter and comprehensive training on how to prevent and report it. Individuals should feel compelled to disclose medication errors without worry of any adverse repercussions (Štrbová et al., 2019).

Errors in nursing practices can happen at any point during pediatric patient care. At some point during their stay in the CCU, almost every patient will be touched by a potentially fatal mistake. In CCU, medication errors make up 78% of all significant errors, and pediatric patients'

accidental falls rank high among the most common adverse events reported in hospitals, adding complications to around 2% of hospital stays (Adly et al., 2020).

Administering medication is a critical and difficult aspect of nursing care that requires nurses to possess the appropriate knowledge and skills. Nurses and nursing students in hospitals are directly involved in administering medication to patients, and they are recognized as individuals who may be responsible for the highest number of medication errors (Gorgich et al., 2016).

Nurses have the job responsibility of preparing and delivering the majority of medications directly to patients. While the process of providing medication involves multiple disciplines, nurses bear the primary duty for administering and managing the medication. According to estimates, over 78% of nurses have made a medication error at some point. Additionally, a research has shown that 40% of their clinical time is dedicated to medication management (Márquez-Hernández et al., 2019).

A primary factor contributing to medication errors among nurses is a deficiency in pertinent knowledge. Additionally, a key concern that poses a risk to patients during the intravenous administration of high-alert drugs is the mode of drug delivery (Güneş et al., 2021).

Shortage of nursing professionals can cause an increase in their workload, less of the educational courses that they can participate in them, and concomitantly resulted in an increased risk of committing MEs (Alrabadi et al., 2020).

The prevention of medication errors is a critical responsibility of neonatal nurses due to the vital role they play in the administration of medications. Professionals working as neonatal nurses would benefit greatly from extensive medication knowledge. Nevertheless, nurses now have a far greater obligation to keep their medical expertise up-to-date due to the growing number of medications accessible for administration in

NICUs. Medication management and administration expertise can be enhanced through ongoing education, which is a crucial strategy in the fight against medication errors (Hoda & Sara, 2022).

2.3.2. Type of Medication Errors

Active errors The active errors result from an individual's failure e.g. in related to medication errors: miscalculation of the drug, errors in pharmaceutical equipment or improperly prepared (for example, intravenous pump), nurses do not follow the policy and procedures of medication administration, the pharmacy provides an incorrect drug and unread handwriting for medication orders., and Latent Errors result from organizational system failures that will allow active errors to happen and cause patient harm, for example about medication errors, nurses do not have adequate education for new drugs, as some drugs are similar and sound-like, an insufficient place to prepare the drug and workload (Abdulmutalib & Safwat, 2020).

2.3.3. Nursing Responsibility toward Medication Error

One of the primary objectives in nursing is to ensure the provision of secure care, minimize the risk of harm, and enhance the well-being of patients. However, in CCUs, patient safety is compromised due to several factors, including errors in medication administration. It is believed by nurses that medication errors occur more frequently in specific hospital units, including the emergency, intensive care, pediatric, and neonatal wards (Joybari et al., 2022).

Multiple study and literature reviews aim to identify certain "slices of cheese," referring to systems or interventions that can potentially decrease the occurrence rate of MEs. Several authors have concentrated on distinct aspects, including an overwhelming workload, weariness, the characteristics of particular medicines, a sense of belonging within a

culture, specialized healthcare locations, and contamination in healthcare environments (Dionisi et al., 2022).

Several variables impact the secure administration of medication. There is a debate about whether RNs have enough knowledge and skills to safely manage medication. Some argue that this is the case due to normalization of risky behavior and interruptions, use of technology with design flaws, time constraints, poor communication, lack of leadership, and outdated policies and guidelines (Fathy Moustafa et al., 2020).

With the goal of lowering severe harm associated with MEs by 50% within 5 years, the WHO has declared reducing patient harm related to MEs its current global patient safety challenge. In particular, young children were identified as being particularly vulnerable to avoidable injury from drugs (Alghamdi et al., 2019).

The organization, protocols, working environment, and human elements pertaining to health care workers are among the many variables that contribute to the genesis and classification of MEs, making this the ideal approach to comprehend why they happen and how to prevent them. The primary reason of ME is often attributed to a lack of understanding regarding drugs or patients. Other variables that contribute to ME include inexperience, weariness, stress, and a heavy workload (Ruano et al., 2016).

Preventing medication errors and safely handling them is one of the fundamental procedures that most quality assurance institutions standardize and advise. Hospital administration is responsible for strategic planning in order to uphold these quality measures (Soomar et al., 2019).

New medication safety risks arise from insufficient compliance in drug library use, and high override rates of soft limits have been identified. Other barriers to optimize the use of smart infusion pumps include limitations in pump capabilities, availability of pumps, programming workflow, associated risks with secondary infusions, pump data analysis,

and deficiencies related to drug library use and updates (e.g., omitting certain drugs or IV fluids) (Kuitunen et al., 2022).

Effective and safe medication management for children ensures good health and provides social and economic benefits. Therefore, one of the important aspects of effective and safe medication management is the evaluation of medication errors and their properties to identify and implement preventive strategies (Sabzi et al., 2019).

Various studies have proposed several techniques to prevent and decrease medication errors. These include staff training, conveying information about new drugs, providing drugs books in hospital wards, and organizing medicinal conferences. Furthermore, the constant presence of pharmacologists in the hospital can enhance the nurses' convenient access to medications knowledge. An analysis of the frequency and nature of medication errors can aid in formulating potential remedies or determining the most suitable and secure methods for administering medication (Izadpanah et al., 2018).

Medication errors still remain the main concern of the healthcare system. Therefore, it is important to enhance the understanding of general public about the causes, complications, and proper action toward medication errors. Predominantly, establishing an effective and a reliable medication errors reporting system is needed in minimizing such events (Ponnusankar et al., 2017).

One aspect of the approach involves fostering a culture that actively identifies safety issues and implements effective remedies, rather than promoting a culture of assigning blame, humiliation, and retribution. Healthcare organizations must cultivate a safety-oriented culture that prioritizes system enhancement, perceiving medical errors as obstacles to be surmounted. Every member of the healthcare team has a responsibility to contribute to the enhancement of patient and healthcare worker safety in the provision of healthcare (Rodziewicz & Hipskind, 2020).

World Health Organization suggested that one approach is to base the classification on the stage in the sequence of medication use process, such as prescribing, transcribing, dispensing, administration or monitoring. Another approach is to consider the types of errors occurring, such as wrong medication, dose, frequency, administration route or patient. A further approach classifies errors according to whether they occur from mistakes made when planning actions (knowledge-based or rule-based mistakes) or errors in the execution of appropriately planned actions (action-based errors, known as "slips", or memory-based errors, known as "lapses") (Udi, 2021).

An essential component of ethical nursing practice and competence in pediatric patient care management is nurses' familiarity with relevant legal and ethical standards. The rights of pediatric patients, the quality of treatment they get, and the decrease of medical mistakes are the primary concerns of ethical and legal considerations in nursing (Aly et al., 2020).

Measuring medications errors is crucial for setting a standard for medication safety, but there isn't yet agreement on how to measure the desirable error. The fact that technology to avoid medication-related incidents has lagged behind the development of tools to measure them could be a contributing factor (Mulac, 2022).

Strategies for the safe delivery of medications to children are as follows, per the American Academy of Pediatrics: as directed while taking medication Be sure to verify, use a name alert if necessary, use dosage calculation sheets for critical care, preface the decimal point with a zero, record everything, keep medications in the correct place, adhere to the institution's policies on medication administration, follow all rules and regulations, have a drug guide on hand at all times, and use bar-coding technology (Zein Eldin et al., 2018).

The high frequency of high-risk medication use, the complexity of neonatal medication usage, and the potential for major adverse outcomes

from even small MEs make it imperative to regularly examine intervention techniques to improve neonatal medication safety. To better understand, implement, and enhance strategies to decrease newborn MEs, it is crucial to identify and evaluate such initiatives. This will benefit healthcare systems and practitioners (Nguyen et al., 2018).

Finding and understanding the contribution of MEs from a nursing perspective was the primary goal of our study, then changes might be made. We looked into the frequency of MEs reported to nurse managers using incident reports and the nurses' recollection of committing MEs. This study also sought to understand nurses' perspectives on the reporting of MEs and the factors that contribute to their occurrence (Alrabadi et al., 2021).

Organizations gain very little insight from self-reported medication errors due to the large disparity between the two. Hospital medication errors are still significantly underreported. There are a lot of factors contributing to hospitals not disclosing medication errors, such as nurses not agreeing on what constitutes an error and the fear of penalties (Udi, 2021).

Ensuring patient safety and safe practices is contingent upon the provision of nursing care by nurses who possess a good attitude. Nurses that possess a positive attitude always strive for exceptional nursing practice. In contrast, nurses who view their role as merely a job are more likely to make medication errors (Alandajani et al., 2022).

It is critical to assess their understanding of the reporting procedures in place for medication errors across all areas of healthcare. According to the report, educational programs should be implemented for both doctors and nurses to help them enhance their knowledge of medications and reduce the likelihood of medication errors, which in turn would improve patient safety (Abdel-Latif, 2016).

The person approach focuses on the human factor perspective, on medical and nurse staff's unsafe acts – errors and procedural violations – credited in cognitive process and lack of knowledge. Followers of this approach, by applying litigation measures and procedures, provoke fear for disciplinary measures or blaming. Medical malpractice litigation and subsequently legal liability is an increased phenomenon in healthcare in recent years. Litigation can be viewed even as a strategy to hold governments and health organizations accountable for implementing the right to health (Chatziioannidis et al., 2017).

2.4. Previous Studies

First Study

Hajibabaee et al. (2023) conducted a study to explore the link between job satisfaction and burnout among nurses in hospitals in Erbil, Kurdistan Region of Iraq. The study included 455 nurses, auxiliary nurses, and nurse aides from public hospitals in the city. Participants were selected using random stratified sampling. Data were collected through demographic forms, Herzberg's job satisfaction scale, and Maslach's burnout surveys. The findings showed that 7.8% of nurses had low job satisfaction, 45.2% had moderate satisfaction, 42.7% had high satisfaction, and 4.4% had very high satisfaction. Regarding burnout, the average scores were 36.16 ± 12.51 for lack of personal achievement, 13.38 ± 9.86 for emotional exhaustion, and 8.67 ± 8.39 for depersonalization. To reduce burnout, the study suggests that managers should promote effective communication, involve nurses in decision-making, and work to reduce job inconsistencies and uncertainties.

Second Study

A study conducted by Mansour & Hussein, (2020) this study investigates the prevalence of burnout among nurses employed at four different hospitals in Iraq's Babylon Province. Utilizing the Maslach Burnout Inventory and two-dimensional demographic data, the study

involved 180 registered nurses selected through purposive sampling from government teaching hospitals in Babylon province. 57.8% of the participants experienced moderate burnout, with similar proportions reporting moderate emotional exhaustion (57.8%) and depersonalization (61.1%). Addressing burnout among nurses, especially those with less than five years of experience, necessitates the implementation of stress-coping skills taught in continuing education programs. The study's authors propose strategies to enhance the job satisfaction and well-being of teaching hospital nurses in Babylon province.

Third Study

A descriptive correlational research design to investigate burnout, its associated factors, and its impact on the quality of life of critical care nurses. The data have been collected from nurses working in the ICU, emergency units, step down ICU, and Artificial Kidney unit (AHU) at Buraydah Central Hospital in the Qassim Region of Saudi Arabia. A self-administered questionnaire was utilized to gather information on socio-demographic and work-related factors. Additionally, the Short Form SF12 was employed to evaluate the quality of life, while the Maslach Burnout Inventory (MBI) was used to measure the amount of burnout. The sample consisted of 170 out of 200 nurses employed in the aforementioned situations. A purposive sample was employed to identify participants from the nursing profession. The eligibility requirements consist of being at least 18 years old, working full-time to directly administer therapy to patients, and having been employed at the hospital for a minimum of one year. The study utilized three subscales from the Maslach Burnout Inventory: severe emotional weariness and depersonalization, low personal accomplishment, and moderate total burnout score. The quality of life measure (sF12) indicated that critical care nurses had moderate levels of physical and mental well-being, as well as an overall moderate quality of life score. Statistically significant factors associated with burnout include age,

nationality, years of experience, and the desire to change departments. There was strong negative association between burnout and quality of life score. Implementing strategies to train nurses in stress management and life skills, providing consultations, creating friendly workplaces, and offering psychological services are some of the approaches that can help reduce the occurrence of burnout (Alotni & Elgazzar, 2020).

Fourth Study

A study using a cross-sectional, correlational design to evaluate the burnout and perceived health of paediatric nurses. The study also examined the moderating effect of the typical work-shift. A sample of 225 paediatric nurses was purposively picked from nine hospitals in Jordan for the sake of convenience. Participants were surveyed through the use of a questionnaire that they completed themselves. The study assessed many demographic variables, such as age, sex, marital status, experience, education, and hospital type. Participants were also queried regarding their typical work schedule, namely whether they worked during the day, at night, or on alternating shifts. Nurses were surveyed using a 5-point Likert scale to assess their perception of their own health, ranging from weak to excellent. The assessment of nurses' burnout was conducted utilizing the Copenhagen Burnout Inventory (CBI). The 19-item CBI assesses three distinct categories of burnout: personal burnout, work-related burnout, and client-related burnout. There was a negative correlation between the reported health of paediatric nurses and their burnout levels, as well as their typical work-shift. Furthermore, there was a substantial correlation between nurses' burnout and their usual work-shift. The regular work schedule mitigated the correlation between burnout among paediatric nurses and their overall health. The nurses could perhaps be incentivized by financial rewards or a reduction in their weekly working hours. Implementing this intervention has the potential to improve the physical and mental well-being of nurses

and reduce their levels of burnout, as demonstrated by (Khatatbeh et al 2022).

Fifth Study

This cross-sectional descriptive-analytic study was conducted by Yusefi et al., 2019 under title Workload and its Associated Factors among Nurses in Teaching Hospitals of Shiraz. The data collection instrument consisted of a two-part questionnaire. The first part was associated with measuring the underlying and demographic variables of the target group, including age, gender, marital status, level of education, work experience, employment relationships, history of work shift per day, duration of rest after each work shift, number of shifts per month, and number of patients monitored in each work shift. The second part was concerned with the standardized and specialized questionnaire of the National Aeronautics and Space Administration Task Load Index (NASA-TLX) measuring the levels of workload in nurses. Using a 5-point visual scale from 0 to 100, the NASA-TLX evaluates mental demand, physical demand, temporal demand, overall performance and efficiency, effort rate, and frustration and failure level. The study population consisted of nurses working in Namazi Hospital, and Shahid Faghihi Hospital. Considering the population examined included 2943 individuals, the sample size was estimated equal to 340 nurses with a confidence level of 95% and an error level of 5%. Results Out of the 340 distributed questionnaires, 312 were completely filled out (attrition rate of 8%). The mean age of the nurses participating in the study was 30.23±6.46 years, and most of them (54.17%) were categorized in the age group below 30 years. The mean score for the history of work experience was 7.23±6.45 years, and the majority of the participants (66.34%) were in the group of below 10 years of work experience. In terms of gender, 86.66% of the participants were women, and the rest were men. Most of the respondents had a bachelor's degree (91.67%); they worked as project workforce (38.78) with a history of 12-

hour shifts (41.99), and more than 20 shifts per month (73.40). The number of patients monitored by the majority of the nurses per shift was higher than 3 individuals (84.93), and the duration of the rest time after each shift was 12 hours (64.43%). Table 2 shows the frequency distribution of nurses participating in the present study. implementation of effective programs to moderate and reduce the workload among nurses to improve their performance is recommended. In this respect, it seems that managers and decision-makers in the domain of nursing would need to pay sufficient attention to this important and necessary issue and make attempts to lower high levels of workload in this group by considering motivational incentives, providing welfare services, and fulfilling financial needs for nurses.

Sixth Study

Fagondes et al., (2016) conducted a quantitative exploratory-descriptive study to assess the impact of nurses' workloads on medication errors at a university hospital in southern Brazil. The study involved 49 randomly selected registered nurses from various care units. A self-administered questionnaire with 25 Likert-style questions, developed and validated for face, content, and construct validity, was used. Results showed that a majority of participants reported encountering medication errors, with dose errors being the most common. The risk of errors increased with the involvement of more staff members. The study underscores the importance of having an adequate number of registered nurses to maintain both staff and patient well-being and to minimize the occurrence of medication errors.

Seventh Study:

Hariyati et al., (2021) employed a correlational descriptive methodology to investigate the impact of nurses' workloads on medication errors in an Indonesian hospital in East Kalimantan. A purposive sample of 164 nurses from various inpatient rooms was selected. The study utilized a

three-part questionnaire to collect data on demographic information, reasons for medication errors, and factors influencing these errors. Findings revealed that a majority of the nurses were female (68.9%) and within the productive age range. Most had a diploma and fewer than six years of job experience. A significant portion reported high workloads, negative work atmosphere, low work motivation, and management elements detrimental to nurses. Around 18 out of 146 nurses admitted to making medication errors. The study underscores the need for healthcare facilities to implement measures to reduce medication administration errors, such as managing workload through information technology-based drug safety measures, to support nurses in their responsibilities and enhance patient safety.

Eighth Study

Othman et al., (2022) conducted a descriptive research study to explore staff nurses' perceptions of the impact of nursing workload on job design. The study took place in the medical, surgical, and general intensive care units of Sohag University Hospital. Data collection involved two instruments: A Nursing Workload Assessment questionnaire and a questionnaire developed by Brooks to evaluate work design. A total of 240 registered nurses from various healthcare facilities, including surgical, medical, and general intensive care units, participated in the study. Results indicated that nursing workload directly influences work design, with better work design achieved under the guidance of a nursing director responsible for managing workload. The study emphasizes the importance of incorporating staff nurses' opinions when creating schedules that accommodate their job and family responsibilities.

Ninth Study

Abassy & Al-Mosawi, (2021) conducted a descriptive study to assess pediatric medication administration errors at Children Welfare Teaching Hospital in Baghdad City. The study utilized a non-probability

purposive sample of 40 nurses from critical care units. Data collection involved a questionnaire consisting of demographic information and multiple-choice questions to assess nurses' knowledge of medication administration errors. Findings indicated a low level of understanding among nurses regarding medication delivery errors. To address this, the study recommends implementing a systematic teaching program and providing continuing education for nurses to enhance their knowledge and prevent medication administration errors.

Tenth Study

A pre-experimental approach, specifically a one group pretest-posttest design, to evaluate the effectiveness of an educational program on nurses' knowledge of medication errors in children with cardiac disorders. Evaluation of the effectiveness of an educational program on nurses is being conducted at the Nasiriyah Heart Center in DhiQar Governorate. The study instrument comprises three components, namely, the nurses included in this study have been characterized by their socio-demographic attributes, which encompass age, sex, educational attainment, marital status, and years of professional experience. This section was designed to evaluate nurses' understanding of the prevention of medication errors. The study program involved a total of 50 nurses. The results indicate that there were extremely significant statistical differences between the control and study groups in the posttest, with a p-value of less than 0.001. The nurse's understanding of medication errors in children with cardiac disorders was found to be deficient in both groups during the pre-test phase of the program. However, after implementing the educational program, the knowledge of the study group significantly improved in both post-tests one and post-test two. This indicates that the education program was successful in enhancing the nurse's knowledge of medication errors. The pre-test results showed that both groups of nurses had a low level of knowledge regarding medication errors for children with cardiac disorders. However, after implementing the

education program, the study group showed significant improvement in knowledge as demonstrated by the results of post-test one and post-test two. This indicates that the education program was effective in enhancing the nurses' knowledge regarding medication errors (Owaid & Aziz, 2023).

Eleventh Study:

The study conducted by Elsayed, (2020) aimed to assess the practical knowledge of nurses regarding neonatal safety when using intravenous devices to prevent medication errors. The researcher utilized a descriptive research design and collected data from a sample of 82 nurses working in the neonatal intensive care unit at Mansoura University Children Hospital. A researcher devised a structured interview form to collect data after examining relevant literature. The study is divided into four sections. focuses on the characteristics of the nurses being researched, such as their age, level of education, employment position, years of experience, and any previous training they have had on drug delivery or medication errors and nurses' understanding of neonatal safety and nurses' practical understanding of administering intravenous medication and nurses' practical understanding of medication errors involving intravenous devices and nurses' practical understanding of methods for preventing medication errors. The findings indicate that over 50% of the nurses studied possessed a moderate level of knowledge regarding neonatal safety and methods for preventing medication errors. Approximately 50% of the surveyed nurses possess a subpar degree of understanding regarding the drug administration process, whereas the rest of them demonstrate an average level of knowledge concerning medication errors. Training programs for neonatal intensive care staff nurses focusing on neonatal safety, medication delivery process, and measures to prevent medication errors.

Twelve Study

A descriptive study was conducted by Udi et al., (2021) to assessing Nurses' Knowledge of Medication Errors: A Descriptive Study. Instrument for data collection was a self-structured questionnaire. The sample size of 270 Nurses was calculated using the sample frame formula while the study participants were selected from a hospital in Southern Nigeria, the study revealed that there are differences the level of awareness of Medication Errors and Errors may also be classified according to their existing Medication Errors reporting systems among nurses. All (100%) the respondents had good knowledge of Medication Errors. Only 195 (75.3%) aware that Medication Error.115 (44.4) % are aware of existing the departmental medication error and how to report the hospital. Despite the respondents' good knowledge of MEs, there was a good proportion that lacked the awareness of how MEs should be reported.

Chapter Three

Methodology

Chapter Three

Methods

This chapter covers the study's design, population, setting, sample, research participants' characteristics, sampling method, sample size, study instruments, data collection procedure, data analysis, research limitations, and ethical considerations. It also covers the instruments' validity and reliability. The researcher ensures that their studies are well-designed and that they use research procedures that are suitable for the subject matter.

3.1. Design of the Study

This study utilized a descriptive correlation design. This design is appropriate because it enables the representation and explanation of numerical data that can be converted into practical statistics. The study aims to examine the impact of burnout and workload factors on nurses' understanding of errors in medication, specifically in the context of pediatric critical care.

3.2. The Study Population

The study population represents a specific segment of the broader target population, from which the sample is selected. Its scope surpasses that of the sample frame in this study, the study population comprises all pediatric critical care nurses, while the target population consists of pediatric critical care nurses at Kerbala Teaching Hospital for Children.

3.3. Table: Distribution of total number of study sample

No	Total number of nurses	sex	NCU	Emergency unit	RCU
1	61	Male	15	30	16
2	37	Female	13	12	12

3.4. Sample and Sample Size

The study's sample was drawn from pediatric nurses employed in critical care units in Karbala Teaching Hospital for Children. The total population of nurses was 134, with a minimum required sample size of 91 calculated based on a 95% confidence level and a 5% margin of error. Ultimately, a total of 98 nurses were included in the sample.

3.5. Sampling

This study utilized a non-probability (convenience) sampling technique. Convenience sampling, also known as opportunity sampling, is the most common type of non-probability sampling. It focuses on getting information from the most convenient and accessible sample of participants.

3.5.1. Inclusion Criteria

This study included nursing staff working in critical care units who possessed a minimum of one year of experience. Both morning and evening shift nurses were included in the sample.

3.5.2. Exclusion Criteria

Nurses with less than one year of experience, employed in administrative roles, and nurses working outside critical care units, such as in medical and hematology units etc., were excluded from the study and pilot study sample.

3.6. Research Setting

The study was carried out in the field of pediatric critical care nursing in Kerbala Teaching Hospital for Children.

3.7. Ethical Considerations

The research ethics committee of the University of Kerbela\ College of Nursing, granted ethical approval for maintaining the

confidentiality and anonymity of the participants' identities, as indicated in Appendix A.

Participants were provided with information regarding the study's objectives and given instructions on how to complete the questionnaire, ensuring that they were fully aware of the study's purpose and that their participation was voluntary. The research ethics committee at the Training and Development Center of Holy Kerbala Health Directorate (Appendix B1, Appendix B2 and Appendix B3).

The researcher took authors permissions before use of questionnaire in the study (Appendix C).

3.8. Instrumentation:

The data were collected from respondents via a self-administered questionnaire that consisted of four sections:

I. **Sociodemographic characteristics:** This section includes demographic information such as age, sex, marital status, educational level, years of experience, monthly income, number of years of experience in critical units, and if the respondents had participated in previous courses on medication errors.

II. **Nursing workload questionnaire:** Atwa, 2002; Othman et al., 2022). to assess nurse's perception related to their workload. It comprises 10 items on the Work Environment, authored by Ahmed Othman. Permission was obtained via email from the copyright owner, utilizing Brisling's back-translation model. The Nursing Workload Questionnaire 10 was translated into Arabic by two bilingual physicians working in healthcare, then back-translated by two additional bilingual physicians. Scoring is Uses a five-point Likert scale, the options range from (1) strongly disagree to (5) strongly agree.

III. **Maslach Burnout Inventory:** Maslach et al., 1997; Hussien et al., 2020), this scale contains 3 domains: Emotional Exhaustion this

domain has seven questions. Depersonalization this domain has seven questions. Reduce personal performance this domain has 8 questions. Scoring of scale: 1 = Never, 2 = Sometimes and = Always

IV. **Knowledge of Medication Errors Questionnaire:** The questionnaire developed by Professor Marco Di Muzio consists of seven items. Permission was obtained via email from the copyright owner, utilizing Brisling's back-translation model. The scoring system for this questionnaire is as follows: 1: Strongly disagree, 2: Disagree, 3: Undecided, 4: Agree, and 5: Strongly agree

3.9. The instrument validity:

Validity was established through a panel of 15 experts, comprising 5 from the University of Baghdad\ College of Nursing, 7 from the University of Kerbala\ College of Nursing, 2 from Al-Kufa University\ College of Nursing, and 1 from Babylon University\ College of Nursing. Each expert was tasked with evaluating the content, simplicity, relevance, style, and applicability of the study instrument (Appendix E).

3.10. Pilot study:

A pilot research was conducted on January 2nd, 2024, for 7 days with a sample of 10 nurses working in critical care units. The objective of the preliminary research is to assess the clarity or complexity of the items, as well as the duration required to complete the study instrument. The assignment was completed within a time frame of 15-25 minutes.

3.11. Reliability of study instrument by Cronbach's alpha approach

Tools	No. of Items	Alpha C Correlation	Assessment
Nursing workload questionnaire	10	.704	Acceptable
The Maslach Burnout Inventory	22	.720	Acceptable
Knowledge of Medication Errors Questionnaire	7	.806	Acceptable
Total sample	10		

3.12. Data Collection

To conduct the research, the researcher initially obtained written consent from all study participants. Prior to commencing the study, the researcher wore specific personal protective equipment to prevent infection. The researcher engaged with nurses in Kerbala Teaching Hospital for Children, seeking their agreement to participate and providing an explanation of the study's objectives. Once consent was obtained, either through written signature or oral agreement, and after assuring the participants of confidentiality, data collection commenced. The data collection period spanned from January 20th, to March 21th, 2024, in order to fulfill the study's objectives. Data was gathered using an Arabic version questionnaire, structured into four parts: sociodemographic information, the Nursing Workload Questionnaire, the Maslach Burnout Inventory, and the Knowledge of Medication Errors Questionnaire. Each participant's time commitment ranged from 15 to 25 minutes, with an overall response rate of 86%.

3.13. Data Analysis

The data was managed and analyzed using SPSS V. 27. In order to ensure normality, descriptive statistics such as frequency numbers and percentages, mean and standard deviation, and inferential statistics

proportionate to the data distribution by used K-S to determine the data's normal distribution. Independent sample t-test, Pearson correlation test, and analysis of variance are used to look at the correlation and differences between the variables.

Chapter Four
Results of the Study

Chapter four

Results of study

This part presents the result of the current study in tables and their correspondence with the objectives of the study as shown in the tables:

Table 4-1: ***Distribution of the Participants According to their socio demographic data Characteristics:***

Demographic Characteristics	Subgroup	f.	%
Age group	21- 34 years	71	72.4
	35- 47 years	24	24.5
	48- 59 years	3	3.1
	Total	98	100.0
	Mean ± SD 30.96 ± 7.775 Min- Max 22 - 59 years		
Sex	Male	61	62.2
	Female	37	37.8
	Total	98	100.0
Marital status	Single	30	30.6
	Married	66	67.3
	Separated	2	2.0
	Total	98	100.0
Educational level	Secondary school	29	29.6
	Institute	25	25.5
	College	42	42.9
	Master's and above	2	2
	Total	98	100.0
Income	400-600 thousand dinars	35	35.7
	601-800 thousand dinars	38	38.8
	801 thousand dinars and more	25	25.5
	Total	98	100.0
Training course about medication error	Yes	53	54.1
	No	45	45.9
	Total	98	100.0
Years of experience in the hospital	1- 5 years	64	65.3
	6- 10 years	18	18.4
	11 years and more	16	16.3
	Total	98	100.0
	Mean ± SD 7.62 ± 7.022 Min- Max 1 - 25 years		
Years of experience in the unit	1- 5 years	72	73.5
	6- 10 years	19	19.4
	11 years and more	7	7.1
	Total	98	100.0
	Mean ± SD 4.78 ± 4.809 Min- Max 1 - 20 years		

f= frequencies, %=Percentages, M = Mean of score, S.D = Standard Deviation, Min= minimum and Max= maximum

Table (4-1) showed that among 98 nurses in critical care units, 72.4% were aged 21 to 34, with an average age of 30.96 years. Most nurses (62.2%) were male, and 67.3% were married. Regarding education, 42.9% had completed college. Most nurses (38.8%) earned between 601 to 800 thousand dinars. The average years of experience in the hospital was 7.62 years, and in the unit, it was 4.78 years. Additionally, 54.1% of the nurses participated in a training course about ME.

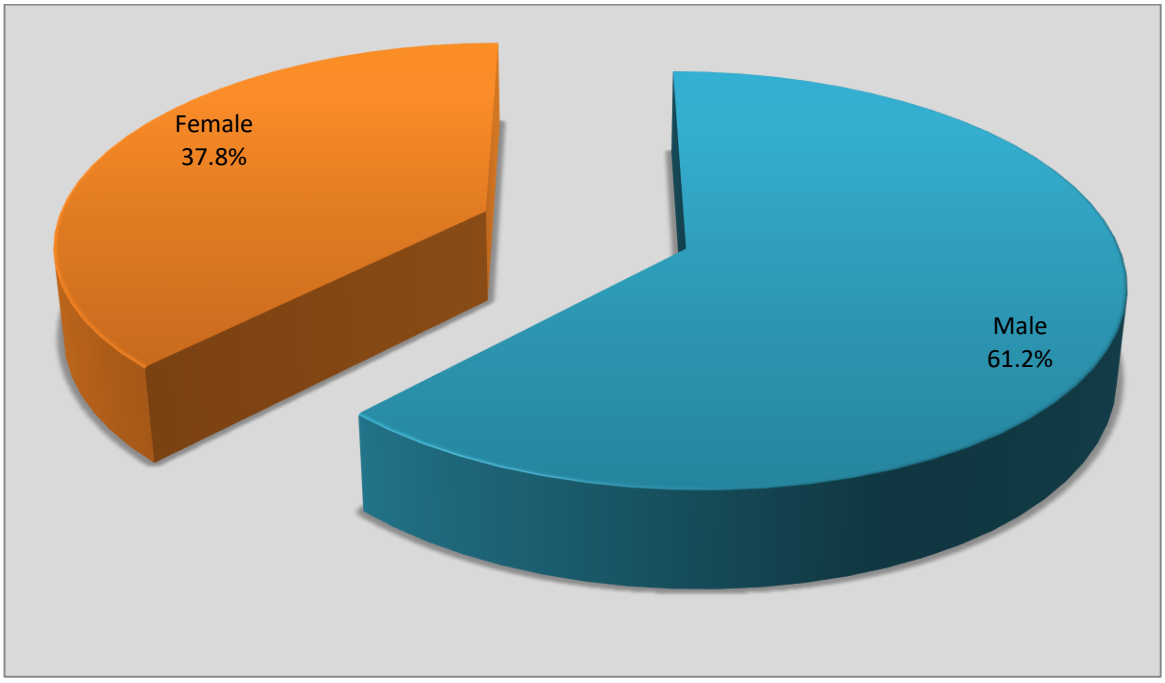

Figure (4-1): Percentage of sex for the nurses.

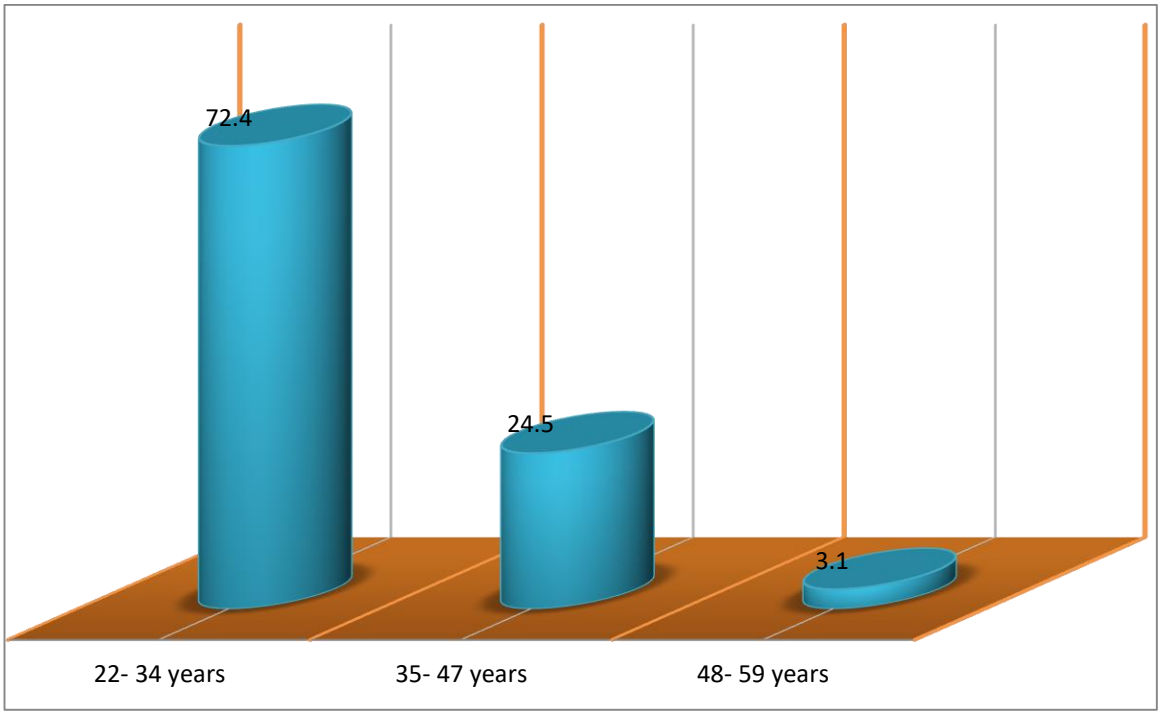

Figure (4-2): Percentage of age group for the nurses.

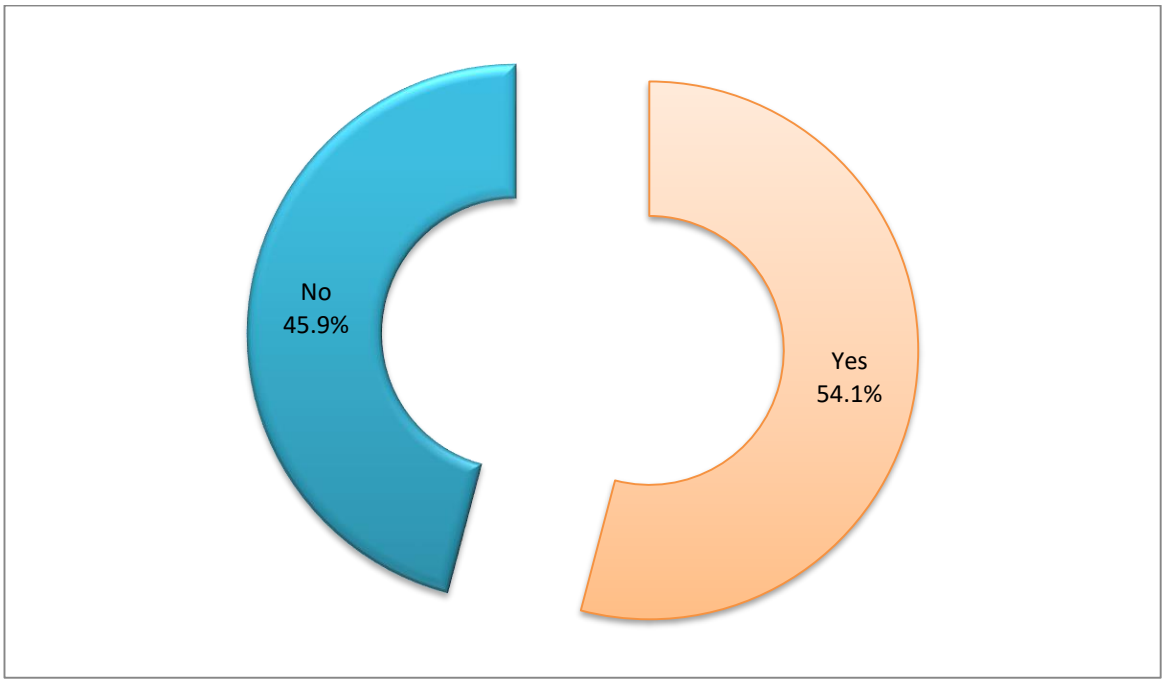

Figure (4-3): Percentage of nurses that participants in Training course about medication error.

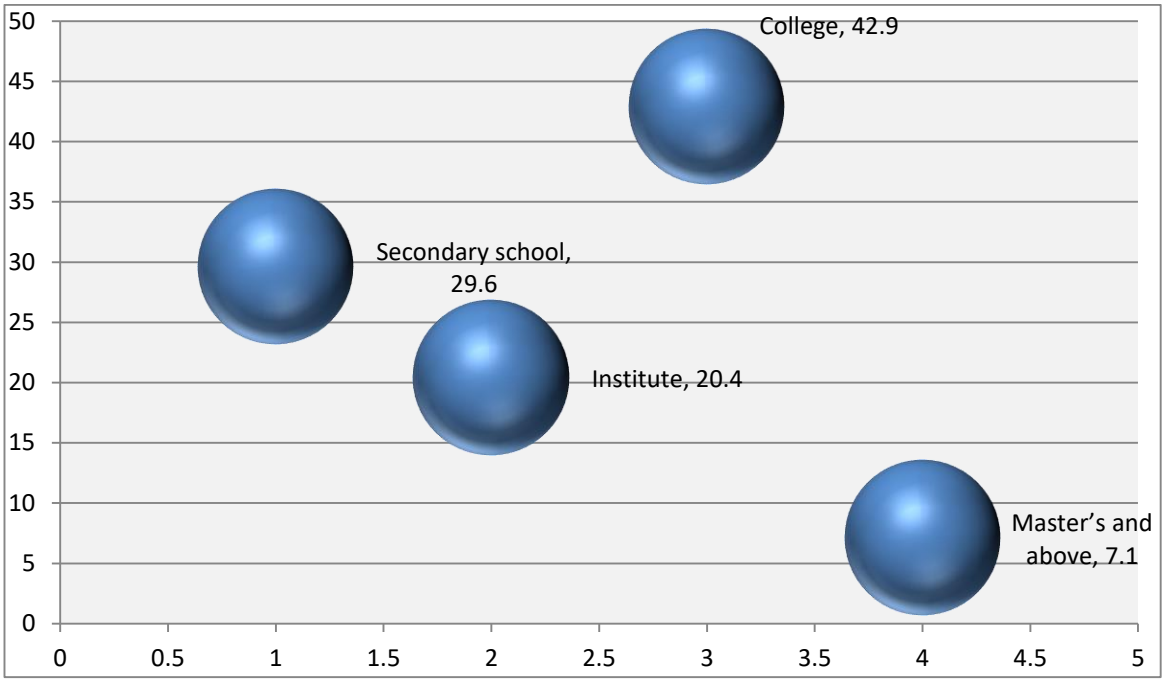

Figure (4-4): Percentage of Educational level for the nurses.

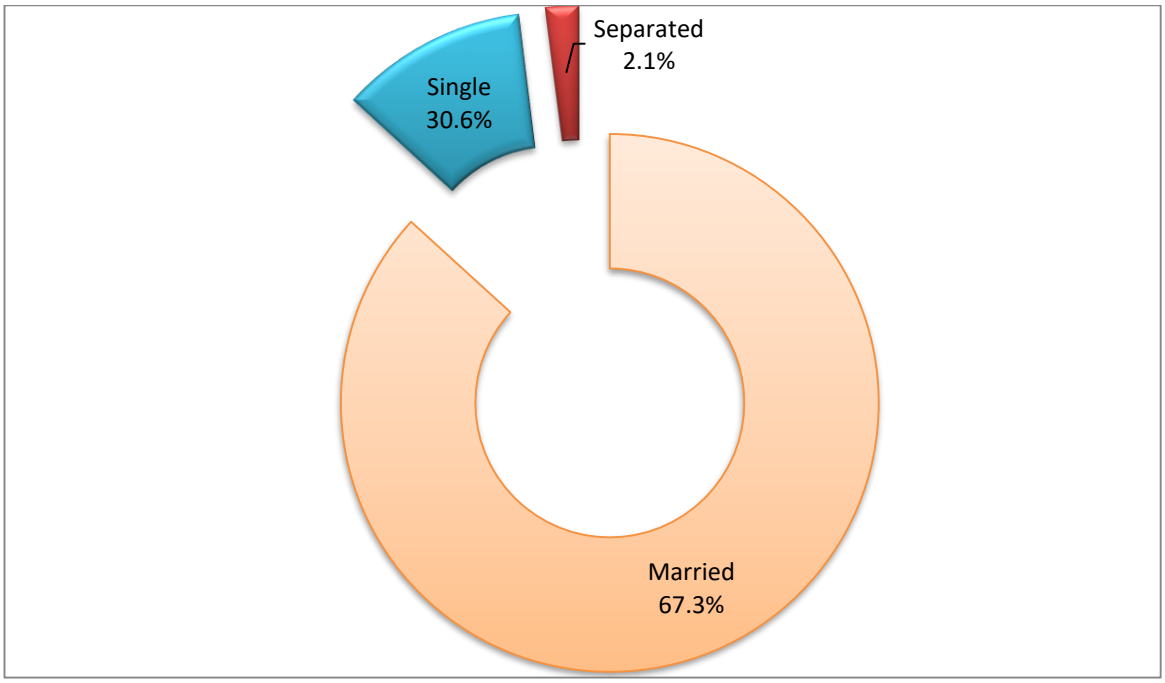

Figure (4-5): Percentage of marital status for the nurses

Table 4-2: ***Assess of the causes of nursing workload at the pediatric critical care units:***

Items	%						Mean	Assess.
	Strongly agree	agree	Not sure	Disagree	Strongly disagree	Total		
1. Lack of time to perform the required work	8.2	20.4	16.3	35.7	19.4	100	3.38	H
2. Insufficient number of nurses to perform nursing services	0	6.1	8.2	23.5	62.2	100	4.42	H
3. Continuous change in work shift periods	0	13.3	15.3	52	19.4	100	3.78	H
4. Excessive overtime negatively affects work	2	7.1	10.2	23.5	57.1	100	4.27	H
5. Lack of supplies and equipment necessary for work to provide good service	1	15.3	9.2	29.6	44.9	100	4.02	H
6. Work responsibility conflicts with my family life	5.1	25.5	24.5	29.6	15.3	100	3.24	M
7. Lack of opportunity to develop new skills and improve professional life at work	2	16.3	11.2	38.8	31.6	100	3.82	H
8. The hospital does not have a clear plan for training nursing staff	3.1	26.5	23.5	23.5	23.5	100	3.38	M
9. Assigning me to work that is not my specialty increases my work effort	4.1	16.3	9.2	19.4	51	100	3.97	H
10. Some of the tasks I perform are not my specialty	7.1	20.4	11.2	27.6	33.7	100	3.60	M
Overall							**3.79**	**H**

%= percentage, Ass = Assessment level, L = low (1 – 2.33), M = moderate (2.34-3.66) and H= high (3.67-5).

The results in table (4-2) showed the perception level of the causes of nursing workload were high with mean 3.79 (Min- Max 1-5) and the higher percentage that showed in item 2 with mean 4.42 and the lower percentage that showed in item 6 with mean 3.24.

Table 4-3: the causes among the three levels for nursing workload at the pediatric critical care units:

Level	Range	f.	%.	Mean	SD
Low	10 – 23	0	0		
Moderate	24 – 37	44	44.9		
High	38 – 50	54	55.1		
Total	10 -50	98	100.0	37.87	5.454

f= frequencies, %=Percentages, M = Mean, S.D = Standard Deviation

The results in table (4-3) showed of the causes among the three levels for nursing workload in the pediatric critical care units at most (55.1%) were high with mean 37.87 (Min- Max 10-50).

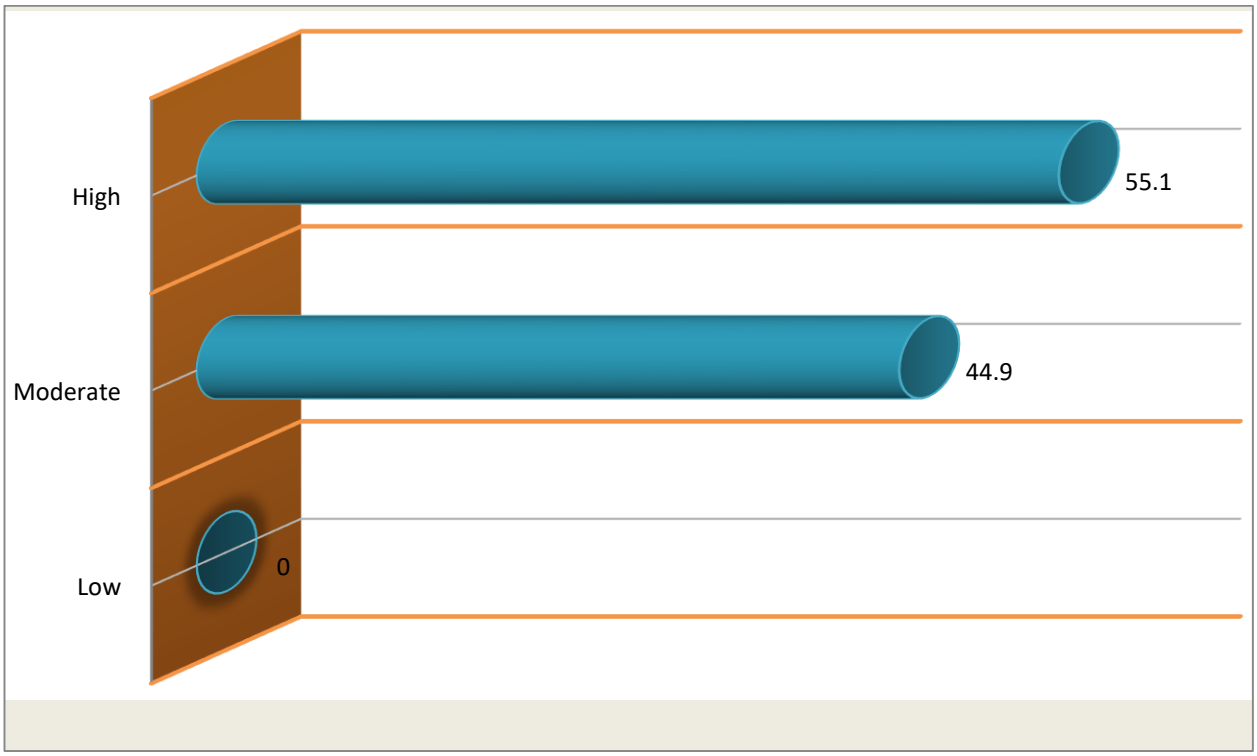

Figure (4-6): The causes among the three levels for nursing workload at the pediatric critical care units.

Table 4-4: ***Assess the nurse's burnout at the pediatric critical care units:***

Domains	Items	%.				Mean	Ass.
		Never	Sometime	Always	Total		
Emotional exhaustion	1. I find it difficult to express my feelings about being in nursing	19.4	67.3	13.3	100	1.94	M
	2. Taking care of patients for long hours while requiring me to put on more effort	6.1	34.7	59.2	100	2.53	H
	3. He felt devastated because of my nursing work	35.7	42.9	21.4	100	1.86	M
	4. I feel frustrated as a nurse	56.1	25.5	18.4	100	1.62	L
	5. I feel that I work at a great pace during work	27.6	54.1	18.4	100	1.91	M
	6. Taking care of patients while working stresses me out a lot	27.6	45.9	26.5	100	1.99	M
	7. I was exhausted from working hours	24.5	37.8	37.8	100	2.13	M
	Overall domain 1					1.99	M
Feelings dull	1. I feel indifference towards patients as if they were objects and not people	89.8	9.2	1	100	1.11	L
	2. I feel tired when I wake up in the morning because I have to face another day of work	31.6	50	18.4	100	1.87	M
	3. I have the impression that patients hold me responsible for some of their problems	22.4	64.3	13.3	100	1.91	M
	4. I feel exhausted at the end of work	5.1	52	42.9	100	2.38	H
	5. I don't care what happens to some patients	76.5	18.4	5.1	100	1.29	L
	6. I became devoid of feelings as a result of this work	60.2	31.6	8.2	100	1.48	L
	7. I fear that this work makes me emotionally cruel	54.1	38.8	7.1	100	1.53	L
	Overall domain 2					1.65	L
		Always	Sometime	Never	Total	Mean	Ass.
Lack of sense of personal	1. I accomplished valuable things during this work	58.2	33.7	8.2	100	1.50	L
	2. I feel full of energy while working	40.8	54.1	5.1	100	1.64	L
	3. I can easily understand what patients feel	53.1	41.8	5.1	100	1.52	L
	4. Take an active interest in solving patients' problems	42.9	43.9	13.3	100	1.70	M
	5. I deal with emotional situations calmly during my work	49	40.8	10.2	100	1.61	L
	6. I imagine that I have a positive impact on patients through my work as a nurse	73.5	21.4	5.1	100	1.32	L
	7. I can easily create a comfortable atmosphere with patients	58.2	38.8	3.1	100	1.45	L
	8. Being close to patients increases my motivation to work	54.1	40.8	5.1	100	1.51	L

	Overall domain 3	1.53	L
Overall nurse's burnout		**1.72**	**M**

M = Mean of score, S.D = Standard Deviation, Ass = Assessment level, L = low (1 – 1.66), M = moderate (1.67-2.33) and H= high (2.34-3).

The results in table (4-4) showed the nurse's burnout at the critical care units were moderate with mean 1.72 (Min-Max 1-3) and the higher percentage that showed in emotional exhaustion with mean ,1.99while the lower percentage that showed in lack of sense of personal accomplishment with mean 1.53, and the domain feelings dull with mean 1.65.

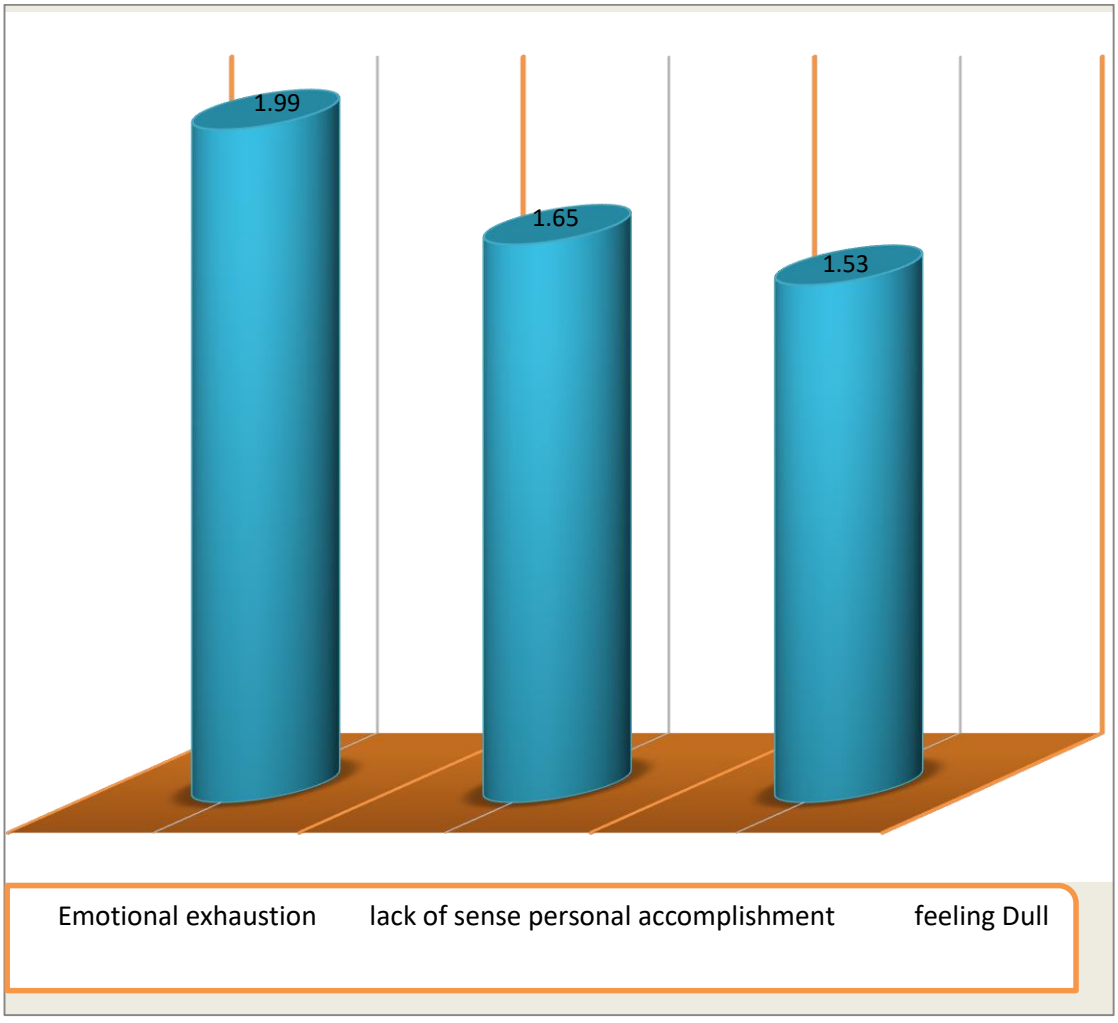

Figure (4-7): The nurse's burnout at the pediatric critical care units.

Table 4- 5*: The nurse's burnout at the pediatric critical care units among the three levels:*

Level	Range	f.	%.	Mean	SD
Low	22 - 36	37	37.8		
Moderate	37 - 51	60	61.2		
High	52 - 66	1	1.0		
Total	22 -66	98	100.0	37.79	5.687

f= frequencies, %=Percentages, M = Mean, S.D = Standard Deviation

The results in table (4-5) indicated that burnout levels among nurses in Critical Care Units were predominantly moderate, with 61.2% of nurses within this category. The average burnout score was 37.79, with a range from 22 to 66.

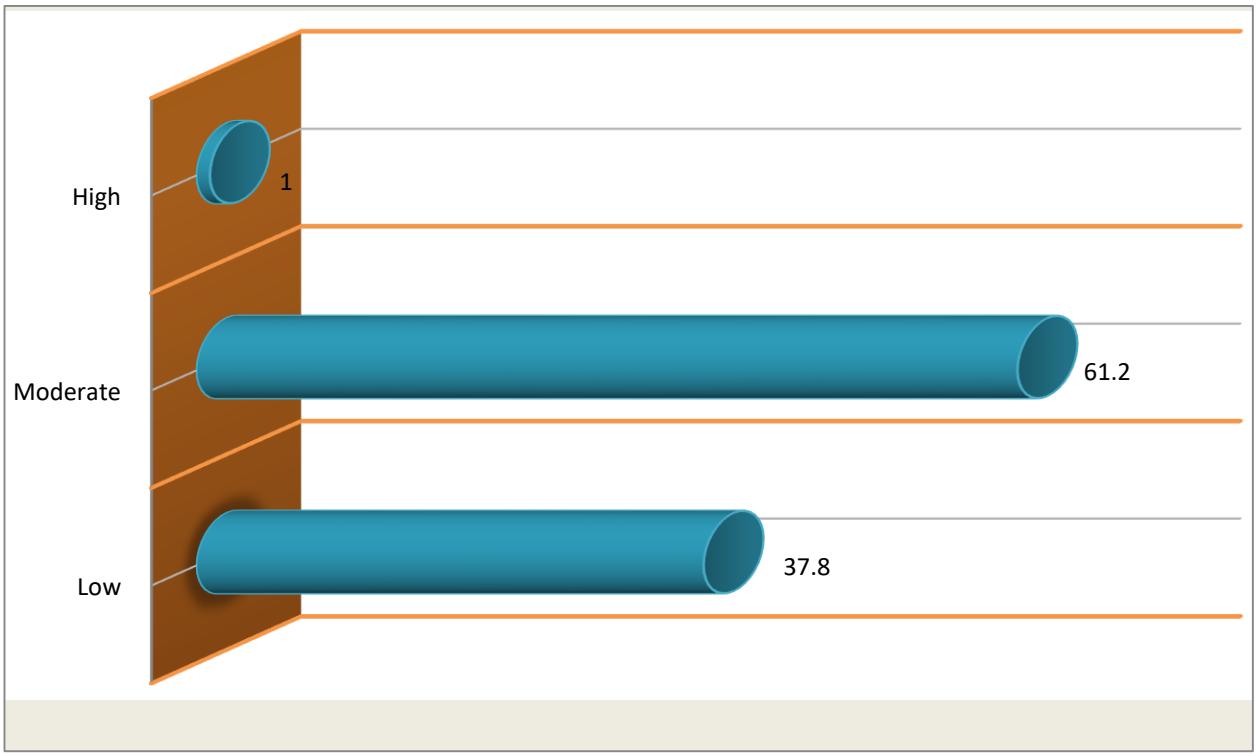

Figure (4-8): The nurse's burnout at the pediatric critical care units among the three levels.

Table 4-6: ***Assess medication error knowledge among nurses at critical care units:***

Items	%						Mean	Assess.
	Strongly disagree	Disagree	Not sure	Agree	Strongly agree	Total		
1. Calculating doses for intravenously administered medications reduces preparation errors	2	7.1	13.3	38.8	38.8	100	4.05	G
2. Providing a computer system for entering medical orders reduces the risk of medication errors	2	5.1	17.3	38.8	36.7	100	4.03	G
3. Providing pre-prepared medications by the pharmacy reduces the risk of medication errors	2	4.1	8.2	36.7	49	100	4.27	G
4. Providing guidance protocols, posters, and informational brochures in health units, which contributes to reducing the risk of errors.	3.1	1	11.2	36.7	48	100	4.26	G
5. The nurse's Asstance to the pharmacist while preparing the medication reduces the risk of errors	8.2	9.2	8.2	37.8	36.7	100	3.86	G
6. Alarm sounds and emergency situations in the departments may cause distraction during the preparation and administration of medications	3.1	5.1	22.4	46.9	22.4	100	3.81	G
7. Workload (double shifts, overtime) contributes to medication errors	1	7.1	17.3	42.9	31.6	100	3.97	G
Overall							**4.03**	**G**

%= percentage, Ass = Assessment level, P = poor (1 – 2.33), F = fair (2.34-3.66) and G= good (3.67-5).

The results in table (4-6) showed the medication error knowledge among nurses at critical care units were good with mean 4.03 (Min-Max 1-5) and the higher percentage that showed in item 3 with mean 4.27 and the lower percentage that showed in item 6 with mean 3.81.

Table 4- 7*: The medication error knowledge among nurses at critical care:*

Level	Range	f.	%.	Mean	SD
Poor	7 – 16	0	0		
Fair	17 – 25	25	25.5		
Good	26 – 35	73	74.5		
Total	7 -35	98	100.0	28.23	3.569

f= frequencies, %=Percentages, M = Mean, S.D = Standard Deviation

The results in table (4-7) indicated that medication error knowledge among nurses in Critical Care Units were predominantly good represented (74.5%), with mean 28.23, with a range from 7 to 35.

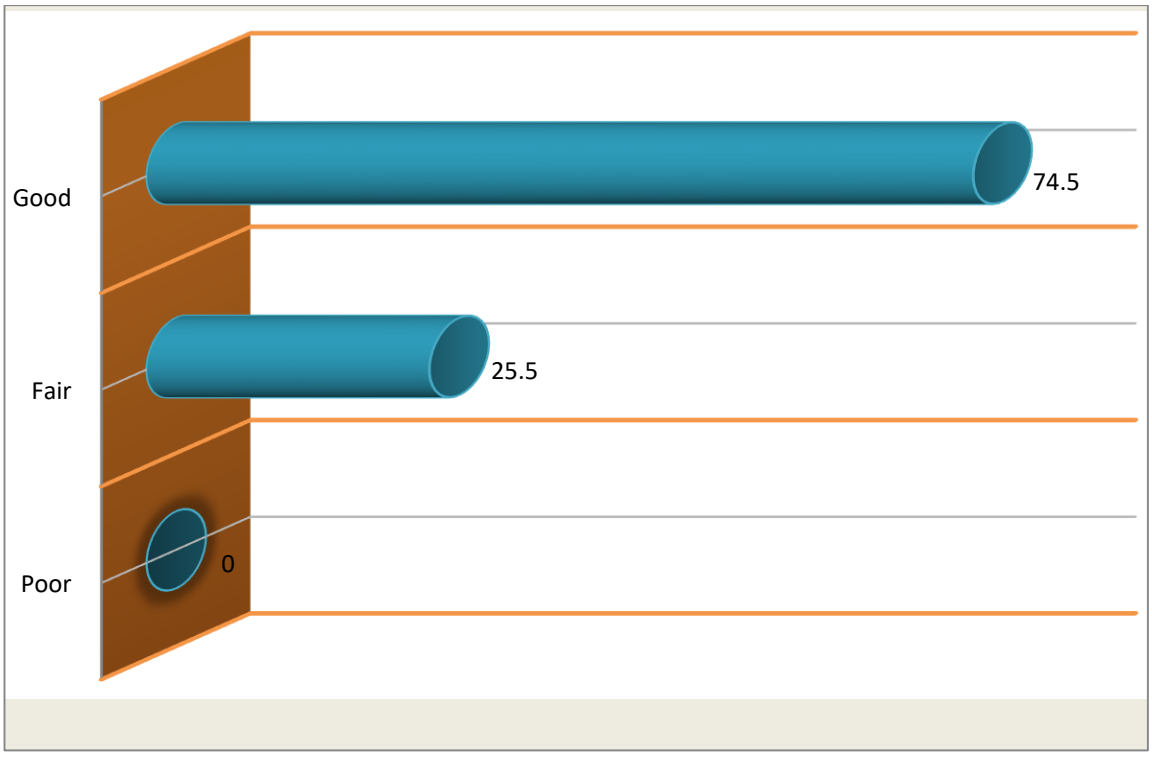

Figure (4-9): the medication error knowledge among the three levels nurses at critical care.

Table 4-8: ***Assess the influence of burnout and workload on nurses' knowledge about medication errors at the critical care units:***

N= 98	Burnout			Workload		
	Cc	p. value	Result	Cc	p. value	Result
Nurses' knowledge	.586	.056	NS	.202*	.047	S

Cc= Correlation coefficient, P=probability value, NS: Non-Significant at P > 0.05, S: Significant at P < 0.05, HS: Highly Significant at P < 0.001.

In table (4-8) the results showed there were significant statistical correlations between workload on nurses' knowledge about medication errors in the critical care units at p- value P < 0.05. And the results showed there is no significant statistical correlations between burnout on nurses' knowledge about medication errors at the critical care units at p- value P > 0.05.

Table 4-9: ***The relationship between burnout, workload and medication errors knowledge with nurses' sociodemographic characteristics. :***

Demographic Characteristics	Subgroup	Burnout			Workload			Knowledge		
		M	Analysis	p. value	M	Analysis	p. value	M	Analysis	p. value
Age	22- 34 years	1.78	Cc=-.280-	.005	3.77	Cc=.006	.954	3.95	Cc=.314	.002
	35- 47 years	1.59			3.81			4.27		
	48- 59 years	1.53			3.93			4.10		
sex	Male	1.68	t= -2.115-	.037	3.80	t= .308	.759	4.10	t= 1.630	.106
	Female	1.80			3.76			3.93		
Marital status	Single	1.81	F=2.094	.129	3.91	F=2.817	.065	3.93	F=2.594	.080
	Married	1.69			3.71			4.06		
	Separated	1.65			4.40			4.71		
Education	Secondary school	1.68	F=.736	.482	3.73	F=.237	.790	3.90	F=2.136	.124
	Institute	1.7			3.78			4.00		
	College	1.74			3.80			4.06		
	Master's and above	1.78			3.87			4.31		
Income	400-600 thousand dinars	1.79	F=2.017	.139	3.76	F=.369F	.692	3.84	F=6.691	.002
	601-800 thousand dinars	1.71			3.84			4.03		
	801 thousand dinars and more	1.66			3.73			4.30		
Experience in the hospital	1- 5 years	1.79	Cc=-.283-	.005	3.78	Cc=.051	.621	3.92	Cc=.238	.018
	6- 10 years	1.57			3.73			4.26		
	11 yrs. and more	1.64			3.90			4.23		
Experience in	1- 5 years	1.76	Cc= -.300-	.003	3.78	Cc= .092	.365	3.97	Cc= .198	.051
	6- 10 years	1.64			3.79			4.20		

the unit	11 yrs. and more	1.57			3.90			4.22		
Training course	Yes	1.71	t= -.510-	.611	3.81	t= .482	.631	4.05	t= .258	.797
	No	1.74			3.76			4.02		

P=probability value, NS: Non-Significant at P > 0.05, S: Significant at P < 0.05, HS: Highly Significant at P < 0.001 Cc= Correlation coefficient, P=probability value, M=mean, t-test, f= frequencies

In table (4-9) the results showed there were significant statistical correlation among burnout with nurse's age at p- value = 0.05, also the results shown there were significant statistical correlation among burnout with nurse's sex at p- value = 0.037, also the results shown there were significant statistical correlation among burnout with nurse's years of experience in the hospital at p- value = 0.005 ,the results shown there were significant statistical correlation among burnout with nurse's experience unit at p- value = 0.03, and there were significant statistical correlation among medication errors knowledge with their age at p < p- value = 0.02, also there was significant statistical correlation among medication errors knowledge with their income at p- value = 0.002, and there were significant statistical correlation among medication errors knowledge with their years of experience in the hospital at p- value =0.018.

Chapter Five

Discussion of the Results

Chapter Five

Discussion of the Study Findings

This chapter will primarily concentrate on discussing the findings, comparing them to previous similar studies, and showcasing the most important and new findings in order to reach conclusions.

5.1. Sociodemographic characteristics

In the table (4-1) the results showed the age for 98 nurses at the pediatric critical care units at age group (22 to 34) years represented (72.4%), These findings similar to result of study conducted by Elsayad et al., (2017) that showed the age of nursing staff from age group (20 to 35) years. Another study disagrees with present study which conducted by Tuama et al., (2020) that showed (63.9%) of the sample from age group (19-28) years, another study disagree with present result conducted by Jassima & Ebrahimb, (2020) which shows about (47%) of sample aged less than 30 years. According to the researcher opinion view, most critical care units in hospital, the nurses were young because hard work in the CCU and need young age nurses.

Regarding the sex, the most of study sample of the nurses were male represented (62.2%), these finding agreement with result of study conducted by Barzani & Dal Yılmaz, (2022) which showed more than half of sample were male, also agree with study result conducted by Alkhaqani & Al-tayee, (2024) that show that male represented (63.3%) compared with female represented (36.7%), in other hand these findings disagree with study done by Jassima & Ebrahimb, (2020) that showed (54%) of participants were female. Also disagree with another study conducted by Mansour & Hussien, (2020) that showed most of the study sample were

female represented (70%). According researcher believe the critical units need more physical load and continuous works so mal more appropriate for the work (Schäfer et al., 2022).

Regarding the marital status present study showed the most of study sample were married represented (67.3%), this result agree with study result conducted by Alnaiem et al., (2022) that showed more than half of study sample were married represented (57.3%). In other hand, present study disagree with result conducted by Dordunoo et al., (2021) that showed the majority of the participants were single represented (67.3%). Also present study disagreement with study conducted by Umoh, & Opue, (2021) that showed (44.1%) were married.

According to the educational level present study showed that most of study sample were Bachelor represented (63.3%), this result supported by study conducted by Elsayed et al., (2020) that showed (67.1%) had a Bachelor of nursing. Also the present study support by study conducted by Almenyan et al., (2021) that showed (60.5%) of participant have bachelor degree. The current study disagrees with study conducted by Fathy et al., (2020) that showed nurses level of education were technical institute represented(61.6%). Also present study disagree with study conducted by Shahin et al., (2020) that showed the majority of study sample had diploma represented (75.0%). According researcher's opinion in pediatric critical care units have complex medical conditions that require specialized knowledge and Advanced medical interventions are often required, and high academic achievement ensures competency in performing them (Rennick et al., 2019).

Regarding the economic status showed that most nurses earned between 601 to 800 thousand dinars represented (38.8%). These finding agree with study result conducted by Tuama et al., (2020) that showed that (47.2%) of the sample were adequate as economic status. Also this finding disagree with study conducted by Alandajani et al., (2022) that shows about two-thirds of the nurses earned a monthly income of less than 10,000 Saudi Riyal represented (64.0%). In other hand the present findings disagree with a study conducted by Al-Otaibi et al., (2018) that showed the economic status of study sample were good represented (70%).

Regarding to years of experience in the hospital the present study shows two-third of study sample had years of experience in the hospital from (1-5) year represented (65.3%), these finding agreement with result conducted by Ltheeth & Abbas, (2017) that showed more than half of nurses had years of experience from (1-5 years) represented (57. 8%). Also another study agree with current study conducted by Gunes et al., (2021) that showed about (49.3%) of sample had (1-5) years of experience in nursing at hosital. In other hand the present study finding disagree with results conducted by Waterval, (2020) that showed (49%) of nurses had years of experience from (6 -10) years.

According to years of experience in pediatric critical care unit, in the current study showed that majority of nurses had years of experiences from (1-5) years represented (73.5%), this result supported by study findings conducted by Gunes et al., (2021) that showed the majority of nurses who have years of experience from (1-5) years represented (60%), other study also agreement with present study results done by Barzani & Dal Yılmaz, (2022) that showed only (37.2%) of nurses had years of

experience from (1-5) in PCCU. In other hand the current study disagreement with study done by Oetelaar et al., (2020) that showed (65.3%) of nurses have experience in PCCU from (10 – 15) years.

Regarding to training courses result showed (54.1%) of the nurses had training course about medication error, the present study agree with study conducted by Alandajani et al., (2022) that showed attend training course about medication error represented (60.8%). In other hand the current study result disagrees with study conducted by Fathy et al., (2018) that show about 60% of them did not attend training course regarding medication errors. Also this results disagree with study conducted by Jassima & Ebrahimb, (2020) that showed only (35%) nurses had training courses about medication errors. The current study disagree with study conducted by Zein Eldin et al., (2018) that showed all nurses did not attend any previous training courses for medication error. The researcher suggested the critical care units special pediatric more risk unit so need more training and experience in this units (Villemure et al., 2016).

5.2. Discuss the causes of nursing workload:

In the table (4-3) the finding regarding cause of nursing workload ware high represented (55.1%), these result consistent with study finding conducted by Hariyati et al., (2021) that showed the workload among nurses is high represented (77,44%). Present study agree with study findings done by Rashed et al., (2022) that showed majority of nurses perceived high level of total nursing workload represent (75.5%). The current study disagrees with study result conducted by Destiani et al., (2020) which showed that majority of respondents (67%) had a moderate workload of nursing. Also present study disagree with result conducted by

Elsayad et al., (2017) that showed (49.4%) of nurses staff had low perception related to nursing workload, according researcher opinion logically the work in critical care unit's high workload because patients in pediatric critical care units are typically very sick and require close attention and continuous monitoring (Marshall et al., 2017).

5.3. Discuss the nurse's burnout at the pediatric critical care units:

In the table (4-5) The finding regarding to burnout among nurses, the results showed the nurse's burnout at the pediatric critical care units were predominantly moderate represented (61.2%). This finding agree with study conducted by Hajibabaee et al., (2023) that showed (57.8%) of nurses had a moderate level of burnout. Also this finding agree with study result conducted by Tuama et al., (2020) that showed (52.8%) of nurses with moderate level of burnout. In other hand the present finding inconsistent with study done by Cishahayo et al., (2017) that showed high level of burnout among the pediatric nurses represented (61.7%). The present study disagree with study conducted by Weheida et al., (2018) that showed more than half of nurses in pediatric critical care units had high burnout represented (52.6%). Also disagree with another study conducted by Vasconcelo & Martino, (2018) that showed (85.7%) of nurses in PCCU did not exhibit burnout. According to the researcher's opinion pediatric critical care units are exposed to high burnout rates due to emotional and psychological demands, intense work environment, long work hours, high workload (Moss et al.,2016).

5.4. Discuses medication error knowledge among nurses at critical care units:

The finding results showed the medication error knowledge among nurses showed that majority of study sample had good knowledge among nurses in PCCU represented (74.5%), this study finding agreement with study done by Kainat et al., (2021) that showed most of the nurses had good knowledge regarding medication errors represented (68%), also other study agree with current study result conducted by Umoh & Opue, (2021) that showed (73.6%) of study sample had adequate knowledge about medication error. Also agreement with another study conducted by Alandajani et al., (2022) that showed more than half of pediatric nurses had good knowledge represented (55%). In other hand the present study finding disagree with study result conducted by Jassima & Ebrahimb, (2020) that showed (44%) of nurses with low level of knowledge regarding medication errors, Also disagreement with another study done by Ben, (2023) that showed (76.2%) of study sample in private hospitals in Sarawak, East Malaysia, had moderate knowledge of medications error. According to the researcher's opinion Pediatric critical care units need a good knowledge about medication errors because pediatric patients are vulnerable to medication errors, complex medication regimens are common, high-risk medications are used (D'Errico et al., 2022).

5.5. Assess the influence of burnout and workload on nurses' knowledge about medication errors at the critical care units:

In Table (4-8), the results showed a significant positive correlation between workload and nurses' knowledge about medication errors in the PCCU, at p-value of less than 0.05. This finding aligns with the study done

by Hariyati et al. (2021), which founded a significant relationship between nurses' workload and medication errors based on nurses' knowledge (p = 0.001). However, the present study contradicts with findings of Bölükbaş et al. (2020), which founded no significant difference between workload perception and medication errors based on nurses' knowledge at p-valu (> 0.05). The current study also showed no significant correlation between burnout and nurses' knowledge about medication errors in the PCCU, at p-value = (0.56). This result disagrees with study done by Im et al. (2023), that founded medication errors were significantly correlated with burnout at p-value (< 0.001). Also current study differs from the study done by Tsiga et al. (2017), which founded a significant positive correlation between nurses' burnout and medication errors in PCCU at p = (0.005).

5.6. The correlation between burnout, workload and medication errors knowledge with nurses' sociodemographic characteristics.

5.6.1. Burnout and nurses' sociodemographic

In the table (4-9) showed that the present study there is a correlation between age and nurses' burnout at p value = 0.005, this finding agree with study conducted by Shahin et al., (2020) that showed a significantly correlation between age and nurses' burnout at p value = (0.002). Present study result disagreement with study finding conducted by Mansour & Hussien, (2020) that showed there is no significant correlation between nurses' burnout and age at P value = (0.115). Also disagree with other study finding conducted by Cishahayo et al., (2017) that showed the there is no statistical correlation between age and nurses' burnout at (P >0.05).

The find of study showed there is a correlation between sex and nurses' burnout at p value = (0.037), this result support by study conducted

by Madinah, (2021) that showed there is a significant correlation between sex and nurses' burnout at p-value = (0.031). Current study disagrees with study conducted by Shahin et al., (2020) that showed no significant correlation between sex and burnout at p-value = (0.502). Also other study result conducted by Mansour, (2020) that showed there was no significant correlation between nurses' burnout and sex at P-value = (0.706).

The find of study showed there is no correlation between education level and nurses' burnout at p-value = (0.482) this result agree with study conducted by Cishahayo et al., (2017) this showed did not find any correlation between the levels of education and nurses' burnout at p-value (>0.05). also current study disagrees with study finding conducted by Shahin et al., (2020) that showed significant correlation between the levels of education and nurses' burnout at p-value = (0.004).

The find of study showed there was correlation between experience in PCCU and nurses' burnout at p-value = (0.005), this finding agree with study conducted by Mansour & Hussien, (2020) that showed a significant correlation between nurses' burnout and number of years of work experience at P-value = (0.003). Also current study agree conducted by Al-Osaimi et al., (2023) that showed highly significant correlation was found between nurses' burnout and years of experience in PCCU at p. value = (0.00). Also current study agree with study conducted by Aljanfawi, (2022) that showed there was a significant correlation to between years of experience in PCCU and nurses' burnout at P-value = (0.026).

The find of study showed there was correlation between years of experience in PCCU and nurses' burnout at p-value = (0.003), this finding agree with study conducted by Kaya & İşler, (2021) that showed significant

correlations years of experience in PCCU and nurses' burnout at p-value = (0.001). Also present study agree with study conducted by Mahmoudi et al., (2020) that showed was significantly correlated with nursing experience in PCCU with burnout at p (< 0.05). Another study conducted by Teixeira et al., (2013) that showed there was no significant correlation between years of experience in PCCU and nurses' burnout at p-value = (0.244).

5.6.2. Workload with nurses' sociodemographic

The find of current study showed there was no correlation between age and nurses' workload at p-value (0.954) this result agrees with study finding conducted by Azadi et al., (2020) that showed no significant correlation between nurse's workload and their age at p=(0.969). Also current study disagree with study conducted by Babamohamadi et al., (2023) that showed nurses' workload had a positive and significant correlation with age at p-value = (0.027).

The finding of study there are no correlation between nurses' workload and education level at p-value = (0.790), this result agree with study conducted by Azadi et al., (2020) that show no significant correlation between nurse's workload and education level at p-value = (0.09). Also present study disagrees with study result conducted by Yusefi et al., (2019) that showed significant correlation with nurse's workload and education level at p-value = (0.03).

The finding of study showed there was no correlation between nurses' workload and years of experience in the hospital at p-value = (0.621), this result agree with study conducted by Azadi et al., (2020) that showed not significant correlation between nurse's workload and years of experience in the hospital at p-value = (0.07). Also current study contrast

with study conducted by Hariyati et al., (2021) that showed a significant correlation between nurse's workload and years of experience in the hospital at p-value = (0.018).

5.3.3. Medication errors knowledge with nurses' sociodemographic

The find of study showed there was correlation between age and medication errors knowledge at p-value = (0.002), this finding support by study conducted by Al-Otaibi et al., (2018) that showed a significant correlated between medication error and age at p=(0.01). Also present' study disagree conducted by Jassima & Ebrahimb, (2020) that showed a significant correlation between medication error and age at p-value = (0.00). Present finding disagree with study conducted by Elsayed et al., (2020) that showed no correlation between age and medication errors at p -value = (0.654). Also present finding disagree with study conducted by Alenezi, & Baker, (2023) that showed no correlation between age and medication errors knowledge at p value = (0.197).

The find of study showed there was correlation between economic status and medication errors knowledge at p-value = (0.002), this finding support by study conducted by Al-Otaibi et al.,(2018) that showed economic status significantly correlated between medication error economic status at p-value = (0.02). Present study disagree with study conducted by Alandajani et al., (2022) that showed no significantly correlated between medication error and economic status at p -value = (0.313).

The find of study showed there was no correlation between education level and medication errors knowledge at p-value = (0.124). This result disagree with study conducted by Alenezi & Baker, (2023) that

showed no correlation with p-value = (0.129). Current study result disagree with study conducted by Ben et al., (2023) that showed strong correlation between the level of education and medication errors knowledge at p-value = (0.004).

The find of study showed there was correlation between years of experience in the hospital and medication errors knowledge at p-value = (0.018), this result agree with study conducted by Al-Otaibi et al., (2018) that showed there was a significant correlation between years of experience in hospital with medication errors knowledge at p-value = (0.01). Current study also agrees with study conducted by Abukhader & Abukhader, (2020) which showed there was a correlation between experience in the hospital and medication errors knowledge at p-value = (0.044). Present study contrast with study conducted by Alenezi & Baker, (2023) that showed there was no significant correlation between years of experience in hospital and medication errors knowledge at p-value = (0.594). Also present study disagree with study conducted by Ben et al., (2023) that showed no correlation between years of experience and medication errors knowledge at p-value = (0.602).

5.7. Conclusion

1. There were significant statistical correlations between workload on nurses' knowledge about medication errors in the pediatric critical care units.
2. There were no significant statistical correlations between burnout on nurses' knowledge about medication errors in the pediatric critical care units.

3. Significant statistical correlation among burnout with nurse's age, nurse's years of experience in the hospital, and with nurse's experience unit.
4. There was no correlation between workload with age, Education level and Experience in the hospital.
5. Significant statistical correlation among medication errors knowledge with their age, income, and years of experience in the hospital.

5.8. Recommendations

1. Team atmosphere and team building is very important factor in managing workload cooperation and coordination among nurses.
2. Training programs about burnout its causes, risk factor, effect on critical care nurses' performance and its overcoming techniques should be carried usually
3. The present study recommends continuous education program for all nursing staff in deferent level of education in all my country's hospitals to decrease medication errors to reduce patient risk of harm and promote the patient safety.
4. Conducting research to evaluation of nurses' practical skills in medication and other research to evaluation and deduction of medication errors for all medical and nursing staff that have direct contact with the patient.
5. Increase the number of nursing staff employed by the General Directorate of Health and Ministry of Health to treat the problem of nursing staff shortage in health institutions.

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Appendices

Appendix A

Ethical Consideration

Ministry of Higher Education and Scientific Research
University of Karbala / College of Nursing
Scientific Research Ethics Committee

UOK.CON.23.015
Ethical Committee Code:
Date: 15 / 11 /2023

Research Ethical Approval Form

Title of the research project	
In the English language	**In the Arabic language**
Influence of Nurses' Burnout and Workload on Medication Errors Knowledge in Pediatric Critical Care Units	تأثير إرهاق الممرضين وعبء العمل على معارف الأخطاء الدوائية في وحدات العناية المركزة للأطفال

Data About the Main Researcher /Student:			
Full Name	**Scientific Title**	**Mobile Number**	**Email**
Muataz Aqeel Oohayyid	Master student	07725108745	motazaqel88@gmail.com

Data About the Co-author /Supervisor:			
Full Name	**Scientific Title**	**Mobile Number**	**Email**
Dr. Zeki Sabah Musihb Member	Ass. Prof	07709249070	zaki.s@uokerbala.edu.iq

Study objectives

1. To assess the burnout in nurses at the pediatric critical care units.
2. To assess the nurses' workload at critical care units.
3. To assess medication error knowledge among nurses at critical care units
4. To assess the influence of burnout and workload on nurses' knowledge about medication errors at the critical care units.
5. To find out the relationship between burnout, workload and medication errors knowledge with nurses' sociodemographic characteristics.

Time and Setting of the Study

Time: Start from October 2023 to August 2024
The samples will be collected from Karbala Children's Teaching Hospital

Study Design

Quantitative/ Descriptive study

Sampling method and sample size

Non probability (convenience sampling) of 100 nurses

Statement of Ethical Commitment

The study will be conducted in accordance with what was mentioned in the protocol above and to commitment that all rules set by the ethical committee are followed in present research process. The researcher also makes a commitment to abide by ethical principles, moral values, law and instruction of the institutions. There is no bias will be during collecting the data, gender, regional aspects and is totally impartial and objective. The researcher will have taken an informed consent from the participants, and provide clarifications and information about the study to the sample members. The researcher deals with the data of the sample members in complete confidentiality.

Name and signature of the researcher

Recommendation of the College's Research Ethical Committee

☑ **Agreement to conduct the study** ☐ **Disagreement to conduct the study**

Instructor Dr. Sajidah Saadoon Oleiwi
Member

Ass. Prof. Dr. Zeki Sabah Musihb
Member

Ass. Prof. Dr. Ghazwan Abdalhussein
Member

Ass. Prof. Dr. Hassan Abdullah Athbi
Chairman of the Committee

Appendix B1

Administrative Agreements

Republic of Iraq
Ministry of higher education & scientific research
University of Karbala
College of Nursing
Graduate studies Division

جمهورية العراق
وزارة التعليم العالي والبحث العلمي
جـــامعة كربلاء
كـلية التـمريـض
شعبة الدراسات العليا

العـدد : د.ع/ 3 55 التاريخ: 15 / 11 / 2023

الى / دائرة صحة كربلاء المقدسة – مركز التدريب و التنمية البشرية

م/ تسهيل مهمة

تحية طيبة...

يرجى التفضل بالموافقة على تسهيل مهمة طالب الدراســات العليــا / الماجستير (معتز عقيل اوحيد) في كليتنا للعام الدراسي (2023-2024) لغرض جمع العينات الخاصة برسالته الموسومـــة :

"تأثير إرهاق الممرضين وعبء العمل على معارف الأخطاء الدوائية في وحدات العناية المركزة للأطفال"

"Influence of nurses burnout and workload on medication errors knowledge in pediatric critical care unit"

** مــع التقديــر **

أ.م.د. سلمان حسين فارس الكريطي
معاون العميد للشؤون العلمية و الدراسات العليا
2023 /11/15

نسخة منه الى :
- مكتب السيد المعاون العلمي المحترم .
- شعبة الدراسات العليا .

العنوان : العراق - محافظة كربلاء المقدسة – حي الموظفين - جامعة كربلاء
Mail: nursing@uokerbala.edu.iq website:

Appendix B2

Form number 53

Decision number:2023230

Date 19/11/2023

Research committee decision

The Research Committee of Karbala Health Directorate has examined the research protocol number(**2023230**Karbala) entitled:

"تأثير ارهاق الممرضين وعبء العمل على معارف الاخطاء الدوائية في وحدات العناية المركزة للأطفال"

"Influence of nurses burnout and workload on medication errors knowledge in pediatric critical care unit"

Submitted by researchers: **Muataz Aqeel Oohayyid**

to the research and Knowledge Management Unit at the Training and Human Development Center of Karbala Health Directorate on 19/11/2023

The unit has decided to:

*** Accept the above-mentioned research protocol as it meets the standards adopted by the Ministry of Health for the implementation of research, and there is no objection to implementing it in the Directorate's institutions.**

الدكتور
حيم عبيد المشهداني
طبيب اختصاص

Rapporteur of the committee

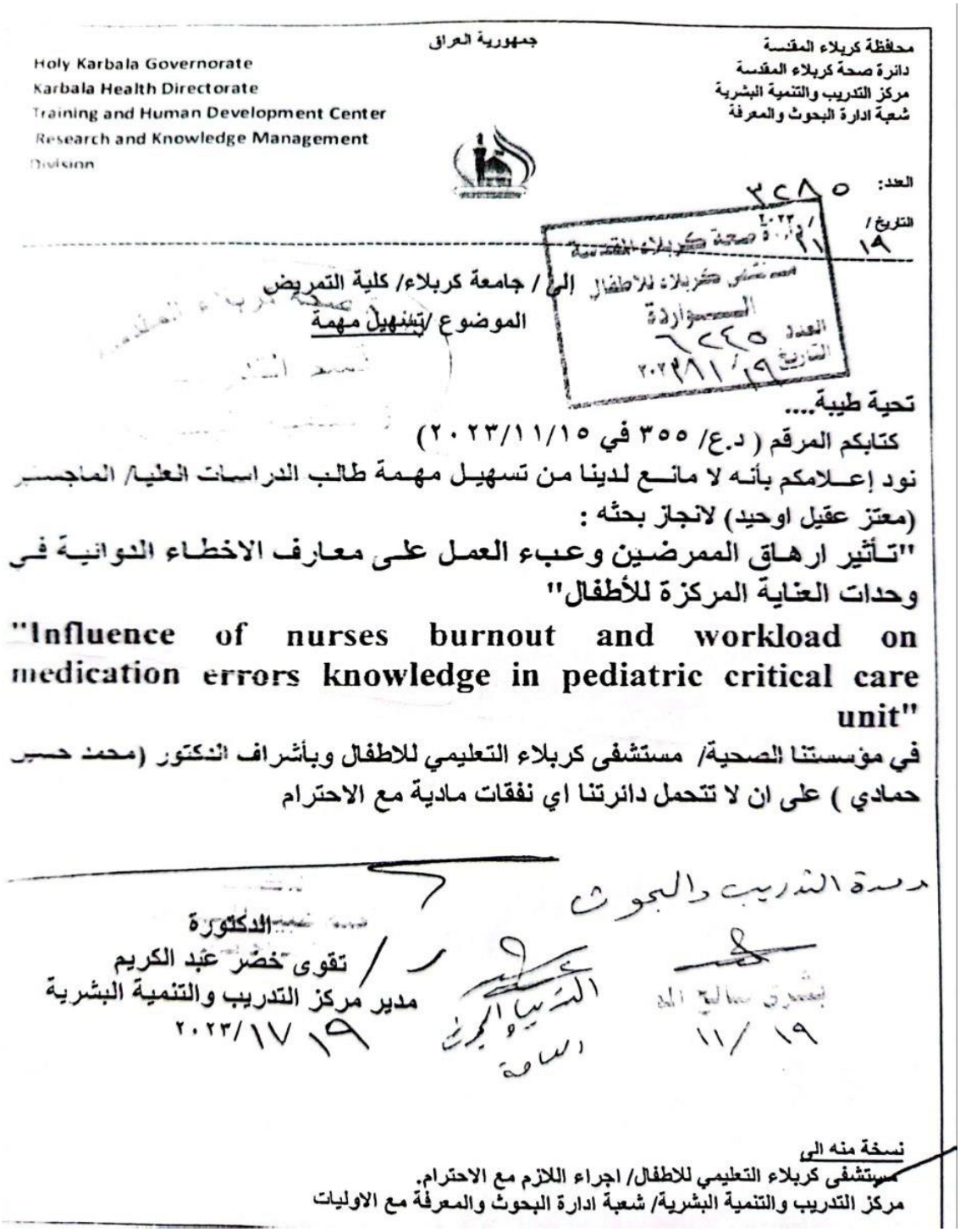
19/11/2023

مديرية صحة
دائرة صحة كربلاء المقدسة
لجنة البحوث

Notes:

- The committee member (Dr. Taqwa Khudhur Abdulkareem)/ committee rapporteur (Dr. Naeem Obaid. Talal) were authorized to sign this decision on behalf of the remaining members of the committee under the rules of procedures of the research committee.
- The research committee approval means that the research project submitted to the aforementioned committee has fulfilled the ethical and methodological standards adopted by the Ministry of Health for conducting a research. As for the implementation of the research, it depends on the researchers adherence to the instructions of the health institution in which the research will be implemented as well as the laws, instructions and recommendations in force that govern the practice of medical and health action in Iraq.

Appendix B3



جمهورية العراق

محافظة كربلاء المقدسة
دائرة صحة كربلاء المقدسة
مركز التدريب والتنمية البشرية
شعبة ادارة البحوث والمعرفة

Holy Karbala Governorate
Karbala Health Directorate
Training and Human Development Center
Research and Knowledge Management
Division

العدد: ٢٧٨٥
التاريخ / ١٩ / ١١ / ٢٠٢٣

إلى / جامعة كربلاء/ كلية التمريض
الموضوع /تسهيل مهمة

مستشفى كربلاء للاطفال التعليمي
الصادرة
العدد ٦٧٢٥
التاريخ ٢٠٢٣/١١/١٩

تحية طيبة....

كتابكم المرقم (د.ع/ ٣٥٥ في ٢٠٢٣/١١/١٥)

نود إعلامكم بأنه لا مانع لدينا من تسهيل مهمة طالب الدراسات العليا/ الماجستير (معتز عقيل اوحيد) لانجاز بحثه :

"تأثير ارهاق الممرضين وعبء العمل على معارف الاخطاء الدوائية في وحدات العناية المركزة للأطفال"

"Influence of nurses burnout and workload on medication errors knowledge in pediatric critical care unit"

في مؤسستنا الصحية/ مستشفى كربلاء التعليمي للاطفال وبأشراف الدكتور (محمد حسين حمادي) على ان لا تتحمل دائرتنا اي نفقات مادية مع الاحترام

مديرة التدريب والبحوث

الدكتورة
تقوى خضر عبد الكريم
مدير مركز التدريب والتنمية البشرية
٢٠٢٣/١١/١٩

التدريب والبحوث
الساعة

بشرى صالح الله
١٩/ ١١

نسخة منه الى
مستشفى كربلاء التعليمي للاطفال/ اجراء اللازم مع الاحترام.
مركز التدريب والتنمية البشرية/ شعبة ادارة البحوث والمعرفة مع الاوليات

Appendix C

Authors Permission

Motaz Motaz ٢٠٢٣/١١/١٠

إلى hassana

Greetings
My name is Motaz Aqeel, a master's student in nursing at University of Karbala. I am interested in your studies especially on nursing Burnout questionnaire . With respect, I am seeking your permission to use questionnaire in my thesis. Could you please send it to me? Your help .is really appreciated
,Thank you

Name: Motaz Aqeel

-mail adress: motazaqel88@gmail.com

hassana hassana ٢٠٢٣/١١/١٢

Yes, of course you can.

Motaz Motaz ٢٠٢٣/١١/٤

إلى ahmedwa3867

Dear Dr. Ahmed

Greetings

My name is Motaz Aqeel, a master's student in nursing at University of Karbala. I am interested in your studies especially on nursing workload questionnaire . With respect, I am seeking your permission to use questionnaire in my thesis. Could you please send it to me? Your help is really appreciated.

Thank you,

Name: Motaz Aqeel
E-mail adress: motazaqel88@gmail.com

ahmed ٢٠٢٣/١١/٥

إلى أنا

الترجمة إلى العربية

الرد

الرد على الكل

إعادة التوجيه

It is a pleasure for us to share our questionnaire with you.
Attached to this mail, you can find the questionnaire and the form to fill out and return to us.
I remain at your disposal for any further information.
Best wishes,

Prof. Marco Di Muzio

Marco Di Muzio, RN, PhD

Assistant Professor in Nursing Science (Uniroma1)

Department of Clinical and Molecular Medicine

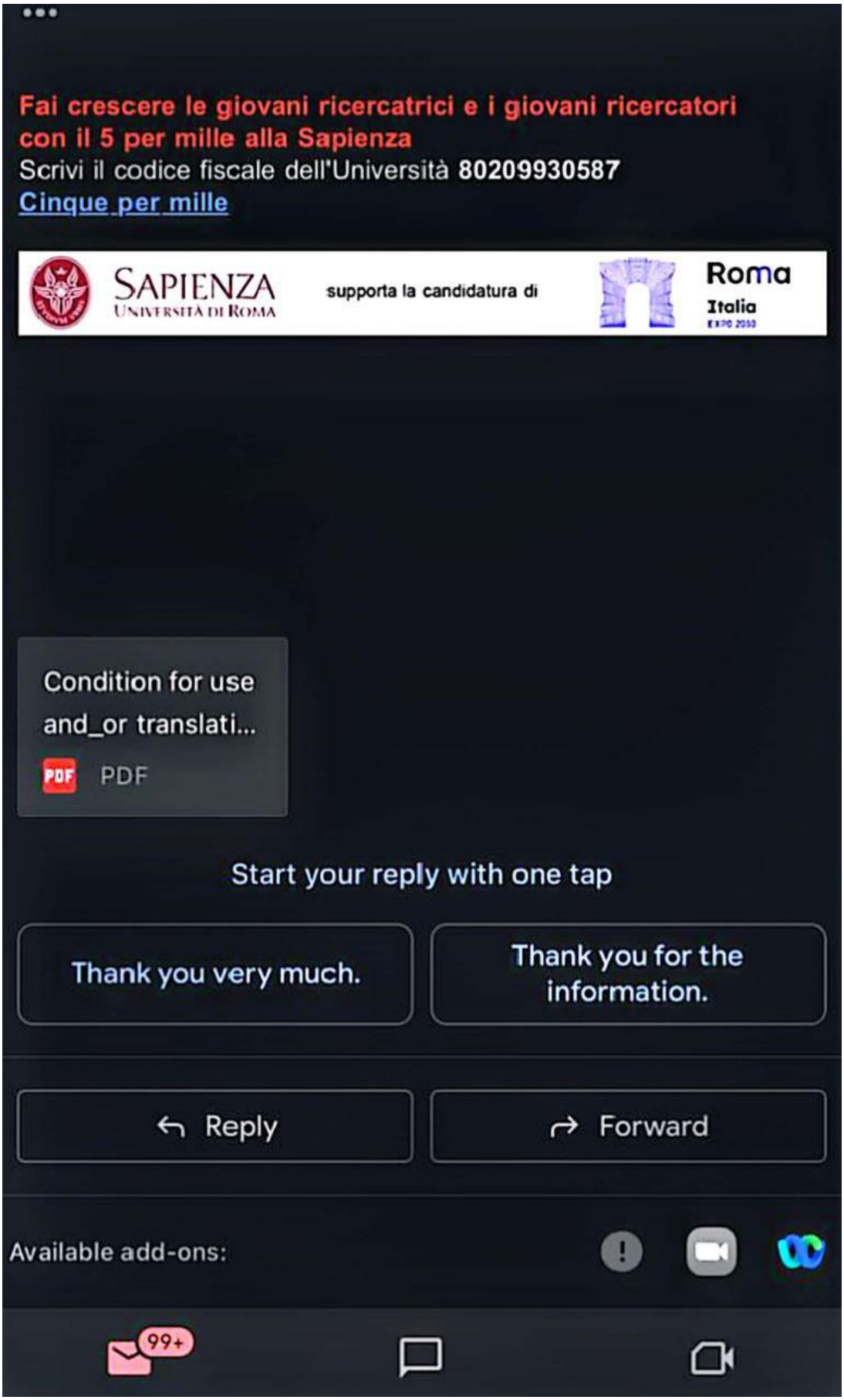
Faculty of Medicine and Psychology

Sapienza University of Rome

Via di Grottarossa 1035 - 00189 Rome, Italy

Phone +39 0633776107

email: marco.dimuzio@uniroma1.it


Fai crescere le giovani ricercatrici e i giovani ricercatori con il 5 per mille alla Sapienza
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UNIVERSITÀ DI ROMA
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Thank you for the information.
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Appendix D1

English version Questionnaire

Format number:

First: Demographic Characteristics:

1-Age: years

2- Gender: Male Female

3- Marital Status: Married Single

4- Educational level: Preparatory nursing graduate

Institute graduate

College graduate Master's degree or higher

5- Monthly income: 400-600 thousand dinars

601-800 thousand dinars

801 thousand dinars and more

6-Number of years of experience in the hospital year

7-Number of years of experience in critical units year

8- Have you participated in previous courses on medication errors?

yes no

Second; Questionnaire assess nurses about nursing workload

perception about causes of the nursing workload

Work environment	Strongly Agree	Agree	Uncertain	disagree	Strongly Disagree
1. Lake of time to perform required work					
2. Insufficient number of nursing to perform nursing services					
3. Continuing change of the shift					
4. Working excessive overtime negatively affects work					
5. Required supplies and equipment for work is not available to perform a good service					
6. Responsibility of work contradicted with my family life					
7. The hospital not nursing staff with the opportunity to develop new skills and improve career in work					
8. The hospital doesn't have a clear plan for training of nursing staff					
9. I assigned works which are not from may specialty					

10. Feeling that performed tasks are un necessary					

Third: Maslach Burnout Inventory {MBI}

Questions	Never	Some time	Always
Emotional exhaustion			
1. I feel emotionally drained by my work			
2. working with people all day long requires a great deal of effort			
3. I feel like my work is breaking me down			
4. I feel frustrated by my work			
5. I feel I work too hard at my job			
6. It stresses me too much to work in contact with people			
7. I feel like I'm at the end of my rope			

Depersonalization			
8. I feel I look after certain patient/client impersonally as if they are objects.			
9. I feel tired when I get up in the morning and have to face another day at work			
10.I have the impression that my patient /client make me responsible for some of their problem.			
11.I am at the end of my patience at the end of my work			
12.I really don t care about what happens to some of my patient /client			
13.I have become more insensitive to			

people since I have been working.			
14. I'm afraid that this job is making me uncaring			
Reduce personal performance			
15. I accomplish many worthwhile things in this job.			
16. I feel full of energy.			
17. I am easily able to understand when my patient/client feel.			
18. I look after my patients /clients problem very effectively.			
19. In my work, I handle emotional problem very calmly			
20. Through my work, I feel that I have positive influence on people			
21. I am easily able to create relaxed atmosphere with my patient /clients.			
22. I feel refreshed when I have been close it my patients /clients at work.			

Fourth: The Nurses' knowledge Questionnaire

Item	Strongly disagree	Disagree	Undecided	Agree	Strongly agree
1. Dosage calculus of intravenous drug reduces preparation errors					
2. Computerized provide order entry system (CPOE) reduce errors during the preparation's					

phase					
3. Provision of pre-packaged by the pharmacy reduces medication errors risk					
4. Availability of informative protocols, posters and brochures in the wards, promotes the decrease of the error risk					
5. Assistance of a pharmacist during drug preparation reduces the error risk					
6. Alarm noises and ward emergencies may cause distractions during drugs preparation and administration					
7. Workload (double shifts, extra time) contributes to pharmacological therapy errors					

Appendix D2

Questionnaire of the Study- Arabic

رقم الاستمارة

المحور الاول: المعلومات الديموغرافية:

1. العمر **سنه**

2-الجنس: ذكر أنثى

3-الحالة الاجتماعية: **اعزب\اء** **متزوج\ه**

منفصل/ه /مطلق/ه /ارمل/ه

4- المستوى التعليمي:

خريج (ة) إعدادية تمريض خريج(ة) معهد خريج (ة) كليه

خريج(ة) ماجستير فأعلى

5-الدخل الشهري: 400 -600 ألف دينار **601 -800 ألف دينار**

801 ألف دينار وأكثر

6.عدد سنوات الخبرة في المستشفى **سنة**

7. عدد سنوات الخبرة في الوحدات الحرجة **سنة**

8.هل اشتركت بدورات سابقه حول الأخطاء الدوائية

نعم **كلا**

المحور الثاني: استبيان يقيم تصور الممرض(ة) حول عبء العمل التمريضي

الفقرات	أوافق بشده	اوافق	غير متأكد	اعارض	اعارض بشده
1. ضيق الوقت لأداء العمل المطلوب					
2. عدم كفاية عدد الممرضين لأداء الخدمات التمريضية					
3. التغير المستمر في فترات مناوبة العمل					
4. العمل الإضافي المفرط يؤثر سلباً على العمل					
5. عدم توفر المستلزمات والمعدات اللازمة للعمل لأداء خدمة جيدة					
6. مسؤولية العمل تتعارض مع حياتي الأسرية					
7. عدم توفر الفرصة لتطوير مهارات جديدة وتحسين الحياة المهنية في العمل					
8. المستشفى ليس لديها خطة واضحة لتدريب الملاكات التمريضية					
9. تكليفي بأعمال ليست من تخصصي يزيد من جهد العمل					
10. بعض المهام التي أقوم بها ليست من تخصصي					

أولاً: تصور عن أسباب عبء العمل التمريضي

المحور الثالث: استبيان يقيم تصور الممرض (ة) حول ارهاق العمل التمريضي

ا- الاستنزاف العاطفي: الشعور بالتعب نتيجة أعباء العمل والمسؤولية الزائدة والمطلوبة من الفرد.

الفقرات	ابدا	احيانا	دائما
1. اجد صعوبة في التعبير عن مشاعري من جراء عملي في التمريض.			
2. الاعتناء بالمرضى ساعات طويلة في عملي يتطلب مني بذل المزيد من الجهد.			
3. اشعر بالانهيار بسبب عملي في التمريض.			
4. اشعر بالإحباط بسبب عملي كممرض.			
5. اشعر اني اعمل بوتيرة كبيرة اثناء وقت العمل.			

6. الاعتناء بالمرضى اثناء العمل يجهدني كثيرا.			
7. انهكت قواي بسبب ساعات العمل الطويلة .			

ب - تبلد المشاعر: شعور الفرد بانه سلبي وصارم وكذألك احساسه باختلال حالته المزاجية.

الفقرات	ابدا	احيانا	دائما
1. اشعر باللامبالاة اتجاه المرضى وكأنهم أشياء وليس انسان.			
2. اشعر بالتعب عند الاستيقاظ صباحا كون علي مواجهة يوم اخر من العمل.			
3. لدي انطباع ان المرضى يحملونني مسؤولية بعض مشكلاتهم .			
4. أصاب بالإنهاك في نهاية العمل.			
5. لا ابالي لما يحدث لبعض المرضى.			
6. أصبحت مجرد(ة) من الاحاسيس جراء هذا العمل.			
7. اخشى ان هذا العمل يجعلني قاسيا(ة) عاطفيا.			

ج- نقص الشعور الإنجاز الشخصي: إحساس الفرد بتدني نجاحه واعتقاده بان مجهوداته تذهب سدى.

الفقرات	ابدا	أحيانا	دائما
1. أنجزت أشياء ذات قيمة خلال هذا العمل			
2. اشعر اني مفعم (ة) بالحيوية اثناء العمل			
3. استطيع ان اتفهم بسهولة ما يشعر به المرضى			
4. اهتم بشكل فعال في حل مشكلات المرضى			
5. اعالج الحالات الانفعالية بكل هدوء اثناء عملي			
6. أتصور ان لي تأثيرا إيجابيا على المرضى من خلال عملي كممرض			
7. استطيع بسهولة خلق جو مريح مع المرضى			
8. القرب من المرضى يزيد من دافعيتي للعمل			

المحور الرابع: معارف الممرضين حول الأخطاء الدوائية

ت	الفقرات	أعارض بشدة	أعارض	غير متأكد	أوافق	أوافق بشدة
1	حساب الجرعات للأدوية المعطاة عن طريق الوريد يقلل من أخطاء التحضير					
2	توفير نظام حاسوبي لإدخال الأوامر الطبية يقلل من مخاطر أخطاء الدواء					
3	توفير الأدوية المحضرة مسبقًا من قبل الصيدلية يقلل من مخاطر الأخطاء الدوائية					
4	توفر بروتوكولات ارشادية، وملصقات، وكتيبات معلوماتية في الوحدات الصحية، يسهم في تقليل مخاطر الأخطاء					
5	مساعدة الممرض للصيدلي أثناء تحضير الدواء تقلل من خطر حدوث الأخطاء					
6	أصوات الإنذار وحالات الطوارئ في الأقسام قد تسبب تشتتًا أثناء تحضير وإعطاء الأدوية					
7	يساهم عبء العمل (فترات المناوبة المزدوجة، والوقت الإضافي) يساهم في حدوث الأخطاء الدوائية					

Appendix E

Expert's Panel

ت	اسم الخبير	اللقب العلمي	سنوات الخبرة	الاختصاص الدقيق	مكان العمل
1	د. عفيفة رضا عزيز	استاذ	41	تمريض اطفال	جامعه بغداد
2	د. علي كريم خضير	استاذ	32	تمريض الصحة النفسية والعقلية	جامعه كربلاء
3	د. نهاد محمد الدوري	استاذ	38	تمريض الاطفال	جامعه بابل
4	د. ختام مطشر حطاب	استاذ	26	تمريض اطفال	جامعه بغداد
5	د. خميس بندر عبيد	استاذ	25	تمريض اطفال	جامعة كربلاء
6	ذ. هالة سعدي عبد الواحد	استاذ	23	تمريض صحة مجتمع	جامعه بغداد
7	د. سلمان حسين فارس	أستاذ مساعد	30	تمريض صحة مجتمع	جامعه كربلاء
8	د. ساجدة سعدون عليوي	أستاذ مساعد	29	تمريض صحه الام والطفل	جامعه كربلاء
9	د. صافي داخل نوام	أستاذ مساعد	20	تمريض الصحة النفسية والعقلية	جامعه كربلاء
10	د. عذراء حسين شوق	استاذ مساعد	19	تمريض الاطفال	جامعه بغداد
11	د. محمد باقر حسن	أستاذ مساعد	19	تمريض اطفال	جامعه الكوفة
12	د. زيد وحيد عاجل	أستاذ مساعد	17	تمريض اطفال	جامعه بغداد
13	د. حسن عبدالله عذيبي	أستاذ مساعد	12	تمريض البالغين	جامعه كربلاء
14	د. وميض حامد شاكر	أستاذ مساعد	10	تمريض اطفال	جامعه الكوفة
15	د. غزوان عبد الحسين عبد الواحد	أستاذ مساعد	9	تمريض صحه المجتمع	جامعه كربلاء

Appendix G

Linguist Export Certification

Republic of Iraq
Ministry of higher education & scientific research
University of Karbala
College of Nursing
Graduate studies Division

جمهورية العراق
وزارة التعليم العالي والبحث العلمي
جـــامعة كربلاء
كـلية التـمريـض
شعبة الدراسات العليا

إقرار الخبير اللغوي

أشهد بأن الرسالة الموسومة :

" تأثير إرهاق الممرضين وعبء العمل على معارف الأخطاء الدوائية في وحدات العناية المركزة للأطفال "

" Influence of Nurses Burnout And Workload on Medication Errors Knowledge in Pediatric Critical Care Unit "

قد جرى مراجعتها من الناحية اللغوية بحيث أصبحت بإسلوب علمي سليم خالٍ من الأخطاء اللغوية و لأجله وقعت .

توقيع الخبير اللغوي :

الإسم و اللقب العلمي : م.د. توفيق مجيد احمد

الإختصاص الدقيق : علم اللغة التطبيقي

مكان العمل : جامعة كربلاء / كلية التربية للعلوم الانسا

التاريخ : 15 / 05 / 2024

العنوان : العراق - محافظة كربلاء المقدسة ـ حي الموظفين - جامعة كربلاء
Mail: nursing@uokerbala.edu.iq website: nursing.uokerbala.edu.iq

Appendix F

Statistician Export Certification

Republic of Iraq
Ministry of higher education & scientific research
University of Karbala
College of Nursing
Graduate studies Division

جمهورية العراق
وزارة التعليم العالي والبحث العلمي
جـــامعة كربلاء
كـلية التـمريـض
شعبة الدراسات العليا

إقرار الخبير الإحصائي

أشهد بأن الرسالة الموسومة :

"تأثير إرهاق الممرضين وعبء العمل على معارف الأخطاء الدوائية في وحدات العناية المركزة للأطفال "

" Influence of Nurses Burnout And Workload on Medication Errors Knowledge in Pediatric Critical Care Unit "

قد تم الإطلاع على الإسلوب الإحصائي المتّبع في تحليل البيانات و إظهار النتائج الإحصائية وفق مضمون الدراسة و لأجله وقعت .

توقيع الخبير الإحصائي :
الإسم و اللقب العلمي : أ.م.د ايناس عبد الحافظ
الإختصاص الدقيق : احصاء تطبيقي
مكان العمل : جامعة كربلاء \ كلية الادارة والاقتصاد
التاريخ : 2 / 6 / 2024

العنوان : العراق - محافظة كربلاء المقدسة – حي الموظفين - جامعة كربلاء
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المستخلص

المقدمة: غالبًا ما يعاني الممرضون في وحدات العناية المركزة للأطفال من الإرهاق نتيجة لتحديات الوظيفة، وأعباء العمل العالية، والتحولات الصعبة، وتوقعات الإنتاجية، وعدم الاعتراف بجهودهم. يمكن أن تؤثر هذه العوامل سلبًا على جودة الرعاية التمريضية المقدمة للأطفال المصابين بالمرض وقد تؤدي إلى زيادة الأخطاء الدوائية داخل وحدات العناية المركزة للأطفال.

الأهداف: تهدف هذه الدراسة إلى تقييم تأثير الإرهاق وعبء العمل على معرفة الممرضين بالأخطاء الدوائية في وحدات العناية المركزة.

منهجية البحث: استخدمت الدراسة تصميمًا ارتباطيًا وصفيًا يركز على وحدات الرعاية الحرجة للأطفال في الفترة من 25 ايلول 2023 إلى 2 حزيران 2024. تم جمع البيانات باستخدام استبيانات بما في ذلك استبيان عبء عمل التمريض، وجرد الإرهاق، واستبيان المعرفة في الأخطاء الدوائية. تم استخدام تقنية أخذ العينات غير الاحتمالية (الهادفة)، والتي شملت 98 ممرضة من إجمالي 134 ممرضة تعمل في وحدات العناية المركزة.

النتائج: وجدت الدراسة أن (55.1%) من الممرضين لديهم عبء العمل مرتفع. بالإضافة إلى ذلك، (61.2%) من الممرضين لديهم مستوى متوسط من الاحتراق النفسي، أظهرت الدراسة (74.5%) من الممرضين لديهم معرفة جيدة بالأخطاء الدوائية في وحدات العناية المركزة للأطفال.

الاستنتاجات: استنتجت الدراسة وجود علاقة ذات دلالة إحصائية بين عبء العمل ومعرفة الممرضين حول الأخطاء الدوائية في وحدات الرعاية الحرجة. لم تكن هناك علاقة ذات دلالة إحصائية بين الاحتراق النفسي على معرفة الممرضين حول الأخطاء الدوائية في الرعاية الحرجة.

التوصيات: أوصت الدراسة بتنفيذ برامج تدريبية حول الإرهاق وأسبابه وعوامل الخطر وتأثيره على أداء ممرضين الرعاية الحرجة وأساليب التغلب عليه. توصي الدراسة الحالية ببرنامج التعليم المستمر لجميع طاقم التمريض في مختلف مستويات التعليم في جميع مستشفيات بلدي لتقليل الأخطاء الدوائية لتقليل خطر تعرض المريض للأذى وتعزيز سلامة المرضى وزيادة عدد طاقم التمريض العاملين في المديرية العامة للصحة. ووزارة الصحة لمعالجة مشكلة نقص الكوادر التمريضية في المؤسسات الصحية.

جامعة كربلاء
كلية التمريض

تأثير إرهاق الممرضين وعبء العمل على معارف الأخطاء الدوائية في وحدات العناية المركزة للأطفال

الرسالة تقدم بها

الى

مجلس كلية التمريض/ جامعة كربلاء

وهي جزء من متطلبات نيل درجة الماجستير علوم في التمريض

بواسطة

معتز عقيل اوحيد

بإشراف

أ.م. د. زكي صباح مصيحب

ذي الحجة 1445 هجرية **حزيران 2024 ميلادية**