An-Najah National University

Faculty of Graduate Studies

KNOWLEDGE, ATTITUDE & PRACTICE TOWARD NEONATAL PAIN ASSESSMENT & MANAGEMENT IN NICUs OF TWO HOSPITALS IN WEST BANK : EVALUATION OF EDUCATIONAL SESSIONS FOR NICU NURSES

By

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Supervisor

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This Thesis is Submitted in Partial Fulfillment of the Requirements for the Degree of Master of Critical Care Nursing, Faculty of Graduate Studies, An-Najah National University, Nablus - Palestine.

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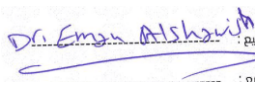
Dr. Eman Al-Shawish	
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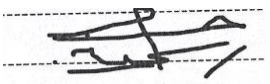
Dr . Rasmieh Al-Amer	
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Dedication

To the memory of my beloved father, whose enduring presence continues to guide and inspire me. Though you are no longer with us, your values, strength, and unconditional love have shaped every step of this journey. This accomplishment is dedicated to you, with profound respect and everlasting gratitude. To my cherished mother, sister, and brother—your unwavering support, encouragement, and belief in my potential have been invaluable throughout this endeavor. To my devoted husband, your patience, steadfast love, and continuous encouragement have sustained me through every challenge.

To my two precious children, your presence has been a constant source of strength, purpose, and inspiration. Finally, to my brothers and sisters in Palestine, your resilience, determination, and spirit serve as a powerful reminder of the strength found in unity and hope. I am proud to share this achievement with you all. With deepest appreciation, I dedicate this work to each of you.

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I would also like to express my heartfelt appreciation to the NICU nurses with whom I had the privilege to work. Their cooperation, professionalism, and commitment greatly contributed to the success of this study, and their dedication to patient care remains truly inspiring.

Declaration

I, the undersigned, hereby declare that I have submitted the thesis entitled:

KNOWLEDGE, ATTITUDE & PRACTICE TOWARD NEONATAL PAIN ASSESSMENT & MANAGEMENT IN NICUs OF TWO HOSPITALS IN WEST BANK : EVALUATION OF EDUCATIONAL SESSIONS FOR NICU NURSES

I declare that the work provided in this thesis, unless otherwise referenced, is the researcher's own work, and has not been submitted elsewhere for any other degree or qualification.

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Signature: Lamees Abuasba

Date: 12/8/2025

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Abstract

Background Neonatal pain is a critical concern in NICUs, as unmanaged pain can lead to serious short-and long-term developmental consequences. Despite increasing awareness, effective pain assessment and management remain inadequate.

Aim To investigate the knowledge, attitudes, and practices of NICU nurses in the West Bank, a region with limited research on the subject, and to identify barriers hindering effective care. Additionally, the study evaluated the impact of targeted educational sessions on improving nurses' clinical practice and neonatal pain outcomes.

Method A quasi-experimental pre-test–post-test multicentre design was conducted in two hospitals in the Jenin area — Al-Khalil Suleiman Governmental Hospital and Al-Razi Private Hospital. A voluntary sample of 50 NICU nurses completed a self-administered questionnaire covering demographics, knowledge, attitudes, practices, and perceived barriers regarding neonatal pain assessment and management. Educational sessions, delivered over two days, combined lectures and practical training on neonatal pain physiology, assessment tools, and management strategies. The questionnaire was re-administered in two phases: three days post-intervention (knowledge and attitudes) and three months post-intervention (full questionnaire) to assess immediate and sustained effects.

Results The study demonstrated significant improvements in nurses' knowledge, attitudes, and practices. Knowledge scores increased from 52% pre-intervention to 82% immediately after and remained at 74.6% after three months. Attitude scores rose from 63.4% to 87.9%, stabilizing at 73.3%, while practice scores improved from 27.5% to 52.4%. Perceived barriers decreased from 69.8% to 56%, with both personal and organizational barriers showing reductions. Knowledge and attitude were positively

correlated, and knowledge was negatively correlated with barriers ($r = –0.372$, $p = 0.008$), indicating that increased knowledge reduced perceived obstacles. Practice was significantly associated with education level, with diploma-holding nurses scoring higher than those with a baccalaureate or higher. No other significant relationships were found between demographics and study variables.

Conclusion The findings highlight the effectiveness of structured educational interventions in enhancing NICU nurses' knowledge, attitudes, and practices regarding neonatal pain care. Improved knowledge not only fosters positive attitudes but also reduces perceived barriers, emphasizing the need for continuous professional development and structured training programs to ensure evidence-based neonatal pain management.

Keywords Neonatal pain, NICU nurses, Pain assessment, Pain management, Educational intervention, Perceived barriers, Nurse knowledge, Attitudes, Practices, West-Bank.

Chapter One

Introduction and Theoretical Background

1.1 Theoretical basis

1.1.1 Neonatal Pain: Assessment Challenges and Considerations

Newborns, also referred to as neonates, are defined as human beings from birth until 28 days of life (Kliegman & Nelson, 2020). Despite their sizes and developmental stages, neonates are capable of perceiving pain similarly to older children and adults, especially when a medical related procedure is needed to be performed &/or illness related discomfort is undergoing. Healthcare professionals and researchers have frequently observed and extensively reported the difficulty of effectively and precisely assessing, and comprehending pain in neonates. The main problem relies on the need for invasive medical procedures during their hospitalization such as venipunctures, intravenous access (I.V cannulation), heel lancing, & suctioning (Sposito et al., 2017).

Accurately recognizing pain in neonates is particularly challenging due to several factors. These include ambiguous behavioral cues — especially for inexperienced caregivers — high workload in neonatal units, limited knowledge of pain assessment and management among nursing staff, lack of standardized, evidence-based pain protocols, and poor interdisciplinary communication within neonatal care teams (Blomqvist, et al .,2020).

The International Association for the Study of Pain (IASP) defines pain as “an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage” (Merskey, 1991). This broadly accepted definition explains & underscores the subjectivity of pain, adding another layer of complexity to its assessment in non-verbal populations such as neonates.

In particular, pain in neonates is complex and difficult to define due to the absence of verbal communication and specific subjective behaviors. Crying, though a common indicator, is non-specific and may be triggered by a variety of factors. Other potential signs of neonatal pain include sleeplessness, elevated vital signs (e.g., tachycardia and tachypnea), and increased oxygen demand. The vast diversity in neonates’ gestational ages and medical conditions adds to the complexity of pain assessment and

management (Alshawish & Zaidan, 2021). As a result, numerous neonatal pain assessment tools and strategies have been developed to address these challenges (Zhan et al., 2025).

1.1.2 Pain Assessment and Management in Neonates

Pain assessment goes beyond basic identification, it also consists of an action plan and then implementation of an appropriate pain relief methods (Christoffel et al., 2019). Effective pain observation and management begin with a thorough, evidence-based assessment process, which nurses must be trained to perform consistently. Paediatric care guidelines recommend pain assessment at the beginning of each shift and during pivotal moments — before, during, and after any invasive procedures — using standardized, evidence-based pain assessment tools (Lim & Godambe, 2017).

When addressing pain management, it is essential to discuss its both strategies ,which include pharmacologic and non-pharmacologic interventions. Pharmacologic methods involve the use of analgesics or local anaesthetics, while non-pharmacologic techniques may include administering sucrose, swaddling, and promoting skin-to-skin contact with the mother during or after painful procedures (Araujo et al., 2015).

A comprehensive discussion of pain management must begin with its core foundation, which is the reduction of overall exposure to painful events. In the neonatal intensive care unit (NICU), where frequent and often invasive medical interventions are routine, minimizing unnecessary procedures is essential (Cruz, 2024). In this sense ,clinicians are encouraged to avoid non-essential interventions and to plan diagnostic tests strategically, such as minimizing the frequency of venipuncture through test consolidation or using arterial or central venous lines when repeated sampling is required. Although the placement of such lines may cause pain & discomfort, it can significantly reduce the frequency of painful procedures (Anand et al., 2017).

Current studies have eliminated the out-dated belief that neonates, particularly preterm infants, cannot feel pain. This is particularly confirmed by Agakidou et al. (2021) who declared that even extremely premature infants are capable of experiencing pain. Moreover, Perry et al. (2018) discovered that preterm neonates may have a 30% to 50% lower pain threshold and reduced pain tolerance compared to older children, making them more reactive to painful stimuli. This can be attributed to their developing

nociceptive pathways that are particularly susceptible to overstimulation from repeated painful experiences (physiological immaturity), which can lead to heightened sensitivity and pain even during routine caregiving activities like diaper changes, feeding, or repositioning, which explains why preterm infants require special consideration in pain management, this will be further elaborated upon in a later chapter.

Nurses play a vital role in neonatal pain assessment and management, due to the active and direct nature of the care they provide to diverse patients populations & developmental levels, with a role that is considered by many to be both complex and integral to healthcare delivery system. Primarily, they are often the first to recognize faint signs of distress. Nevertheless, a lack of knowledge, training, or organizational support/protocols can lead to the misjudgement & under treatment of pain (Carlsen Misic et al., 2021). Upholding an adequate training and education courses for nurses is crucial for effective pain control in neonates, a point that will be explained more in the last chapter .

A fundamental element of this process (enhancement of neonatal pain assessment & management by nurses) is the use of validated pain assessment tools. Among these, the Neonatal Infant Pain Scale (NIPS) is widely used in NICUs for both preterm and full-term infants. This tool is designed to assesses non-verbal cues such as facial expressions, crying, breathing patterns, and limb movements. A total score of 3 or more on the NIPS indicates the presence of pain (Anand et al ., 2006). Studies have consistently shown the NIPS to be one of the most utilized and effective neonatal pain scales (Anand et al., 2006; Lago et al., 2020; Xie et al., 2020) .

Proceeding to pain management, its protocols should be developed and guided by evidenced based assessment practices. These protocols are significantly influenced and shaped by a number of factors, including the nurses' beliefs, level of knowledge, and the availability of institutional support. The presence or even absence of systemic, research-based guidelines significantly impacts the quality of pain relief provided to neonates. For instance, a study conducted in Brazil in 2015 found that 41.2% of nurses reported a lack of systemic pain management protocols in their units, highlighting a major barrier to effective pain treatment (Beckett et al ., 2015) .

1.1.3 Non-Pharmacologic and Pharmacologic Pain Management in Neonates

The widely used and broadly accessible strategies for pain control in nursing are non-pharmacological interventions, which are techniques used to reduce pain without the administration of drugs, primarily providing short-term relief. These interventions are generally administered by nurses and are particularly appropriate for managing mild procedural pain. Commonly used non-pharmacological methods include non-nutritive sucking, breastfeeding or bottle feeding, glucose or 24% oral sucrose administration (if available), swaddling, and skin-to-skin contact. Among these, oral sucrose is the most frequently researched non-pharmacologic method in neonatal pain palliative treatment (Witt et al.,2016) .

The mechanism of action of oral sucrose is hypothesized to involve the activation of endogenous opioid pathways, although many researchers have reported that the precise physiological mechanism remains to be established. When administered approximately two minutes prior to a painful procedure, sucrose has been shown to significantly reduce both physiological and behavioral indicators of pain, with effects lasting up to four minutes (Harrison & Bueno, 2023). A meta-analysis of 57 studies involving 4,730 neonates with gestational ages between 25 and 44 weeks concluded that a single dose of sucrose is a safe and effective means of reducing procedural pain (Stevens et al., 2013). For prolonged or invasive procedures, such as ophthalmologic examinations or circumcision, larger or repeated doses may be required for sustained analgesic effect. Notably, combining sucrose with other non-pharmacological techniques, such as non-nutritive sucking and swaddling, enhances its effectiveness, especially during longer procedures. Glucose solutions (20–30%) have also been found effective as an alternative for sucrose in managing procedural pain, particularly for heel lancing and venipunctures (Weng et al., 2024). Bueno et al. (2013), in a systematic review, found no significant difference in efficacy between glucose and sucrose, further validating glucose as a feasible option .

In contrast to non-pharmacological therapy, pharmacological management relies on the use of medications to alleviate moderate to severe pain and typically provides longer-lasting effects. These interventions require a physician’s order and compliance to written protocols. The most commonly used pharmacological agents in neonatal care include acetaminophen and opioids such as morphine and fentanyl, especially for

neonates undergoing endotracheal intubation (mechanical ventilation), invasive procedures, or post – operative pain control (Witt et al., 2016).

Acetaminophen is the most frequently used/prescribed drug for neonates, due to its safe profile and proven efficacy. It is recommended for procedures causing mild to moderate pain, such as dressing changes, circumcision, heel-sticks, arterial punctures, and venipuncture. Despite it being generally safe in neonates, however, when administered at low doses, acetaminophen can occasionally cause specific side effects including hepatic or renal toxicity, warranting careful monitoring.

On the other hand, managing moderate to severe pain is by using Opioids like morphine and fentanyl. These agents are typically administered systemically and require precise titration to avoid adverse effects. Procedures requiring the use of opioid include central line placements, tracheal intubation, wound care, chest tube insertion, and lumbar puncture. Importantly, combining acetaminophen with morphine can reduce the required opioid dose, thereby decreasing the risk of opioid - related complications such as hypotension, especially in preterm infants.

Topical anaesthetics also play a significant role in neonatal pain management for specific procedures. Among the most extensively studied and utilized agents are tetracaine gel and EMLA, a eutectic mixture comprising 2.5% lidocaine and 2.5% prilocaine. These agents have demonstrated procedural pain alleviating efficacy during certain interventions such as, venipuncture, peripheral arterial puncture, and the installation of central venous catheters. Significantly, EMLA appears to be more effective when used in combination with 24% oral sucrose or glucose, suggesting a synergistic benefit from the co-administration of pharmacological and non-pharmacological pain relief methods. Nevertheless, EMLA does not provide a substantial relief of pain for heel lancing procedures in neonates as indicated by recent clinical studies (Witt et al., 2016).

1.1.4 Nurses' Knowledge, Attitudes, and Practice Toward Neonatal Pain

As discussed earlier, nurses' information base plays a viable role in the implementation of neonatal pain assessment and management. Even so, knowledge alone is not enough ,and mainly it is strongly correlated with the person's attitude , and both aspects deeply influence clinical practice and patient outcome. Numerous studies have stressed this

connection, highlighting how inadequate knowledge and negative attitudes among caregivers can hinder effective pain assessment and intervention in neonates (Carlsen Misic et al., 2021). A partial comprehension of neonatal pain in all its aspects , reinforced by superficial or disregarding attitudes, remains one of the primary barriers to optimal pain management in this vulnerable population. Therefore, assessing the knowledge and attitudes of nurses toward neonatal pain is essential. Such measures are essential for the development of targeted strategies to enhance nurses' understanding and change attitudes, ultimately improving pain identification, assessment, and treatment in newborns (Asadi-Noghabi et al., 2014) .

Despite the extensive body of global research exploring nursing knowledge, beliefs, practices, and perceptions surrounding neonatal pain, a substantial gab persists in the literature specific to the West Bank. Only a limited number of studies have been conducted in this region, even as researchers continue to stress the need for more localized research (Costa et al., 2017; Carlsen Misic et al., 2021). So this study strives to investigate the knowledge, attitudes, and practices of NICU nurses in the West Bank toward neonatal pain assessment and management, as well as to identify the barriers that hinder effective pain assessment & management in this population. In addition, it aims to evaluate the effectiveness of educational sessions provided to these nurses, with the goal of improving clinical practice performance and neonatal pain care outcomes.

1.2 Problem Statement

Several studies have concluded the presence of a significant gap in nurses' knowledge & attitudes regarding neonatal pain care, with some nurses holding the believe that neonates experience pain the same as or even less than that experienced by adults & older children, although there's multiple evidence indicating that neonates, especially preterm infants, are more sensitive to painful stimuli (Carlsen Misic et al., 2021). Moreover, these misconceptions & negative attitudes can lead to under-recognition & mismanagement of pain in neonates (Popowicz et al., 2021).

Persistent, undertreated pain in neonates has led to numerous consequences that have been well researched over the years. The topic of unmanaged chronic pain received a widespread attention by researchers, particularly adverse neurodevelopmental outcomes including alterations in sensory processing, in other words resulting in changes in

interpreting any touch the newborn experiences, even if the touch is meant for feeding or comfort (Anand et al., 2006).

This study is of great interest to the authors, because the West Bank area has limited research that identifies and explores nurses' knowledge, attitudes, and practices regarding neonatal pain assessment and management, as well as any barriers that may encounter the nurses in their units and negatively affect the implementation of neonatal pain care strategies. Addressing this issue could play a significant role in improving neonatal pain care outcomes in the region for this vulnerable population.

1. 3 Study Hypotheses

This study aims to test the following null hypotheses

H_0 : There are no statistically significant differences in the levels of NICU nurses' knowledge regarding neonatal pain assessment and management between the three assessment points: pre-educational sessions, and post the educational sessions both immediately and after three months (P = 0.05) .

H_0: There are no statistically significant differences in the levels of NICU nurses' attitudes regarding neonatal pain assessment and management between the three assessment points: pre-educational sessions, and post the educational sessions both immediately and after three months (P = 0.05) .

H_0: There are no statistically significant differences in the levels of NICU nurses' practices regarding neonatal pain assessment and management between pre-educational sessions, and three months post the educational sessions (P = 0.05) .

H_0: There are no statistically significant differences in the levels of NICU nurses' barriers regarding neonatal pain assessment and management between pre-educational sessions, and three months post the educational sessions (P = 0.05) .

H_0: There are no statistically significant differences in the levels of NICU nurses' knowledge post the educational sessions regarding neonatal pain assessment and management in two hospitals in West Bank according to the demographic characteristics (age, years of experience as a nurse, years of experience in the NICU, level of education, and type of hospital) (p = 0.05) .

H_0: There are no statistically significant differences in the levels of NICU nurses' attitudes post the educational sessions regarding neonatal pain assessment and management in two hospitals in West Bank according to the demographic characteristics (age, years of experience as a nurse, years of experience in the NICU, level of education, and type of hospital) ($p = 0.05$) .

H_0: There are no statistically significant differences in the levels of NICU nurses' practices post the educational sessions regarding neonatal pain assessment and management in two hospitals in West Bank according to the demographic characteristics (age, years of experience as a nurse, years of experience in the NICU, level of education, and type of hospital) ($p = 0.05$) .

$H_{0:}$ There are no statistically significant differences in the levels of NICU nurses' barriers post the educational sessions regarding neonatal pain assessment and management in two hospitals in West Bank according to the demographic characteristics (age, years of experience as a nurse, years of experience in the NICU, level of education, and type of hospital) ($p = 0.05$) .

$H_{0\ :}$ There are no statistically significant relationships between the NICU nurses'(knowledge, attitudes, and practices) regarding neonatal pain assessment and management and the barriers they encounter during pain assessment and management in the two hospitals in West Bank ($p = 0.05$) .

1.4 Significance of the Study

Despite advancements in medical knowledge and the presence of effective pain assessment & management guidelines for neonates, evidence suggests that neonatal pain is still under-recognized and undertreated, even though this contributes to critical neurodevelopmental adverse effects & low quality of care in neonatal units. It is often attributed to gaps found in healthcare providers' knowledge about the neonate's ability to experience pain. This study seeks to add to the literature specific to the West Bank, where minimal & insufficient data exist on nurses' knowledge, attitudes, and practices regarding neonatal pain care, also the barriers hindering the implementation and advancement of neonatal pain assessment and management strategies, as well as provide an educational intervention & explore its outcomes on neonatal pain care. Ultimately, this research can help in policy reforms, which may contribute to enhancing the overall

clinical practice, and promoting evidence-based strategies regarding the matter in the region .

1.5 Aim and Goals of the Study

To investigate the knowledge, attitudes & practices of NICU nurses toward neonatal pain assessment and management in two hospitals in West Bank, as well as any barriers encountered by the nurses during the implementation of neonatal pain care practices. Furthermore, to implement educational sessions on the topic, which gives us these specific goals :

1- To evaluate the NICU nurses' knowledge regarding neonatal pain assessment and management in two hospitals in West Bank pre the educational sessions, post the educational sessions immediately, and post the educational sessions after three months.

2- To evaluate the NICU nurses' attitudes regarding neonatal pain assessment and management in two hospitals in West Bank pre the educational sessions, post the educational sessions immediately, and post the educational sessions after three months.

3- To evaluate the NICU nurses' practices regarding neonatal pain assessment and management in two hospitals in West Bank pre the educational sessions, and post the educational sessions after three months.

4- To evaluate the barriers facing NICU nurses' regarding neonatal pain assessment and management in two hospitals in West Bank pre the educational sessions, and post the educational sessions after three months.

5- To evaluate the effects of the educational sessions on NICU nurses' knowledge regarding neonatal pain assessment and management in two hospitals in West Bank.

6- To evaluate the effects of the educational sessions on NICU nurses' attitudes regarding neonatal pain assessment and management in two hospitals in West Bank.

7- To evaluate the effects of the educational sessions on NICU nurses' practices toward neonatal pain assessment and management in two hospitals in West Bank.

8- To evaluate the effects of the educational sessions on barriers facing NICU during neonatal pain assessment and management in units in two hospitals in West Bank.

9- To determine the effects of NICU nurses' demographics (age, working experience, and level of education, etc…) on nurses' knowledge, attitudes, practices, and barriers regarding neonatal pain assessment and management in two hospitals in West Bank.

10- To determine the relationships between NICU nurses'(knowledge, attitudes, and practices) regarding neonatal pain assessment and management and the barriers they face during pain assessment and management in two hospitals in the West Bank.

1.6 Research Questions

1. Is the level of NICU nurses' knowledge regarding neonatal pain assessment and management increased post the educational sessions ?
2. Is the level of NICU nurses' attitudes toward neonatal pain assessment and management increased post the educational sessions ?
3. Is the level of NICU nurses' practices toward neonatal pain assessment and management increased post the educational sessions ?
4. Is the level of barriers facing NICU nurses' during neonatal pain assessment and management decreased post the educational sessions ?
5. Are there significant differences in the levels of NICU nurses' knowledge regarding neonatal pain assessment and management between pre the educational sessions, post the educational sessions immediately, and post the educational sessions after three months ?
6. Are there significant differences in the levels of NICU nurses' attitudes regarding neonatal pain assessment and management between pre the educational sessions, post the educational sessions immediately, and post the educational sessions after three months ?
7. Are there significant differences in the levels of NICU nurses' practices regarding neonatal pain assessment and management between pre the educational sessions, and post the educational sessions after three months ?
8. Are there significant differences in the levels of NICU nurses' barriers regarding neonatal pain assessment and management between pre the educational sessions, and post the educational sessions after three months ?

9. Are there significant differences in the levels of the NICU nurses' knowledge post the educational sessions regarding neonatal pain assessment and management in two hospitals in West Bank according to the demographics (age, working experience, and level of education, etc…) ?
10. Are there significant differences in the levels of the NICU nurses' attitudes post the educational sessions regarding neonatal pain assessment and management in two hospitals in West Bank according to the demographics (age, working experience, and level of education, etc…) ?
11. Are there significant differences in the levels of the NICU nurses' practices post the educational sessions regarding neonatal pain assessment and management in two hospitals in West Bank according to the demographics (age, working experience, and level of education, etc…) ?
12. Are there significant differences in the levels of the NICU nurses' barriers post the educational sessions regarding neonatal pain assessment and management in two hospitals in West Bank according to the demographics (age, working experience, and level of education, etc…) ?
13. Are there significant relationships between the NICU nurses' (knowledge, attitudes, practices) regarding neonatal pain assessment and management and the barriers they face during pain assessment and management in two hospitals in West Bank ?

1.7 Conceptual Framework

1.7.1 Conceptual Definitions

Neonate: "a neonate is also called a newborn. The neonatal period is the first 4 weeks of a child's life. It is a time when changes are very rapid. Many critical events can occur in this period: Feeding patterns are established, bonding between parents and infant begins, the risk for infections that may become more serious are higher, many birth or congenital defects are first noted" (MedlinePlus, 2023) .

Neonatal Intensive Care Unit (NICU): "is a specialized hospital unit designed to provide comprehensive care for premature and critically ill newborns. These units are equipped with advanced medical technology and staffed by healthcare professionals trained to manage complex neonatal conditions. NICUs offer a range of services, including intensive care for infants with severe health issues, as well as high-

dependency and special care services for less critical cases" (National Institute for Health and Care Excellence [NICE], 2010) .

Pain: "an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage" (Merskey,1991).

Pain assessment: "involves a comprehensive characterization of the pain experience by using clinical judgment to consider the nature, significance, and context of a patient's pain" (Lalloo & Stinson, 2014).

Neonatal pain management: "is a systematic approach to assessing, preventing, and alleviating pain in newborn infants, particularly those in neonatal intensive care units (NICUs). This encompasses the use of both pharmacological and non-pharmacological interventions tailored to the unique physiological and developmental needs of neonates, aiming to minimize immediate discomfort and prevent long-term adverse effects associated with untreated pain" (Anand & Hall, 2014) .

1.7.2 Operational Definitions

Demographic data: the data consisting of level of education, working experience as a nurse, working experience as a nurse in the NICU, age, & training about neonatal pain .

Knowledge of NICU nurses about neonatal pain: the author will distribute a self-administered questionnaire containing a section to measure NICU nurses' degree of knowledge regarding neonatal pain assessment & management, consisting of (43) True / False questions, before & after the educational sessions (intervention) .

Attitudes of NICU nurses about neonatal pain: the author will distribute a self-administered questionnaire containing a section to gain information about NICU nurses' attitude toward neonatal pain assessment & management, consisting of (16) Yes / No questions, before & after the educational sessions (intervention) .

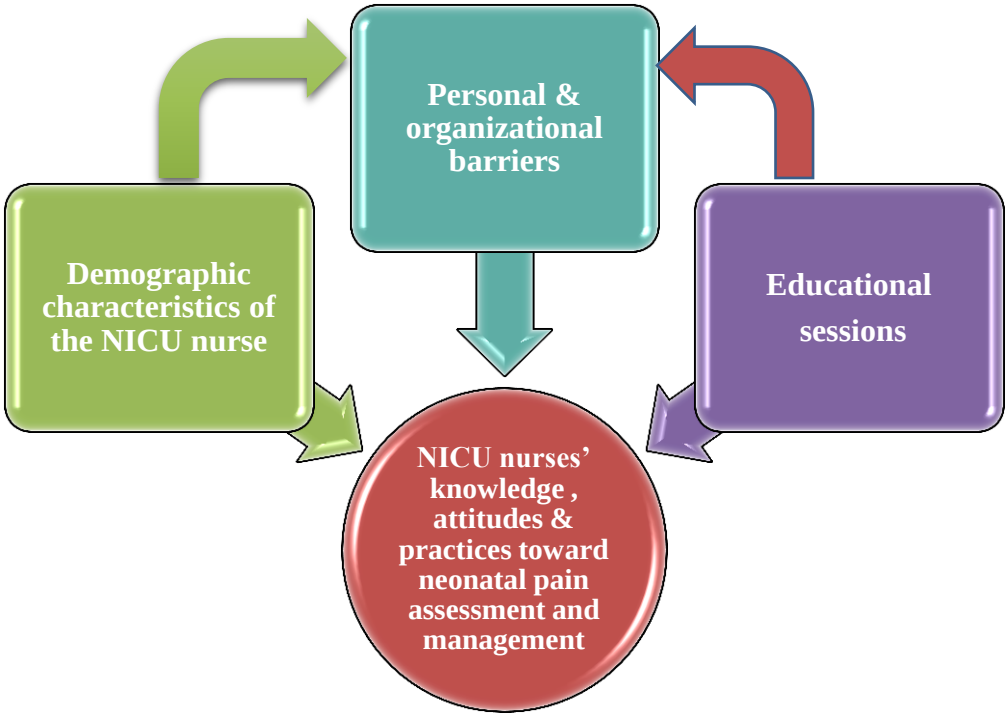
Practices of NICU nurses toward neonatal pain: the author will distribute a self-administered questionnaire containing a section to gain information about NICU nurses' practices toward neonatal pain assessment & management, consisting of (15) Yes / No questions, before & after the educational sessions (intervention) .

Barriers: any personal &/or organizational obstacles facing the NICU nurse affecting their knowledge, attitudes & practices toward neonatal pain assessment & management, the author constructed (10) Yes/No questions (5 personal, 5 organizational) to assess it, before & after the educational sessions (intervention) .

1.7.3 Framework

Figure 1

Relationship between the research's variables



1.8 Literature Review

1.8.1 General Pain Physiology

Throughout history, pain has been a central subject of medical discussion and investigation, ranging from its impact on humankind physiologically to the methods & tools used to assess it, then application of management techniques according to its intensity in the ones in need. Pain is considered the "fifth vital sign", reflecting its clinical importance in patient care. Researchers provided in many studies both the pharmacological and non-pharmacological strategies in clinical situations to resolve it and gain effective pain management (Morgan & Rowles, 2025).

Physiologically the pain receptors are of sensory kind called nociceptors, found throughout the body and affected by chemical, physical, or heat stimuli. When actual or sometimes potential tissue damage/breakage occurs, this the sensorial aspect is the first to be activated (nociceptors), which send neural impulses to the spinal cord and then to the brain for processing, a process referred to as the pain pathway (Anand et al., 2006).

1.8.2 Neonatal Pain Physiology & Development

In the past, it was widely believed that neonates can't feel pain, or are immune to it from the aspect of neural underdevelopment, looking into previous researches neonatal pain is considered a fresh subject, never discussed before the 1980s, nevertheless it was first mentioned in 1987 by Anand and Hickey, tracing pain back to the fetal life (Anand et al., 2006).

The notion that newborns are painless is not a recent one. In his well-known book The Expression of the Emotions in Man and Animals, Charles Darwin said that although newborns show pain reflexes, they are only reflexive and that they are unable to feel or communicate actual pain (Rodkey & Pillai Riddell, 2013). Neonatal neural systems were believed to be so underdeveloped that they were incapable of feeling sensation, and a diminished or disjointed reaction to pain resulted from decreased myelination. We now know that inadequate myelination does not result in pain being absent; rather, it just causes pain to be transmitted more slowly, and by the second or third trimester, myelination is typically finished.

Development of pain & responses to somatic stimuli start early in gestation. Around 7.5 weeks after conception, reflex reactions to stimuli begin to appear in the perioral skin. They then progress in the palms of the hands before eventually reaching the limbs by 13 to 14 weeks. Peripheral pain receptors are systemically present by around 20 weeks post conception. Nerve tracts connecting the brain stem and spinal cord to the thalamocortical fibers are established approximately 22 weeks after conception.

However, the descending inhibitory fibers are not completely developed until 32 weeks post gestation. These fibers help to reduce the intensity of pain perception and reaction. As a result, the preterm neonate is more susceptible to pain than older children and adults due to a lack of neurotransmitters in the descending tract, which shows a lack of complete neuromodulating processes (Tucker et al., 2023).

1.8.3 Neonatal Pain Theories

The human brain encompasses certain regions that regulate emotions and thoughts. A person's ideas and feelings might alter how they perceive and experience pain. Unfortunately, newborns lack the linguistic skills, life experience, emotional regulation and cognitive maturity necessary to support this gating process. Thereby, they have limited capacity to regulate pain (Williams & Lascelles, 2020)

Lowering agitation, encouraging sleep, and reducing a sense of disarray, are known to be necessary comfort methods for newborns to aid in decreasing pain during stressful procedures (Lim & Godambe, 2017) .

One of the most widely discussed theories was the gate control theory, that has been challenged by several hypotheses, some of which contend for a less linear and more dynamic approach to pain interpretation, it revolves around closing pain gates that are allegedly present in the spinal cord , by countering the painful stimuli with another non–painful sensation. On the other hand, The wind-up model is another pain theory that significantly affects the newborn. According to Mendell et al.(2022), wind-up is a process in which repetitive exposure to the same unpleasant stimuli causes an excessive reaction that persists even after the unpleasant stimulus is removed. Due to the immature nervous system in neonates, they're more vulnerable to cumulative pain .

1.8.4 The Lasting Impact of Unmanaged Neonatal Pain: Insights from Wind-Up Theory and Neurodevelopmental Consequences

Despite the numerous guidelines originating from the American Academy of Pediatrics (AAP) and other important professional associations, the process of neonatal pain assessment and management is still inadequate in many clinical settings. To confirm the previous statement, many researchers observed that analgesia is administered in only half of the neonatal procedures, and mainly without pain assessment. The major concern related to the under-treatment of neonatal pain does not only stem from an ethical viewpoint, but also due to the terrifying short- and long-term side effects on the physiological and developmental outcomes, specifically in preterm neonates (Anand ,2007).

The central nervous system experiences an increase in nociceptive signals when excitatory and inhibitory processes are out of balance. Certain cell populations within

the preterm infants' central nervous system are especially susceptible to inflammation, & oxidative stress. Newborn animal studies have shown that frequent or continuous pain enhances neuronal death, and that stress and pain during infancy cause anxiety - like behaviors in maturity. More neonatal pain-related stress exposure in humans has been linked to changes in brain morphology and stress hormone levels (glucocorticoids), as well as to less developed cognitive, motor, and behavioral neurodevelopment in newborns and very preterm children. As a result, it seems that frequent encounters with painful procedures affects the maturation of the newborn's brain (Walker, 2019).

The "wind-up" theory as mentioned earlier briefly, is a phenomenon that further explains how repeated pain experiences adversely affect neonates. It states that full term or preterm newborns start to form connections between the unpleasant signal and an action. For instance, when an alcohol wipe is applied to the newborn's heel, he will experience pain and may scream or struggle. The newborn anticipates the painful heel lance that will come next.

Furthermore, aversions may form if exposure is very protracted or painful. For instance, prolonged and frequent endotracheal intubation may lead a preterm newborn to refuse a bottle or the breast for feeding. A gastrointestinal tube may need to be surgically inserted until the oral aversion goes away, and even with developmentally appropriate care, real oral aversions can take months or even years to overcome. (Lim & Godambe, 2017; Walker, 2019).

To summaries these facts explained above, healthcare systems need to highlight the role of neonatal pain assessment and management, not only to prevent exposure to repeated painful events, but also to enhance clinical positive effects and to maintain healthy neurodevelopmental outcomes accomplished by continuously supporting evidence-based trajectories (Anand, 2007; Williams & Lascelles, 2020) .

1.8.5 Effects of Pain/Stress on the Preterm & Very Preterm Neonates

Upon admission to the NICU, preterm and very preterm neonates need frequent and excruciating operations required for newborn care and survival. These interventions occur during a time of fast brain development, as well as a period of creation and configuration of stress systems. Despite having the nociceptive circuitry necessary to

sense pain, infants born this early have functionally underdeveloped sensory systems, as discussed earlier, that may increase the transmission of pain through its neural pathway, leading to accumulation of inflammatory and oxidative stress by products, and subsequently cause cellular apoptosis along with long-term behavioural changes, that persist till adulthood (Walker, 2019).

1.8.6 NICU Nurses' Perspectives, Perceptions, and Challenges in Neonatal Pain Assessment and Management

Neonatal pain is mainly hard to recognize as issued by many neonatal medical personnel most importantly nurses, attributed to the absence of verbal communication, while they may give other signs of discomfort and pain, these signs can be interpreted or mistaken for many other issues. This frequently leads to delayed and even no management of pain in this population (Fitzgerald,2015).

Organizations must start adopting, regulating and implementing neonatal pain assessment scales and management guidelines, as in 2008 the National Association of Neonatal Nurses (NANN) issued a number of protocols to control neonatal pain and assist nurses in their job, that emphasized the importance of assessment, reassessment, management, and finally documentation, as well as highlighted the need for nursing training in this field (Campbell et al., 2025).

The main obstacles to effective neonatal pain care, according to recent studies, are the limited knowledge and experience among nurses. On that topic, a study done in Gaza years ago revealed that 59.42% of their respondents had limited knowledge and 58.33% reported limited practice regarding neonatal pain assessment and management. The author then recommended to build training & learning programs to improve the nurses' cognition and clinical competencies in this area (Qasim, 2021). Another study by Popowicz et al. (2021) had a similar observation, stating that the lack of training of the unit's employees was the leading barrier to effective pain management.

On another note, Assefa et al. (2022) conducted a study in Ethiopia that discovered in most NICUs, where painful procedures are continuously needed, analgesic support was not routinely administered, this lead them to state the urgent need for on-going implementation of neonatal pain assessment and pharmacological intervention. However, a thesis from Sweden highlighted the crucial role of nurses' beliefs toward a

comprehensive pain assessment and management, declaring that knowledge and training alone aren't enough to support actual clinical practice, and nurses also need a positive attitude and motivation by their institutions (Carlsen Misic et al., 2021).

Meanwhile, Christoffel et al. (2019) declared that institutions are responsible for adopting and implementing formal neonatal pain care protocols, emphasizing their important role in effective pain assessment and management in neonates. On the other hand, a study in Brazil found out that 41.1% of healthcare professionals reported that there were no guidelines to follow in their units, with 34.1% never using an assessment scale (Costa et al., 2017). Lastly some authors mentioned the obstacle of discouragement and demotivation of workers, leading them to neglect the assessment process, even if they have enough information about it (Blomqvist et al., 2020) .

Chapter Two

Methods

2.1 Study Design

This study used a quantitative, quasi-experimental (pre-test & post-test), multi-centre design, that was chosen because it successfully represented the way the intervention part of the research will be carried out (educational sessions) and its impact on NICU nurses, the design also explained the data collection method implementation, which allowed an evaluation of the changes in knowledge, attitudes, practices, and barriers over time. Because the target population was relatively small and the researcher needed the majority of them to participate in the study. Therefore, randomization was not feasible, and in turn a quasi-experimental design was used instead of a true experimental design.

2.2 Site Setting

The research was conducted at two hospitals in the Jenin area of the West Bank: Khalil Suleiman Governmental Hospital and Al-Razi Private Hospital .

2.3 Target Population

All employed nurses working in the NICUs of the two intended hospitals, with voluntarily participation, including 31 nurses from Khalil Suleiman Governmental Hospital and 25 nurses from the private Al-Razi Hospital, giving a total of 56 participants.

2.4 Inclusion & Exclusion Criteria

Inclusion criteria: all employed nurses (staff nurses) working in the NICUs of the two hospitals mentioned above, regardless of their education level, job description, and years of experience.

Exclusion criteria: nursing students, part timers and volunteers if present, and the nurses on maternity / annual leaves.

2.5 Sample Size

A program was used to calculate the needed sample size, as illustrated in Appendix A. The total number of NICU nurses in the two hospitals is 56, and the researcher intended

to include all of them in the study. According to Raosoft calculations, the required sample size was 49.

This calculation was performed to ensure that adequacy was met with the inclusion criteria of the study .

2.6 Data Collection Tool

The data collection tool was a self-administered questionnaire (Appendix B), consisting of five parts. The researcher developed some of its parts by referring to the existing literature, in which the first, fourth, and fifth parts were developed from prior instruments designed by Christoffel et al. (2019) and Popowicz et al. (2021), while the second and third parts were constructed using Ghanim's study (Ghanim, 2022), after granting their approval via Email (Appendix J), with a few adjustments and modifications to their questionnaire to achieve this study's objectives. These modifications were based on the work of Qasim (2021) and Sposito et al. (2017) .

- The first part: contained basic demographic data, consisting of five questions (age, total nursing experience, NICU-specific experience, level of education, and type of hospital).

- The second part: included 43 True/False questions assessing the knowledge of NICU nurses regarding neonatal pain assessment and management.

- The third part: contained 16 Yes/No questions evaluating the attitudes of NICU nurses toward neonatal pain assessment and management.

- The fourth part: consisted of 15 Yes/No questions assessing practices related to neonatal pain assessment and management.

- The fifth part: consisted of 10 Yes/No questions addressing potential barriers to effective neonatal pain assessment and management, divided into five personal and five organizational barrier items.

Scoring System of the Tool

According to the average percentage of the nurses' answers , as follows:

- Poor (≤50% of total score).

- Fair (50–75% of the total score).
- Good (≥75% of the total score).

2.7 Validity of the Questionnaire

To determine the questionnaire's face validity, it was reviewed by a group of experts with similar experience and qualifications concerning the study's objectives. In this case, the experts included neonatologists working in NICUs and academic staff members holding a PhD in critical care nursing. A total of five experts were consulted, including four neonatologists and one academic staff member. All provided positive feedback, emphasizing that the questionnaire was reliable, the content was coherent and interrelated with research's objectives, and that the language was clear and free of complex unnecessary jargon; as a result, no adjustments were made to the questionnaire.

2.8 Reliability of the Questionnaire

A pilot study was needed to provide feedback on the questionnaire's internal consistency as well as weaknesses if present & the time needed to fill it. This feedback provided the authors with necessary modifications if needed. The pilot was performed on 15 participants in the NICU of each hospital of different ages, experience and level of education. Before starting, a thorough explanation of the study and questionnaire was done. The nurses' responded with satisfaction, stating that the language was simple, questions easily understood & well structured. Answering it required almost fifteen minutes. As no modifications were needed, theses participants were added to the overall respondents.

The internal consistency by Cronbach's alpha to measure the reliability was calculated. The values were as follows: 0.81 for knowledge items, 0.74 for attitude items, 0.83 for practice items, 0.72 for personal barriers, and 0.71 for organizational barriers. All values of Cronbach's alpha were higher than 0.70, indicating the existence of high degree of reliability and internal consistency for the study's tool .

2.9 Data Collection Strategy

After obtaining ethical approval from the Institutional Review Board (IRB), the Ministry of Health (for Khalil Suleiman Governmental Hospital), and the private hospital's authorities (Al-Razi), data collection was carried out in three phases

Phase One – Questionnaire Administration

Following a detailed explanation of the research and its objectives by the researcher, self-administered questionnaires were hand-delivered to the head nurses of the NICUs in the aforementioned hospitals. Agreeing to answer the questionnaire & participate in the study is obtained after signing the informed written consent sheet from the nurse (see Appendix B), while emphasizing that participation was voluntary and complete confidentiality of their information will be secured, only used for scientific purposes. The questionnaires was kept in a closed envelope prior to administration. During morning and afternoon shifts, the researcher was available for data collection at various times/days, head nurses collected the night shift's questionnaires from the participants ,and handed them over to the researcher at a later time.

This phase required two weeks to collect all the questionnaires from the two hospitals.

Phase Two – Educational Sessions

The researcher delivered six educational sessions, involving a combination of lectures and training, delivered over two days from 8:00 AM to 2:00 PM, as displayed in the table present in Appendix (D). These sessions were facilitated by head nurses of each unit, as they're responsible for organizing the staff's schedules. These sessions were held in the hospitals' lecture rooms. Before starting the intervention the content of the sessions were sent via WhatsApp groups to NICU nurses in each hospital one day prior to the sessions. Each session included approximately 10–15 participants. The dates and hours chosen were arranged by head nurses to ensure no interference with the nurses' unit's duties and shifts, these sessions were scheduled every other day in each hospital to allow both night and day shift nurses to attend.

The educational content explored the physiological processes of neonatal pain, its effects on the neonate, and the influence of under-management of pain on neurological development, with a particular concern for premature babies, as was illustrated through

explaining the ‘wind-up theory’. The lectures also addressed neonatal pain assessment, with the introduction of various assessment tools with detailed explanation and administration of these tools, especially the (NIPS).

On the other hand, the pain management component was divided into two phases: non-pharmacological and pharmacological methods. Non-pharmacologic techniques were explored by mentioning the one used the most, way of application, when to use, and the benefits of combining multiple techniques. This was followed by pharmacological approaches and their guidelines , mainly their side effects .

The educational material was prepared by the researcher developing its information from neonatal books, literature, and paediatric association guidelines. It was then reviewed by two neonatologists actively working in NICUs for approval, in which they stated that the material was comprehensive, adequate, clear, and highly effective in raising awareness among nurses. Throughout the sessions, the content was openly discussed as needed within the timeframe.

This phase was completed in one week without any repetitions, owing to the current circumstances in the West Bank, specifically in Jenin area, and to the nurses’ heavy schedules.

Phase Three – Re-administration of the Questionnaire (Evaluation)

NICU nurses’ knowledge & attitudes were evaluated three days post completion of each educational session at the two hospitals (immediate post-test), using the same questionnaire from the first phase omitting the fourth & fifth parts (practice & barriers domains), as these questions weren’t subjected to change at that time.

A follow up after three months was conducted, by using all of the questionnaire’s parts, to evaluate the longer effects of the educational intervention on the study’s variables.

In this phase, the time required to finish data collection was a week and a half for both the immediate (post-3 days) and follow up (after three months) post-tests.

2.10 Variables

Dependent variables

- Knowledge of NICU nurses regarding neonatal pain assessment & managemen

- Attitudes of NICU nurses toward neonatal pain assessment & management.
- Practices of NICU nurses toward neonatal pain assessment & management.
- Barriers, divided into:

1. Personal (lack of interest, lack of knowledge, poor collaboration within the unit's team , unclear roles of the nurse) .
2. Organizational (nursing shortage, workload, long working shifts, no protocols to use).

Independent variables

- Demographic data belonging to NICU nurses (gender, level of education, working experience as a nurse, working experience as NICU nurse, & type of hospital they work in).
- Educational sessions (theory lectures & practical training).

2.11 Ethical Consideration

In this research paper, Declaration of Helsinki guidelines were followed and implemented. The study's purpose was explained to NICU nurses at the two aforementioned hospitals. All answered information collected from the staff was kept confidential, and privacy insured. Prior to initiating the study, ethical approval was obtained from the IRB (Appendix C), the Ministry of Health, and the management of the private hospital (Appendices "I" and "K" ,respectively). Participants were guaranteed the right to withdraw from the research at any time, a point stated in the informed written consent, which was obtained before data collection began.

2.12 Statistical Analysis

The researcher collected and coded 50 questionnaires from the respondents of the study sample. The correct answers in the knowledge scale were recoded to 1 and the incorrect answers to 0, and the total knowledge was computed for each respondent by summing the answers, and then converting the total knowledge to percentages by dividing the sum on the total number of items. The same procedures were used for the computation of the practices and barriers, were the answers (yes) recoded to 1 and the answers (no) recoded to 0. Regarding the attitudes, the answers (no) were recoded to 1 and the

answers (yes) to 2, and the total level of attitudes was computed for each respondent by averaging the answers. The attitudes items included two opposite direction items (11 and 15). All the opposite direction items were recoded reversely during the computation of the total degrees of attitudes section, and then returned to their original coding. The levels of the research's variables (knowledge, attitudes ,practices , & barriers) were all categorized: into poor, fair, and good based on the percentage of correct answers provided by the participants.

During data analysis the researcher obtained consultation, guidance and collaborated with a professional statistician.

The questionnaires were fully completed, without an observable missing data. This 100% response rate may be attributed to the cultural background of the participants, and their strong commitment to the study.

2.12.1 Statistical Methods

The statistical package for social science (SPSS) Version 22 is used for data analysis. The Descriptive statistics (Frequencies, Percentages, Means, and Standard Deviations) were computed to describe the demographic and personal data and to describe the levels of the study variables (Knowledge, Attitudes, Practices, and Barriers). The reliability and internal consistency of the study items for each scale was tested by Cronbach's alpha coefficients. The following statistical tests and methods were used to analyze the results and to test the study hypotheses assuming that the statistical test with the P-value less than or equal 0.05 is significant

- The ANOVA repeated measures F-test: used to test the differences in the means of the knowledge and attitudes levels pre intervention, immediately post the intervention, and after three months post the intervention.

- The paired sample T-test: used to test the differences in the means of the levels of practices and barriers pre intervention, and after three months post the intervention.

- The one way analysis of variance (ANOVA) test: used to test the differences in means of the levels of Knowledge, Attitudes, Practices, and Barriers according to the demographic variables (age, years of experience as a working nurse, years of experience in the NICU, level of education, and type of hospital).

2.12.2 Normality Test of the Study Variables

The normal distribution test was performed for the main variables of the study in order to select between the parametric and the non-parametric methods during the analysis of data. The results of the tests of normality and the Skewness coefficients are present in Appendix E, Table (5.1).

The results of normality tests (Kolmogorov-Smirnov and Shapiro-Wilk) show that most of the study variables are not normally distributed (P-values <0.05). On the other hand, most of the Skewness coefficients are less than 1, and since the sample size is reasonable and large (more than 30), so the researcher decided to use the parametric methods in the study analysis.

Chapter Three

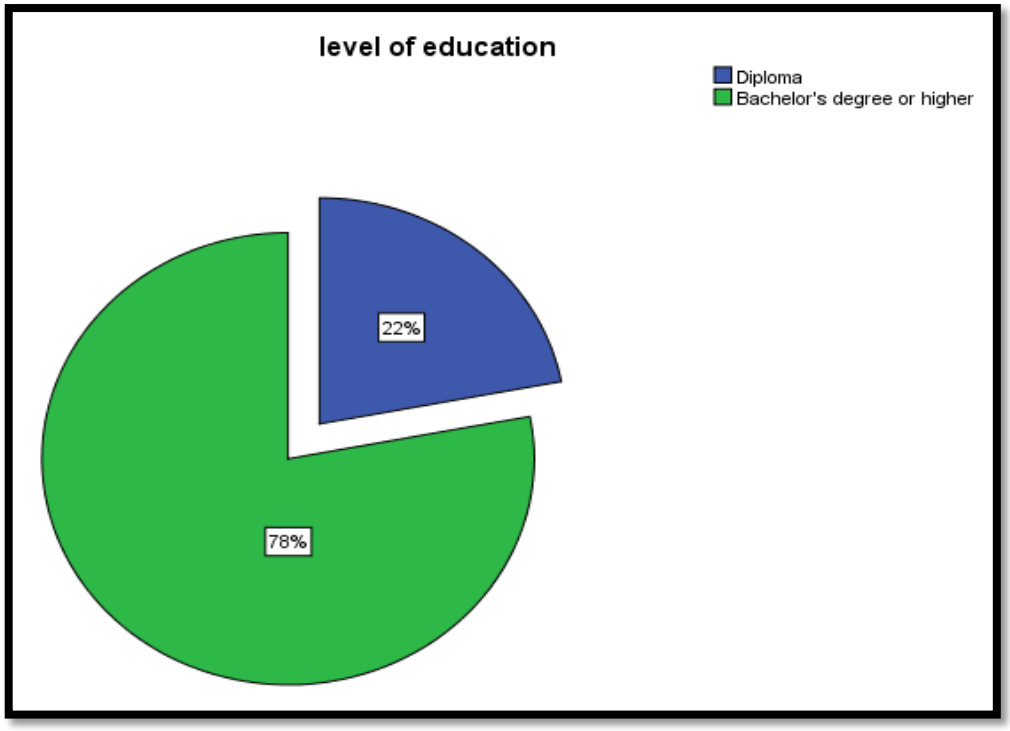
Results

3.1 Description of Demographic Variables

The study consisted of 50 NICU nurses that are working in the two hospitals mentioned above in West Bank (Jenin), 30 nurses in a governmental hospital and 20 nurses in a private hospital. Most of the nurses in the study sample are from the age groups 26-30 (46%) and 31-35 (26%). The sample of nurses distributed as 28% of nurses who have less than or equal 5 years of experience as a working nurse, 42% for the group (5-10) years of experience as a working nurse, and 30% for the group (more than 10) years of experience as a working nurse. The sample also distributed as 30% of nurses who have less than or equal 5 years of experience in the NICU, 40% for the group (5-10) years of experience in the NICU, and 30% for the group (more than 10) years of experience in the NICU. The majority of the nurses in the sample have Bachelor's degree or higher level of education (78%).

Figure 2

Distribution of the study's participants (NICU nurses) according to their educational levels



The next table (Table 1.1) shows the frequencies and percentages of the demographic and personal data for the study sample

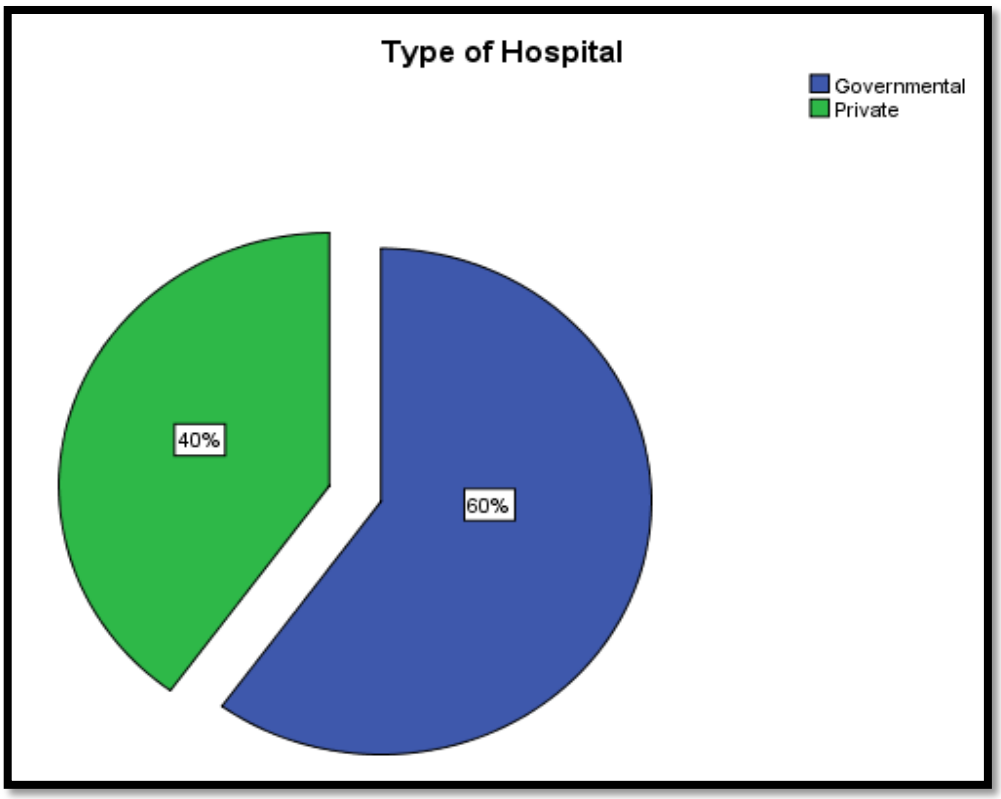
Table 1.1

Demographic and Personal Data (N=50)

Variable	Category	N	%
Age	22 - 25	8	16.0%
	26 - 30	23	46.0%
	31 – 35	13	26.0%
	>=36	6	12.0%
	Total	50	100.0%
Years of Experience as a Working Nurse	=<5 years	14	28.0%
	5-10 years	21	42.0%
	>10 years	15	30.0%
	Total	50	100.0%
Years of Experience in the NICU	=<5 years	15	30.0%
	5-10 years	20	40.0%
	>10 years	15	30.0%
	Total	50	100.0%
Level of Education	Diploma	11	22.0%
	Bachelor's degree or higher	39	78.0%
	Total	50	100.0%
Type of Hospital	Governmental	30	60.0%
	Private	20	40.0%
	Total	50	100.0%

Figure 3

Distribution of the study's participants (NICU nurses) categorized according to the type of hospital in which they work



3.2 Research Questions

In what follows, the researcher introduces the analysis of the study questions based on data analysis from the sample study .

Q1) Is the level of NICU nurses' knowledge regarding neonatal pain assessment and management increased post the educational sessions?

The researcher computed the frequencies and percentages of the true answers that represent the NICU nurses' knowledge regarding neonatal pain assessment and management pre the educational sessions, post immediately, and after 3 months post the educational sessions.

The results in Table (2.1) of Appendix (G) below show that the level of NICU nurses' knowledge regarding neonatal pain assessment and management increased from 52% pre the educational sessions to 82% immediately post the educational sessions and to 74.6% post three months after the educational sessions. The results also show that the

levels of NICU nurses' knowledge regarding neonatal pain assessment and management increased in all the knowledge items immediately post the educational sessions and post three months after the educational sessions. For example, the level of nurses' knowledge toward the item (Pain diminishes quicker in newborns than adults) increased to 100% immediately post the sessions (pre =16%, post 3 months=54%), and the level of knowledge increased toward the item (Morphine is not used for neonate pain relief due to the risk of respiratory depression) to 98% and 82% immediately post and after three months (pre =24%), and the level of knowledge increased toward the item (Opioids should not be administered for neonate pain relief, due to the high risk of psychological dependence) to 80% and 86% immediately post and after three months (pre =28%).

Q2) Is the level of NICU nurses' attitudes toward neonatal pain assessment and management changed post the educational sessions?

The researcher computed the means and standard deviations of the nurses' attitudes toward neonatal pain assessment and management pre the educational sessions, post immediately, and post after 3 months the educational sessions, the following table shows the results .

The results in Table (2.2) in Appendix G below show that the level of NICU nurses' attitudes toward neonatal pain assessment and management changed post the educational sessions increased. The mean of the nurses' attitudes pre the educational sessions is (1.63) and increased to (1.87) immediately post the educational sessions and to (1.78) post three months after the educational sessions. The results also show that the means of the nurses' attitudes toward neonatal pain assessment and management increased in most of the attitudes items immediately post the educational sessions and post three months after the educational sessions. For example, the nurses think that pain management and pain relief are of priority in neonates' treatment post the educational sessions (post immediately mean =1.96, post 3 months mean=1.84) more than what they have thought pre the sessions (Mean=1.46). The nurses also think that failure to assess and manage the neonate's pain affects his body and mind in the long term post the educational sessions (post immediately mean =1.98, post 3 months mean=1.76) more than what they have thought pre the sessions (Mean=1.46). Similarly, the nurses think that measurement and control of neonate's pain can affect the healing process and

reduces the hospital stay post the educational sessions (post immediately mean =1.98, post 3 months mean=1.86) more than what they have thought pre the sessions (Mean=1.46). On the other hand, the nurses thought that comparable stimuli in different people produce the same intensity of pain pre the educational sessions (Mean=1.38) more than what they think post the sessions (post immediately mean =1.14, post 3 months mean=1.16).

The researcher also computed the frequencies and percentages of the nurses' attitudes toward neonatal pain assessment and management pre the educational sessions, post immediately, and after 3 months post the educational sessions. The results in Table (2.3) of Appendix (G) below show that the total percentage of the NICU nurses' positive attitudes toward neonatal pain assessment and management increased pre the educational sessions is (63.4%) which increased to (87.9%) immediately post the educational sessions and also increased to (73.3%) post three months after the educational sessions. The results also show that the percentages of the nurses' attitudes toward neonatal pain assessment and management increased in most of the attitudes items immediately post the educational sessions and post three months after the educational sessions.

Q3) Is the level of NICU nurses' practices toward neonatal pain assessment and management changed post the educational sessions ?

The researcher computed the frequencies and percentages of the NICU nurses' practices toward neonatal pain assessment and management pre the educational sessions, and after 3 months post the educational sessions. The results in Table (2.4) of Appendix (G) below show that the level of NICU nurses' practices toward neonatal pain assessment and management increased from 27.5% pre the educational sessions to 52.4% post three months after the educational sessions. The results also show that the levels of NICU nurses' practices toward neonatal pain assessment and management increased approximately in all the knowledge items post three months after the educational sessions.

The results show that after three months post the educational sessions, 30% of nurses' perform neonatal pain assessment using a pain assessment tool when needed before, during, & after an invasive painful procedure after 3 months post the educational

sessions (pre =0%), and 30% of nurses' perform neonatal pain assessment using a pain assessment tool constructed for neonates (pre =4%), and 46% of the nurses perform neonatal pain assessment using a pain assessment tool at the start of the shift alongside V/S measurement (pre =6%), also 40% of the nurses implement a pain management method according to the score of the assessment tool they used (pre=8%). In addition, 84% of the nurses apply pharmacological pain management for neonates when needed according to their pain intensity (Acetaminophen, opioids) (pre=8%), and 36% of the nurses reassess (evaluate) pain in the neonate after application of a management method using a pain assessment tool constructed for neonates (pre=8%), also 54% of the nurses document non-pharmacological pain management for the neonate in his/her medical file (pre=14%), and 90% of the nurses also document pharmacological pain management for the neonate in his/her medical file (pre=28%).

Q4) Does the level of barriers faced by NICU nurses during neonatal pain assessment and management decrease following the educational sessions ?

The researcher computed the frequencies and percentages of the personal and organizational barriers that the NICU nurses face during neonatal pain assessment and management pre the educational sessions, and after 3 months post the educational sessions, the following table shows the results.

Table 2.5

Frequencies and percentages of the personal and organizational barriers that the NICU nurses face during neonatal pain assessment and management (N=50)

Barriers Items	Pre				Post 3 Months			
	No		Yes		No		Yes	
	N	%	N	%	N	%	N	%
Personal Barriers								
1. Do you lack the knowledge in regards to neonatal pain assessment & management & their protocols?	4	8.0%	46	92.0%	32	64.0%	18	36.0%
2. Do you lack interest in the field of neonatal pain knowledge and its implementation?	38	76.0%	12	24.0%	34	68.0%	16	32.0%
3. Do you question the importance of neonatal pain assessment and management?	42	84.0%	8	16.0%	32	64.0%	18	36.0%
4. Do you suffer from unclear roles or responsibilities in your unit?	23	46.0%	27	54.0%	33	66.0%	17	34.0%
5. Is there limited collaboration between physicians and nursing staff in your unite regarding neonatal pain assessment & management?	11	22.0%	39	78.0%	14	28.0%	36	72.0%
Total of the personal barriers		47.2%		52.8%		58%		42%
Organizational Barriers								
1. Is there a lack of training for NICU nurses in regards to neonatal pain assessment & management protocols?	10	20.0%	40	80.0%	15	30.0%	35	70.0%
2. Are neonatal pain assessment protocols not routinely followed in your unit?	3	6.0%	47	94.0%	2	4.0%	48	96.0%
3. Are neonatal pain management protocols not routinely followed in your unit?	1	2.0%	49	98.0%	12	24.0%	38	76.0%
4. Do you experience challenges due to a lack of adequate nurse-to-neonate ratio (enough working NICU nurses)?	14	28.0%	36	72.0%	30	60.0%	20	40.0%
5. Do you have long working hours (long period shifts more than 10 hours) ?	5	10.0%	45	90.0%	16	32.0%	34	68.0%
Total of the organizational barriers		13.2%		86.8%		30%		70%
Total of all barriers		30.2%		69.8%		44%		56%

The results in the table above show that the level of barriers that the NICU nurses face during neonatal pain assessment and management decreased from 69.8% pre the educational sessions to 56% post three months after the educational sessions. The total level of the personal barriers also decreased from 52.8% to 42%, and also the total level of the organizational barriers decreased from 86.8% to 70%.

The results of the personal barriers show that after three months post the educational sessions, the lack of the knowledge in regards to neonatal pain assessment & management & their protocols decreased for the nurses from 92% to 36%, and the collaboration of physicians in the nurses' units with the nursing staff about neonatal pain assessment & management increased from 22% to 28%, and also the suffering from unclear roles or responsibilities in the nurses' units decreased from 54% to 34%. On the other hand, the nurses became less interested in the field of neonatal pain knowledge and implementation (pre=76%, post=68), but the difference is not large, and also their believes in the importance of neonatal pain assessment and management decreased from 84% to 64%.

Regarding the organizational barriers, the results show that after three months post the educational sessions, the lack of training for NICU nurses in regards to neonatal pain assessment & management protocols decreased from the nurses point of view from 80% to 70%, and the nursing units became more following neonatal pain management protocols (pre= 2%, post=24%), and also the nurses became have enough nurse to neonate ratio (enough working NICU nurses) (pre= 28%, post=60%), and the percentage of nurses with long working hours (long period shifts more than 10 hours) decreased from 90% to 68%.

The researcher will answer the following research questions by testing the study hypotheses (H1-H4)

Q5) Are there significant differences in the levels of NICU nurses' knowledge regarding neonatal pain assessment and management between pre the educational sessions, immediately post the educational sessions, and after three months post the educational sessions?

Q6) Are there significant differences in the levels of NICU nurses' attitudes toward neonatal pain assessment and management between pre the educational sessions,

immediately post the educational sessions, and after three months post the educational sessions?

Q7) Are there significant differences in the levels of NICU nurses' practices regarding neonatal pain assessment and management between pre the educational sessions, and post the educational sessions after three months?

Q8) Are there significant differences in the levels of NICU nurses' barriers regarding neonatal pain assessment and management between pre the educational sessions, and post the educational sessions after three months?

The researcher will answer the following research questions by testing the study hypotheses (H5-H8)

Q9) Are there significant differences in the levels of the NICU nurses' knowledge regarding neonatal pain assessment and management post the educational sessions according to the demographics (age, years of experience as a working nurse, years of experience in the NICU, level of education, and type of hospital)?

Q10) Are there significant differences in the levels of the NICU nurses' attitudes toward neonatal pain assessment and management post the educational sessions according to the demographics (age, years of experience as a working nurse, years of experience in the NICU, level of education, and type of hospital)?

Q11) Are there significant differences in the levels of the NICU nurses' practices regarding neonatal pain assessment and management post the educational sessions according to the demographics (age, years of experience as a working nurse, years of experience in the NICU, level of education, and type of hospital)?

Q12) Are there significant differences in the levels of the NICU nurses' barriers regarding neonatal pain assessment and management post the educational sessions according to the demographics (age, years of experience as a working nurse, years of experience in the NICU, level of education, and type of hospital)?

And the researcher will answer the following research question by testing the study hypothesis (H9)

Q13) Are there significant relationships between the NICU nurses' knowledge, nurses' attitudes, and nurses' practices regarding neonatal pain assessment and management and their barriers that facing them during pain assessment and management in the two hospitals in West Bank?

3.3 Study Hypotheses

In what follows, the researcher introduces the analysis of the study hypotheses based on data analysis from the sample study

H1) There are no statistically significant differences in the levels of NICU nurses' knowledge regarding neonatal pain assessment and management between the three assessment points: pre-educational sessions, and post the educational sessions both immediately and after three months (P = 0.05) .

The researcher used the analysis of ANOVA repeated measures in order to test the differences in the means of the nurses' knowledge pre, immediately post, and after three months post the educational sessions, and the following table shows the results .

Table 3.1

Means, standard deviations, and the results of the ANOVA repeated measures analysis of the differences in the nurses' knowledge pre, immediately post, and after three months post the educational sessions

Scale	Pre	Post Immediately	Post 3 Months	F (P-value)
	Mean ± SD	Mean ± SD	Mean ± SD	
Total NICU nurses' knowledge regarding neonatal pain care	51.95 ± 7.9	81.91 ± 8.11	74.61 ± 12.58	149.164 (0.000)

The results in the table above show that there are statistically significant differences at the level of 0.05 in the means of the NICU nurses' knowledge regarding neonatal pain assessment and management between pre the educational sessions, immediately post the educational sessions, and after three months post the educational sessions, the p-value of the F-test is less than 0.05 (p-value =0.000<0.05), and the results of pairwise comparisons in the table below show that the mean of the NICU nurses' knowledge immediately post the sessions (Mean=81.91) is significantly higher than the mean of

knowledge after three months post the sessions (Mean=74.61) which is itself significantly higher than the mean of the knowledge pre the sessions (Mean=51.95). Based on these results, the researcher can reject the null hypothesis H1.

For pairwise comparison see Appendix (F) Table (6.1).

H2) There are no statistically significant differences in the levels of NICU nurses' attitudes regarding neonatal pain assessment and management between the three assessment points: pre-educational sessions, and post the educational sessions both immediately and after three months (P = 0.05).

The researcher used the analysis of ANOVA repeated measures in order to test the differences in the means of the nurses' attitudes pre, immediately post, and after three months post the educational sessions, and the following table shows the results .

Table 3.2

Means, standard deviations, and the results of the ANOVA repeated measures analysis of the differences in the nurses' attitudes pre, immediately post, and after three months post the educational sessions

Scale	Pre	Post Immediately	Post 3 Months	F (P-value)
	Mean ± SD	Mean ± SD	Mean ± SD	
Total NICU nurses' attitudes toward neonatal pain care	1.63 ± 0.17	1.87 ± 0.04	1.78 ± 0.17	45.630 (0.000)

The results in the table above show that there are statistically significant differences at the level of 0.05 in the means of the NICU nurses' attitudes toward neonatal pain assessment and management between pre the educational sessions, immediately post the educational sessions, and after three months post the educational sessions, the p-value of the F-test is less than 0.05 (p-value =0.000<0.05), and the results of pairwise comparisons in the table below show that the mean of the NICU nurses' attitudes immediately post the sessions (Mean=1.87) is significantly higher than the mean of attitudes after three months post the sessions (Mean=1.78) which is itself significantly higher than the mean of the attitudes pre the sessions (Mean=1.63). Based on these results, the researcher can reject the null hypothesis H2.

For pairwise comparison see Appendix (F) Table (7.1).

H3) There are no statistically significant differences in the levels of NICU nurses' practices regarding neonatal pain assessment and management between pre-educational sessions, and three months post the educational sessions (P = 0.05).

The researcher used the paired samples T-test in order to test the differences in the means of the nurses' practices pre and after three months post the educational sessions, and the following table shows the results.

Table 3.3

Means, standard deviations, and the results of the paired samples T-test of the differences in the nurses' practices pre and after three months post the educational sessions

Scale	Pre	Post 3 Months	T (P-value)
	Mean ± SD	Mean ± SD	
Total NICU nurses' practices regarding neonatal pain care	27.47 ± 14.17	52.4 ± 22.21	-6.920 (0.000)

The results in the table above show that there are statistically significant differences at the level of 0.05 in the means of the NICU nurses' practices regarding neonatal pain assessment and management between pre the educational sessions and after three months post the educational sessions, the p-value of the T-test is less than 0.05 (p-value =0.000<0.05), and the results in the table show that the mean of the NICU nurses' practices after three months post the sessions (Mean=52.4) is significantly higher than the mean of practices pre the sessions (Mean=27.47). Based on these results, the researcher can reject the null hypothesis H3.

H4) There are no statistically significant differences in the levels of NICU nurses' barriers regarding neonatal pain assessment and management between pre-educational sessions, and three months post the educational sessions (P = 0.05) .

The researcher used the paired samples T-test in order to test the differences in the means of the nurses' barriers pre and after three months post the educational sessions, and the following table shows the results .

Table 3.4

Means, standard deviations, and the results of the paired samples T-test of the differences in the nurses' barriers pre and after three months post the educational sessions

Scale	Pre	Post 3 Months	T (P-value)
	Mean ± SD	Mean ± SD	
Total NICU nurses' personal barriers regarding neonatal pain care	52.8 ± 15	42 ± 33.38	2.097 (0.041)
Total NICU nurses' organizational barriers regarding neonatal pain care	86.8 ± 13.77	70 ± 20.3	4.318 (0.000)
Total NICU nurses' barriers regarding neonatal pain care	69.8 ± 9.79	56 ± 19.8	4.159 (0.000)

The results in the table above show that there are statistically significant differences at the level of 0.05 in the means of the NICU nurses' barriers regarding neonatal pain assessment and management between pre the educational sessions and after three months post the educational sessions, the p-value of the T-test is less than 0.05 (p-value =0.000<0.05), and the results in the table show that the mean of the NICU nurses' barriers after three months post the sessions (Mean=56) is significantly lower than the mean of barriers pre the sessions (Mean=69.8). The results also show that the mean of the NICU nurses' personal barriers after three months post the sessions (Mean=42) is significantly lower than the mean of the personal barriers pre the sessions (Mean=52.8), and also the mean of the NICU nurses' organizational barriers after three months post the sessions (Mean=70) is significantly lower than the mean of the organizational barriers pre the sessions (Mean=86.8). Based on these results, the researcher can reject the null hypothesis H4.

For the rest of the following hypotheses (H5-H8), the researcher used the one way analysis of variance (ANOVA) in order to test the differences in the means of the nurses' knowledge, attitude ,practice, and barriers post the educational sessions according to the demographic variables.

H5) There are no statistically significant differences in the levels of NICU nurses' knowledge post the educational sessions regarding neonatal pain assessment and management in two hospitals in West Bank according to the demographic

characteristics (age, years of experience as a nurse, years of experience in the NICU, level of education, and type of hospital) (p = 0.05).

Table 4.1

Means, standard deviations, and the results of ANOVA tests of the differences in the means of the nurses' knowledge post the educational sessions according to the demographic variables

Demographic Variables	Group	N	Mean	Standard Deviation	F (P-value)
Age	22 - 25	8	75.29	11.46	0.195(0.900)
	26 - 30	23	73.31	13.61	
	31 – 35	13	75.13	14.22	
	>=36	6	77.52	6.85	
Years of experience as a working nurse	=<5 years	14	75.42	12.33	0.048(0.954)
	5-10 years	21	74.53	13.17	
	>10 years	15	73.95	12.80	
Years of experience in the NICU	=<5 years	15	74.26	12.69	0.058(0.943)
	5-10 years	20	75.35	12.95	
	>10 years	15	73.95	12.80	
Level of education	Diploma	11	72.30	13.62	0.466(0.498)
	Bachelor's degree or higher	39	75.25	12.38	
Type of hospital	Governmental	30	74.88	11.58	0.036(0.850)
	Private	20	74.19	14.25	

The results in the table above show that there are no statistically significant differences at the level of 0.05 in the levels of the NICU nurses' knowledge regarding neonatal pain assessment and management post the educational sessions according to the demographics (age, years of experience as a working nurse, years of experience in the NICU, level of education, and type of hospital). The p-values of the F-tests are higher than 0.05, hence, the researcher cannot reject the null hypothesis H5.

H6) There are no statistically significant differences in the levels of NICU nurses' attitudes post the educational sessions regarding neonatal pain assessment and management in two hospitals in West Bank according to the demographic characteristics (age, years of experience as a nurse, years of experience in the NICU, level of education, and type of hospital) (p = 0.05).

Table 4.2

Means, standard deviations, and the results of ANOVA tests of the differences in the means of the nurses' attitudes post the educational sessions according to the demographic variables

Demographic Variables	Group	N	Mean	Standard Deviation	F (P-value)
Age	22 - 25	8	1.83	0.12	0.668(0.576)
	26 - 30	23	1.80	0.16	
	31 – 35	13	1.73	0.22	
	>=36	6	1.77	0.11	
Years of experience as a working nurse	=<5 years	14	1.85	0.11	1.614(0.210)
	5-10 years	21	1.77	0.20	
	>10 years	15	1.74	0.15	
Years of experience in the NICU	=<5 years	15	1.83	0.12	1.142(0.328)
	5-10 years	20	1.78	0.21	
	>10 years	15	1.74	0.15	
Level of education	Diploma	11	1.74	0.17	0.715(0.402)
	Bachelor's degree or higher	39	1.79	0.17	
Type of hospital	Governmental	30	1.78	0.15	0.002(0.966)
	Private	20	1.78	0.20	

The results in the table above show that there are no statistically significant differences at the level of 0.05 in the levels of the NICU nurses' attitudes toward neonatal pain assessment and management post the educational sessions according to the demographics (age, years of experience as a working nurse, years of experience in the NICU, level of education, and type of hospital). The p-values of the F-test are higher than 0.05, hence, the researcher cannot reject the null hypothesis H6.

H7) There are no statistically significant differences in the levels of NICU nurses' practices post the educational sessions regarding neonatal pain assessment and management in two hospitals in West Bank according to the demographic characteristics (age, years of experience as a nurse, years of experience in the NICU, level of education, and type of hospital) (p = 0.05).

Table 4.3

Means, standard deviations, and the results of ANOVA tests of the differences in the means of the nurses' practices post the educational sessions according to the demographic variables

Demographic Variables	Group	N	Mean	Standard Deviation	F (P-value)
Age	22 - 25	8	59.17	24.80	2.081 (0.116)
	26 - 30	23	45.51	15.91	
	31 – 35	13	53.33	27.35	
	>=36	6	67.78	22.08	
Years of experience as a working nurse	=<5 years	14	52.86	20.50	2.532 (0.090)
	5-10 years	21	45.40	19.39	
	>10 years	15	61.78	25.13	
Years of experience in the NICU	=<5 years	15	51.11	20.88	2.212 (0.121)
	5-10 years	20	46.33	19.40	
	>10 years	15	61.78	25.13	
Level of education	Diploma	11	67.88	22.67	7.797** (0.007)
	Bachelor's degree or higher	39	48.03	20.30	
Type of hospital	Governmental	30	56.89	20.40	3.200** (0.080)
	Private	20	45.67	23.62	

Note The test is significant at the 0.05 level

The results in the table above show that there are no statistically significant differences at the level of 0.05 in the levels of the NICU nurses' practices regarding neonatal pain assessment and management post the educational sessions according to the demographics (age, years of experience as a working nurse, years of experience in the NICU, and the Type of hospital). The researcher couldn't reject the null hypothesis H7 corresponding to these four demographic variables.

On the other hand, the results show that there are statistically significant differences at the level of 0.05 in the levels of the NICU nurses' practices regarding neonatal pain assessment and management post the educational sessions according to the level of education. The p-value of the F-test is 0.007 which is lower than 0.05, hence, the researcher can reject the null hypothesis H7 corresponding to level of education variable. The results show that the mean of practices for the nurses who have (Diploma) level of education (Mean=67.88) is significantly higher than the mean of practices for the nurses who have (Bachelor's degree or higher) level of education (Mean=48.03).

H8) There are no statistically significant differences in the levels of NICU nurses' barriers post the educational sessions regarding neonatal pain assessment and management in two hospitals in West Bank according to the demographic

characteristics (age, years of experience as a nurse, years of experience in the NICU, level of education, and type of hospital) (p = 0.05).

Table 4.4

Means, standard deviations, and the results of ANOVA tests of the differences in the means of the nurses' barriers post the educational sessions according to the demographic variables

Demographic Variables	Group	N	Mean	Standard Deviation	F (P-value)
Age	22 - 25	8	62.50	23.15	1.374(0.263)
	26 - 30	23	58.70	17.92	
	31 – 35	13	53.08	15.48	
	>=36	6	43.33	28.05	
Years of experience as a working nurse	=<5 years	14	54.29	20.27	0.588(0.560)
	5-10 years	21	59.52	19.10	
	>10 years	15	52.67	20.86	
Years of experience in the NICU	=<5 years	15	56.67	21.60	0.314(0.732)
	5-10 years	20	58.00	18.24	
	>10 years	15	52.67	20.86	
Level of education	Diploma	11	54.55	20.67	0.075(0.786)
	Bachelor's degree or higher	39	56.41	19.80	
Type of hospital	Governmental	30	54.67	20.30	0.336(0.565)
	Private	20	58.00	19.36	

The results in the table above show that there are no statistically significant differences at the level of 0.05 in the levels of the NICU nurses' barriers regarding neonatal pain assessment and management post the educational sessions according to the demographics (age, years of experience as a working nurse, years of experience in the NICU, level of education, and type of hospital). The researcher couldn't reject the null hypothesis H8.

H9) There are no statistically significant relationships between the NICU nurses' (knowledge, attitudes, and practices) regarding neonatal pain assessment and management and the barriers they encounter during pain assessment and management in the two hospitals in West Bank (p = 0.05).

The researcher computed Pearson correlation coefficients to examine the relationships between nurses' knowledge, attitudes, and practices regarding neonatal pain assessment and management and the barriers they face during the assessment and management of neonatal pain (Appendix H, Table 8.1).

The results show that there is a statistically significant negative relationship between the nurses' knowledge and barriers, the value of Pearson correlation is (r=-0.372) is moderate and the p-value of the test is 0.008 which is less than 0.05. Hence, the researcher can reject the null hypothesis H9 regarding the relationship between the knowledge and the barriers, this indicates that as the NICU nurses' knowledge regarding neonatal pain assessment and management increases, their barriers that facing them during pain assessment and management in the two hospitals decrease moderately.

On the other hand, the results in table (8.1) show that there are no statistically significant relationships between the nurses' attitudes or practices and their barriers; the values of Pearson correlations are low (r=-0.170 and r=-0.275) and the p-values (0.238 and 0.053) are higher than 0.05. Hence, the researcher cannot reject the null hypothesis H9 regarding the relationships between the (attitudes, practices) and the barriers.

Additionally, the results of Pearson correlations show a statistically significant positive relationship between the nurses' knowledge and their attitudes toward neonatal pain assessment and management, the value of Pearson correlation is (r=0.526) is moderate and the p-value of the test is 0.000 which is less than 0.05. This indicates that as the NICU nurses' knowledge regarding neonatal pain assessment and management increases, their attitudes toward pain assessment and management in the two hospitals increases moderately.

Chapter Four

Discussion and Conclusions

4.1 Introduction

During the previous ten years, the field of neonatal pain has witnessed a continuous growth and interest in the clinical and academic aspects, leading to an increase of research & investigations, contributing to a shift in the knowledge & attitudes of numerous medical professionals, with a notable impact on nursing staff, and positively impacting neonatal care.

While that has been said, there are still some hindrances, which serve as key motivators for continued research in this field (Sposito et al., 2017; Maciel et al., 2018). This is why the current study aimed to develop an educational program in the two previously mentioned hospitals, as discussed in the above chapters.

4.2 Knowledge of NICU Nurses Toward Neonatal Pain Assessment & Management

The findings of this study demonstrate a significant improvement in NICU nurses' knowledge regarding neonatal pain assessment and management, increasing from 52% prior to the educational sessions to 82% immediately after the sessions, and maintaining a 74.6% level after three months. According to the scoring system used in this thesis, the pre-intervention knowledge level is classified as fair. This was also evident during the educational sessions, with nurses engagement and conference room dynamics shifted in response to the new information presented. The data further indicate that nurses' knowledge improved across all individual knowledge items both immediately after the intervention and at the three-month follow-up. These results, supported by statistically significant differences between the pre- and post-tests in the advantage of the post-intervention phase, support the findings of an earlier study conducted in Thailand by Mala et al. (2023). However, the Thai study reported a more pronounced improvement during its follow-up phase, which was conducted six weeks after the intervention, in contrast to the three-month follow-up used in the current study.

The pre-test figure is similar to that reported in a study from Iran conducted by (Asadi-Noghabi et al., 2014), which utilized a descriptive, self-administered questionnaire to assess the knowledge, attitudes, and clinical performance of nurses in neonatal units in relation to pain management. The study found that 48.2% of the nurses had a deficit in

knowledge concerning pain management. These findings are also consistent with a study conducted in Gaza by Qasim (2021), which reported that respondents had a low level of knowledge (58.33%) according to the scoring system used in their research. Contrarily, a study done by Mehrnoush et al. (2016), that explored neonatal nurses' perceptions of their knowledge and practices regarding pain assessment and management in the NICU, found that nurses were generally well-informed and demonstrated a positive attitude toward pain care. However, unlike the present study, the participants in Mehrnoush et al.'s (2016) study had received continuous education programs on pain management, with 65% acknowledged participating in such programs. This may explain their relatively higher levels of knowledge and more positive attitudes toward neonatal pain care.

This following section will discuss specific results, starting with question number 36 in Table (2.1) (Appendix G) which draws considerable attention, as it presents an increase in the percentage of correct responses from 16% before the sessions to 100% immediately after. This significant change reflects a shift in the nurses' knowledge and beliefs regarding the subject, specifically challenging the prevalent misunderstanding that neonates have a diminished capacity to experience pain compared to older children and adults, and that any pain they do experience is brief and quickly subsides. This outcome highlights the potential effectiveness of the educational sessions.

Next, Items focusing on the misconception that neonates either do not experience pain or experience it to a lesser degree than older children and adults also demonstrated a marked shift in the proportion of correct responses. To illustrate, scores for Item 31 ('Neonates do not experience pain') and Item 32 ('Neonates experience a lesser degree of pain than adults') reached 96% and 98%, respectively, immediate post-session. These results contrast with the findings of Popowicz et al. (2021), whose respondents held differing beliefs and opinions suggesting the misunderstanding that, due to their underdeveloped immune systems, neonates, particularly preterm infants, are less susceptible to pain than older children and adults.

Furthermore, the questions concerning the knowledge of the participants toward neonatal pain assessment and pain assessment scales (Items number 13, 14, & 15) demonstrated a marked enhancement in the number of correct responses post-intervention. Most nurses responded correctly either immediately after the intervention

or at the three-month follow-up. Although there was a slight decline in correct responses at the three-month mark, the scores remained higher than those recorded in the pre-test phase. These responses reflect, at a baseline, a lack of foundational knowledge regarding neonatal pain assessment and the use of pain assessment scales. However, the educational intervention effectively enhanced their understanding, as evidenced by the marked increase in correct responses post-intervention. In a comparable setting, a descriptive cross-sectional study conducted in Estonian NICUs assessed nurses' perceptions of neonatal pain assessment and management using non-pharmacological technique. The study found that only slightly above half of their respondents (51%) agreed on the importance of using pain assessment scales, while approximately 67% confirmed that assessing neonatal pain has an impact on effective pain management. Based on these findings, the authors of that study recommended implementing educational courses focused on the improvement of nurses' knowledge and clinical outcomes in pain assessment and management to enhance neonatal pain care (Treiman-Kiveste et al., 2022) .

Moreover, the knowledge of NICU nurses regarding pharmacological pain management (Items number 16–20, 26–29, and 35 in Table 2.1) revealed considerable progress in correct responses during both post-test phases, once more highlighting the importance of the educational sessions provided. These results stand in contrast to a similar thesis by Ghanim (2022), which aspired to improve medical staff's knowledge and attitudes regarding neonatal pain but reported little to no observable enhancement, presumably due to the longer follow-up period of six months."

In addition, the domain related to non-pharmacological pain management questions presented a significant change in the amount of correct responses, despite beginning with high pre-test percentages. A substantial increase in correct responses was observed in question 23 (Swaddling the neonate during painful procedures causes limitation of motion which results in increased pain) having a shift from 32% in the pre-test to 90% immediately post-test, followed by a decline to 62% at the three-month follow-up phase. Although there was a decline in the percentage, the score continues to be favorable and significantly higher than the baseline. Promoting a positive reception of the implemented educational intervention.

4.3 Attitudes of NICU Nurses Toward Neonatal Pain Assessment & Management

Table (2.2) in Appendix G showed a change in the mean scores of attitudes toward neonatal pain assessment and management before and after the implementation of the educational intervention. Although the change was moderate, the mean attitude score increased from a pre-intervention value of 1.63,which is already an indication of a generally positive attitude, to 1.87 immediately post-intervention, reflecting an improvement of 0.24. This was followed by a slight decline to 1.78 at the three-month follow-up, resulting in a net increase of 0.15 points from baseline. The enhancement in the nurses 'attitudes is further substantiated by the nature of the inquiries that were raised during the educational lectures, indicating elevated interaction among the participants (NICU nurses). In particular, the increase in positive attitudes was observed across the majority of attitude-related items in both the immediate and three-month post-intervention follow ups. These results suggest a general improvement in nurses' awareness and understanding toward neonatal pain assessment & management.

The most notable improvement was observed in items concerned with the impact of prolonged and unmanaged pain on neonates' healing processes and its effect on the length of hospital stay, as well as in the overall importance & the role of neonatal pain management (Table 2.3 Appendix G).Markedly, the item "Measurement and control of neonate's pain can affect the healing process and reduce the hospital stay" raised from 46% (23 nurses) in the pre-test to 98% (49 nurses) immediately after the intervention, and remained steadily at 86% (43 nurses) at the three-month follow-up, which indicated a considerable improvement in positive responses. This outcome further confirmed the impact of the educational sessions, revealing a substantial and sustained positive shift in nurses' attitudes in this critical area. These findings align with those of Mehrnoush et al. (2016), who concluded that constructing and implementing targeted training for healthcare professionals in NICUs contributes to important and notable changes in cognitive perceptions and attitudes toward neonatal pain management.

Moving to a separate observation, item number 11 "When the necessary procedures have been done for the patient, the persistence of pain does not cause problems" presented a limited positive shift. Responses dropped from 34% in the pre-test to 0% immediately after the educational sessions, then rose again to 56% at the three-month follow-up. although the post – test results regarding the immediate phase suggested

confusion or misinterpretation of the item, the observed increase thereafter represents an improvement over the baseline (pre-test) and reflected a gradual and measurable positive shift in nurses 'attitudes, even if it was a limited change . These test results displayed a similarity to study by (Asadi-Noghabi et al., 2014), where out of the 40 nurses, 23 agreed with the same statement, showcasing a persistent gap in understanding the side effects of untreated or persistent pain in neonates.

On a different note, in their study (Asadi-Noghabi et al., 2014) , 90% of participants (36 out of 40) answered item number 3, which stated "Neonates have the right to appropriate assessment and management of their pain" positively. Comparable findings of the present study were observed during the pre-test and immediate post-test phases, where 86% and 98% of participants, respectively, responded positively to the same item. At the three-month follow-up, the percentage declined to 84%; nonetheless, it remains a favorable & positive attitude. These satisfactory results illustrated a sufficient understanding related to neonatal pain assessment & management.

Certain aspects within both the knowledge and attitude parts received a minimal improvement, with some items even demonstrating a decline compared to the pre-intervention phase. Several factors contributed to this outcome, such as the on-going misconceptions held by some nurses regarding neonatal pain care, restricted educational intervention time, and the requirement for consisted & sustained learning & training efforts. This was similarly observed, recommended and highlighted in previous studies, including those by Abubaker et al. (2019), Kebede et al. (2024), Jember et al. (2024), Maciel et al. (2018), Mehrnoush et al. (2016), and Mlambo et al. (2021), all of which stress the need of continuous professional development to target weaknesses & to fill knowledge, attitudes and performances gaps toward neonatal pain .

The authors additionally noted a statistically significant positive relationship between nurses' knowledge and their attitudes toward neonatal pain assessment and management as evident by their answers. This indicates that an increase in NICU nurses' knowledge is moderately linked to positive gains in attitudes toward pain assessment and management in both hospitals, which was similarly observed in the findings of Asadi-Noghabi et al.(2014), Ghanim (2022), Mala et al. (2023), and Abuhammad et al.(2024).

4.4 Practices of NICU Nurses Toward Neonatal Pain Assessment & Management

With regard of the practical component of the study, as illustrated in Table (2.4) in Appendix (G), a noticeable improvement in the competency level of NICU nurses in regards to neonatal pain assessment and management was evident, rising from 27.5% before the educational sessions to 52.4% three months after their completion. Likewise, Abd El-Aziz et al. (2018), in a study at Mansoura University, conducted an initial evaluation of the baseline knowledge and training of neonatal nurses regarding non-pharmacological pain management practices administered for neonates. The study confirmed that more than two-thirds of participants had not received any prior formal training on the topic. To fill this gap, the researchers implemented a structured educational intervention, which was evaluated in two phases : immediately after the intervention and three months later, to determine the impact of the program. Results displayed a statistically significant enhancement in both knowledge and practice domains related to pain management in the neonatal population, with a more substantial gain at the three-month follow-up. The observed progress in outcomes of both studies reflect the effectiveness & importance of the educational and training sessions conducted during the study.

Next, the authors will proceed to analyse and discuss the table mentioned below, beginning with the three-month follow-up phase that showed a noticeable positive change in the implementation of pain assessment practices by nurses, as evidenced by the increase in the percentage of positive responses. For example, question number 3 (Do you perform neonatal pain assessment using a pain assessment tool at the start of the shift alongside V/S measurement?) showed an increase from 6% to 46%.

It is important to mention that the number of nurses identifying the significant role of pain on both physiological and behavioral aspects has increased, as observed in responses to questions number 4 and 5. A descriptive cross-sectional study by (Treiman-Kiveste et al., 2022) had a similar conclusion related to this result, in which nurses also identified physical and behavioral indicators when assessing neonatal pain. This improvement is further illustrated in in items number 3 and 4 (which investigated the same matter) of Table (2.1) in the knowledge part. These findings indicate that strengthening & enhancing the foundational knowledge base is essential & plays a critical role in improving clinical outcomes among nurses, a conclusion also echoed by

Mlambo et al. (2021), who pointed out that in order to improve clinical practices, organizations need to provide a nurturing conditions with a well-resourced and developed learning. In spite of the clear connection between knowledge and practice components, and despite the implemented intervention in this thesis that enhanced both domains, a persistent gab continued to exist. This long-standing knowledge – practice gap has also been emphasized by previous researches, including studies by Christoffel et al. (2019) and Asadi-Noghabi et al.(2014), which highlighted the on-going challenge of translating conceptual knowledge into consistent and effective clinical practices.

Nurses predominantly declared that they preferred their own clinical experience rather than using an evidenced based pain assessment tool when assessing pain in neonates. This is apparent in the pre-test's score, where 54% of nurses stated that they rely solely on personal clinical judgment, and only a small minority (4%) indicated using a standardized neonatal pain assessment tool. The follow up data that was collected three months later, showed a shift in figures to 74% and 30%, respectively, indicating a sustained reliance on personal experience. Nevertheless, the on-going reliance on personal experience highlights the critical need to encourage the adoption & use of evidence-based assessment tools in neonatal pain care, supported by continuous education and training. Treiman-Kiveste et al.2022 had similar findings, in which most of the nurses (86%) did not perform neonatal pain assessment using any standardized pain assessment scales in their clinical practice, with roughly 58% considering that they could effectively assess neonatal pain without them. On the other hand, a study by Carlsen Misic et al. (2021) reported that the majority of their participating nurses (74%) use pain assessment tools multiple times per shift. This difference in outcomes between the studies may be credited to the presence of developed & implemented neonatal pain care protocols within their units, which likely contributed to more systemic and standardized assessment practices.

Moreover, NICU nurses in both hospitals exhibited an increase in non-pharmacological pain management administration, highlighting an important shift in their practices toward pain management. The figures of the level of practice related to pharmacological pain management grew considerably three months after the educational intervention to reach 84%, while it was markedly low at baseline, with only 8% of nurses administering analgesia for the neonates in pain when needed, even though it is still at a lower level than that reported for non-pharmacological methods (86%). This variation in choosing

to implement one method over the other may be explained by the persistent misunderstanding and concerns related to the possibility for physiological dependence associated with non- opioid analgesia use, which may lead nurses to prefer non-pharmacological strategies (Anand et al., 2017). Validating this point, a study by Assefa et al. (2022) reported that painful invasive procedures in neonatal intensive care units were commonly carried out without the use of any analgesic drug. The study's authors emphasized the necessity for effective strategies that facilitate the routine coordination between neonatal pain assessment and appropriate analgesic administration into clinical practice. On a similar note, Maciel et al. (2018) reported that pharmacological approaches continue to face significant barriers, while non-pharmacological pain relief methods are mainly adopted by nurses for neonates during hospitalization. They also highlighted the need to implement standardized protocols to evaluate the effectiveness and comprehension of pain management administration. Furthermore, another study by Kebede et al. (2024) reported that the availability of clear systemic neonatal pain management protocols within NICUs, is essential to improve and support analgesic and any other pharmacological pain management use. They also encouraged the improvement of continuous training sessions for nurses to enhance their skills in managing neonatal pain.

Lastly, it is important to mention the improvement of documenting practices among NICU nurses, notably regarding pharmacological pain management administration. Nevertheless, no significant comparable effort was made for documenting pain assessments and non-pharmacological pain management methods. This is likely related to the presence of persistent systemic and organizational barriers, which will be elaborated upon in the next section. Sposito et al. (2017) found similar & compatible findings in their study, specifically related to this study's pre-test phase, stating that documentation of non-pharmacological interventions after assessment and procedural pain management was completely absent from medical records, and pharmacological interventions were not registered in vast majority of all procedures performed (96%). Urging the necessity to coordinate a systemic & high quality strategies to advocate comprehensive recording of neonatal pain management in clinical files.

4.5 Barriers Encountered by NICU Nurses in the Assessment & Management of Neonatal Pain

NICU nurses face many barriers in their work related to neonatal pain care, this section discusses and explains these barriers (Table 2.5 Appendix G) that may impede or stop them from skilfully & efficiently assesses and manage neonatal pain following the protocols discussed in previous chapters. These barriers, as categorized in the questionnaire into two main types: personal barriers and organizational barriers, had a general overall level of 69.8% prior to the sessions decreasing to 56% three months after the educational sessions.

The most significant change was among the personal barriers in the "lack of knowledge" domain, which dropped markedly from 92% to 36%, reflecting a 56% reduction. As a result of this decline, NICU nurses showed a shift in their perception toward the importance of neonatal pain assessment and management, reporting a decrease in item number 3 (from 84% to 64% post-intervention). In addition, the drop also affected the item related to the interest regarding the issue, declining slightly from 76% to 68% three months after the educational sessions. This slight decline may be caused by the nurses' increased knowledge base, potentially resulting in a misperception that part of the issue had been resolved. These findings stress the need for a dynamic professional growth, maintained through continuous education and training for nurses. Crucial methods should be implemented by organizations, such as continuously updating the unit's guidelines & protocols in accordance with the latest research findings related to neonatal pain assessment and management, which will contribute to strengthening & reinforcing clinical performance (Blomqvist et al., 2020). Also an interconnection between both the personal and organizational barriers was discovered through these outcomes, in which one of the barriers tend to influence the other, so an enhancement or deterioration in one domain can majorly effect the other, this explains the necessity of approaching both types of barriers at the same time, in order to yield an improved neonatal pain assessment and management practices. To further highlight these suggestions, Mlambo et al. (2021) discovered in their meta-synthesis of 25 studies that explored the continued professional development (CPD) in nursing, the important role by healthcare organizations in facilitating and constructing programmes for CPD, which could be accomplished by the various capabilities owned by these institutions, such as the presence of financial resources, and all the authorities

to sustain and provide easily accessible learning and training for their nursing staff. Thereby, emphasizing on the organizational role to a successful professional development among nurses.

However, the item asking about the collaboration between nursing staff and physicians within the unit related to neonatal pain assessment and management demonstrated only a minimal increase, rising from 22% to 28% over the three-month period. These low percentages and slight change suggests a significant problem and indicates continued challenges in interdisciplinary communication and teamwork, highlighting a persistent barrier that needs more attention and intervention, as was also additionally observed by previous research (Mlambo et al., 2021; Abubaker et al., 2019; Blomqvist et al., 2020; Alshawish, 2013; Affouneh & Alshawish, 2022).

Proceeding to discuss the results of the next part, which is the organizational barriers, that received an overall decline in its level from 86.8% to 70% three months after the educational sessions. One of the most improved areas was the lack of training barrier in relation to neonatal pain care, which is considered a modest change, received a decrease from 80% to 70% according to the nurses' perspectives. In spite of this noticeable moderate reduction, 70% of nurses still think they're in need for more training on the matter of neonatal pain care, it remains a barrier that stirs a marked concern and signals a need for a continuous staff development within the institution as mentioned earlier. Notably, in a study by Collados-Gómez et al. (2018), which was titled "Perception of Neonatal Nurses on Pain Management", it was advised that nurses who continuously receive a structural education and training are more capable of effectively assessing and then dealing with health problems in neonates than those who don't. The study also proposed that the implementation of an enhanced and organized training programs has been contributing to the improved administration of pain management practices in neonatal settings.

Additionally, the participants declared in their answers that both hospitals have shown an increase in implementing neonatal pain management, the responses rose from 2% pre-intervention to 24% post-intervention, which showed a substantial increase in the level of protocol use. While this shift reflects a significant improvement, there is still a need for more work in this area by the institution.

However, the same can't be said for the adherence to neonatal pain assessment practices, with even a decline in responses from 6% pre-intervention to 4% post-intervention, as a matter of fact both figures are considered very low. This result reflects the gradual increased awareness related to neonatal pain management, but the basic step of accurate pain assessment continues to be markedly overlooked. This finding depicts the need for healthcare institutions to begin adopting a comprehensive, evidence-based protocols for neonatal pain care in both the assessment and management phases .This explains, as discussed in the practice domain above, why despite some reported positive improvements, the actual use of assessment scale remains limited .Also this sheds a light on why nurses continue to mainly rely on their personal judgement & previous experience than on standardized assessment tools . It is the responsibility of institutions to reinforce their staff and support them, by following the latest research guidelines, construct routine evaluation, & continuous education. It is worth mentioning that the governmental hospital is starting to have a change in mind about the implementation of neonatal pain protocols; nevertheless, it has not yet been standardized , & still needs to be worked on. These findings are similar to a study conducted by (Treiman-Kiveste et al., 2022), who declared that many nurses didn't recognize or use neonatal pain assessment tools, stating in the study's open-ended answers that such tools were rarely utilized in daily practice, largely because of the absence of conceptual systems, the lack of neonatal pain scales, or insufficient training. Their study emphasized upon the importance of resolving these issues, which can be accomplished through targeted training courses and the use of evidence-based guidelines into routine clinical practice.

To explain & support the barrier-related outcomes of this thesis, the suggestions and results of the following two studies will be discussed, starting with Christoffel et al. (2019) work. They identified several major obstacles to an effective neonatal pain care, including, but not limited to, inadequate training, the lack of structural protocols, limited application of pain assessment scales, and poor communication and teamwork among healthcare professionals. The authors of that study highlighted the urgent need to recognize these obstacles in order to develop the appropriate methods to solve these issues, and in turn improve the quality of care performed to neonates in NICUs. Likewise, a thesis by Popowics et al. (2021), that aimed to examine nurses' knowledge and practices regarding neonatal pain, suggested several key barriers reported by their participants. These included insufficient practical training, heavy workload and

understaffing, resistance to changing current practices by the staff, ineffective team communication, and a lack of knowledge in pain assessment tools related to the neonatal population.

To finalize this section, an evaluation of the relationship between the study's other variables and barriers will elaborated now. Beginning with the relationship between the nurses' knowledge and present barriers that indicated a statistically significant negative correlation (See Table "8.1" Appendix H). This is evident through the nurses answers of item number one in Table (2.5), as was implied thoroughly above. As the knowledge base of NICU nurses in relation to neonatal pain assessment and management increases, the barriers encountered by them in their units tend to decrease moderately. However, no statistically significant relationships were detected between nurses' attitudes or practices and the barriers the they face in their units. These results align with the recommendations of numerous other studies that strongly suggest the construction and promotion of continuous education and training for nurses for their professional development. This can be carried out through keeping up to date with the latest evidence based guidelines for neonatal pain assessment and management, that in turn is very important to improve clinical practice performances, reduce barriers, and provide a high-quality care for neonates in NICUs (Jember et al., 2024; Kebede et al., 2024; Abubaker et al., 2019 ; Alshawish, 2013; Affouneh & Alshawish, 2022).

4.6 Correlation of Demographic Characteristics with the Study's Variables (Knowledge, Attitude, Practice, and Barriers)

The results of this study showed, as noted above, statistically significant improvements in NICU nurses' knowledge and attitudes toward pain assessment and management following the implementation of educational sessions, which were associated with the educational intervention (lectures + training). Nevertheless, no statistically significant change was credited to the nurses' demographic variables such as age, years of nursing experience, years of NICU experience, educational level, or type of hospital (See Tables "4.1" & "4.2"). It should be noted that, neither of the participating hospitals aforementioned above had any prior adherence to neonatal pain care guidelines, suggesting that the topic was considered fresh by the nursing staff. In comparison with other studies, Ghanim (2022) had several different outcomes opposing these results, including a positive correlation between their participants' educational levels and

knowledge base, as well as between their years of experience and attitudes level, indicating that background factors may have an effect on such outcomes. On the other hand, the findings of Abubaker et al. (2019) align with those found in this thesis, in which they also reported no significant relationship between the nurses' level of education and their knowledge and attitudes.

In addition, the results presented in Table (4.4) - as illustrated in the previous chapter - showed that there were no statistically significant differences in the levels of barriers encountered by NICU nurses regarding neonatal pain assessment and management after the educational sessions, when assessed against demographic variables. This result is compatible with the study by Christoffel et al. (2019), who also observed no association between their healthcare staff characteristics and the barriers present in their NICUs that hindered the implementation of neonatal pain care. Their study further emphasized on the role of institutional policies, labelling them to be the main issue rather than any individual demographic, thereby highlighting the need to improve clinical practice outcomes by implementing structured educational programs.

Proceeding to the practice domain (Table "4.3"), the findings presented in the table above revealed that there were no statistically significant differences in NICU nurses' practices regarding neonatal pain assessment and management after the educational sessions when analyzed in relation to age, years of general nursing experience, years of experience in the NICU, and type of hospital. On the other hand, statistically significant differences post the sessions were observed according to the level of education. Surprisingly, nurses holding a diploma degree demonstrated a superior mean practice scores compared to those with a bachelor's degree or higher. This outcome contrasts with what was reported in previous studies, where better clinical performances were linked to a higher educational degree (Treiman-Kiveste et al., 2022).

4.7 Conclusion

This study accomplished an overall positive outcome in all its targeted variables, it showcased the effectiveness of the intervention on NICU nurses in both hospitals regarding neonatal pain assessment and management, which reinforces the crucial role played by targeted educational and practical training sessions on clinical & professional development. It demonstrated a significant improvement in the knowledge, attitudes,

and practices of nurses, with a simultaneous decline in the study's barriers, irrespective of the nurses' demographic variables.

The efforts of constructing an on-going educational programs that integrate both conceptual and practical components, while also adopting & supporting neonatal pain assessment and management protocols, is very important for strong improvements in delivering high quality pain care for neonates in NICUs.

4.8 Limitations of the Study

1. The study faced a limited time for the educational intervention, which impeded the possibility of delivering the material more than one time. This was due to the shift-based nature of the nurses' work schedules. This one-time delivery might have contributed to some decline in scores at the three month follow up.

2. The area's instability, which posed challenges in traveling to the two hospitals and reaching them safely, in turn affecting the flexibility of data collection processes.

4.9 Recommendations of the Study

1. Implement & evaluating evidenced based protocols: in order to reinforce neonatal pain assessment and management across NICUs.
2. Developing continuous education and training programs: to maintain & improve nursing competencies.
3. Regular evaluation: to guide future education efforts for nurses according to their knowledge levels and performances, also to grant a prize for the ones who deserve it.
4. Administrative Support: to ensure the presence of resources and availability of time, to help enhance neonatal pain care.
5. Conduct further research efforts.
6. Integrate neonatal pain care in nursing schools 'curriculum: include & highlight the effects of neonatal pain assessment & management in nursing educational programs.

List of Abbreviations

Abbreviations	Meaning
NICU	Neonatal intensive care unit
NICU nurse	Neonatal intensive care unit nurse
V/S	Vital signs
I.V	Intravenous
IASP	International association for the study of pain
EMLA	Eutectic mixture of lidocaine and prilocaine
NIPS	Neonatal infant pain scale
SPSS	Statistical package for the social sciences
AAP	American Academy Of Pediatrics
NANDA	North American Nursing Diagnosis Association
GA	Gestational Age
CPD	Continued professional development
HR	Heart rate
RR	Respiratory rate
IRB	Institutional review board
Neonatal Pain Care Practices	Neonatal Pain Assessment & Management

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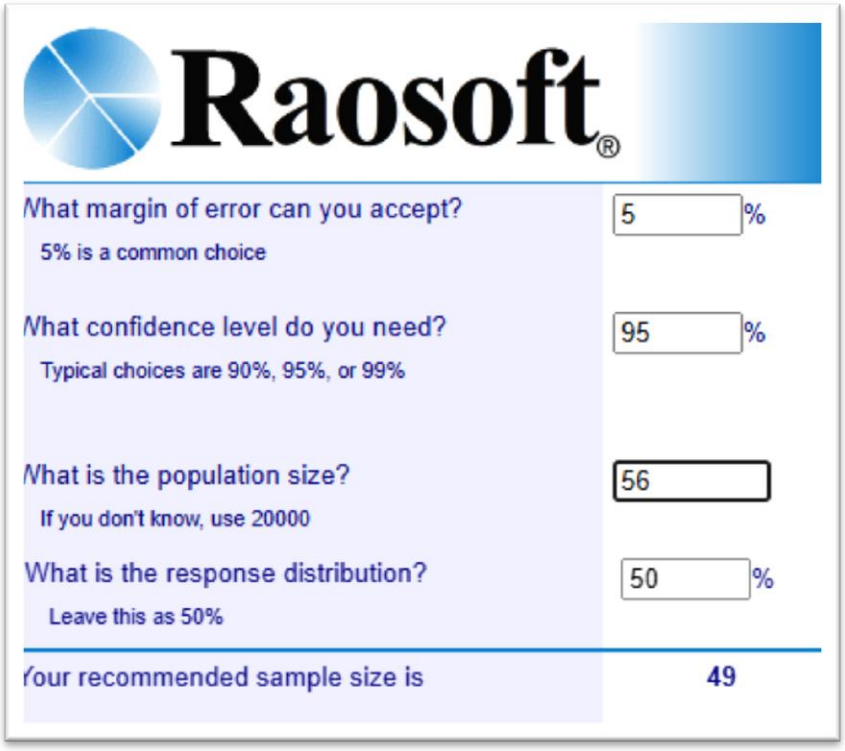
Appendices

Appendix A

Sample Size Calculation



The Source Sample size calculator by Raosoft (Raosoft, 2021)

Appendix B

Questionnaire and Consent Form

An-Najah National University

Faculty of Graduate Studies

Master of Critical Care Nursing

Research & questionnaire titles

KNOWLEDGE, ATTITUDE & PRACTICE TOWARD NEONATAL PAIN ASSESSMENT & MANAGEMENT IN NICUs OF TWO HOSPITALS IN WEST BANK : EVALUATION OF EDUCATIONAL SESSIONS FOR NICU NURSES

This study which aims to investigate the knowledge , attitudes & practices of NICU nurses toward neonatal pain assessment and management in two hospitals in West Bank is prepared by a master student named Lamees Abu Asba and supervised by Dr. Eman Alshawish . In order for its completion , the authors need neonatal ICU nurses to answer a questionnaire ,that contains five parts : demographic data, then questions regarding the knowledge , attitudes & practices toward neonatal pain assessment & management, & finally questions about possible barriers (personal & organizational) , it may take approximately (15-20 minutes) of your time .It is important to note that participation is completely voluntary ,withdrawal from the study can happen at any given time , and any information written will be kept confidential .

Consent I have read and I understand the above written information and have had the opportunity to ask questions that were fully answered. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving a reason and without cost. I voluntarily agree to take part in this study .

Participant's signature _____ Date _____

Researcher's signature _____ Date _____

For any questions , Email s12154049@stu.najah.edu

Questionnaire

Part one

Demographic data

1- Age :

- 22 - 25 years old -------
- 25 - 30 years old --------
- 30 – 35 years old --------
- 35 – 40 years old ---------
- => 40 years old ---------

2- Years of experience as a working nurse :

- =<5 years ----------
- 5-10 years ----------
- 10-15 years ----------
- >15 years ----------

3- Years of experience in the NICU :

- =<5 years ----------
- 5-10 years ----------
- 10-15 years ----------
- >15 years ----------

4- Level of education :

- Diploma degree ……..
- Bachelor's degree ……
- higher level (Master's degree) …….
- Neonatal pain training courses …….
- others …….

5- Type of hospital you work in :

- Governmental ……
- Private ……

Part two

knowledge about neonatal pain assessment and management

The item	True	False
1.Do you believe full term neonates experience more pain than adults?		
2.Do you believe pre-term neonates experience more pain than adults?		
3. Pain has an effect on the following V/S in neonates : heart rate, respiratory rate , and O2 saturation (SPO2 level) ?		
4.Pain has an effect on the neonates behaviour ,such as : 'facial expressions , limb movements ,& crying ?		
5. Nursing procedures such as : venipunctures, I.V cannulation , heel lance & suctioning cause pain in neonates ?		
6. Ignoring neonatal pain assessment could lead to consequences such as : neurodevelopmental disorders ?		
7. Do you use a pain assessment tool?		
8. Have you used a pain assessment tool in the past or in a previous job?		
9. Neonates who can be distracted from pain usually do not have severe pain		
10 . Children sleep in spite of severe pain		
11. Children who need to frequently undergo painful procedures, need the maximum treatment for pain control during the first procedure to minimize the anxiety for the next procedures ?		
12. The World Health Organization pain ladder suggests using a single analgesic rather than combining classes of drugs (e.g., combining an opioid with a non-steroidal agent)		
13. Nurses are obligated to routinely assess pain in neonates using pain assessment scales ?		
14.Neonatal pain assessment should be done at the start of the shift ,before , and after any painful invasive procedure ?		
15.Neonatal pain assessment scales differ according to GA and the baby's birth age ?		
16. The usual duration of action of Morphine is 4 to 5 hours ?		
17. After an initial does of opioid analgesic is given, subsequent doses should be adjusted in accordance with the individual patient's response ?		
18. Neonates respond to drug treatment less than adults ?		
19. Anti-anxiety drugs, Sedatives, and Barbiturates are suitable for pain relief during painful procedures ?		
20. Opioids should not be administered for neonate pain relief, due to the high risk of psychological dependence.		

21. Non-pharmacologic methods of pain relief have no applications for neonates .		
22. Oral administration of glucose to neonates before painful procedures can reduce pain		
23. Swaddling the neonate during painful procedures causes limitation of motions which results in increased pain		
24. Direct skin contact of mother and neonate is a good way to relieve pain in neonates		
25. Intramuscular injection is the recommended route of administration of opioids for neonates with brief, severe pain of sudden onset as trauma or postoperative pain		
26. Morphine is not used for neonate pain relief due to the risk of respiratory depression		
27. Paracetamol is the most commonly used analgesic in neonates		
28. Non-steroidal, anti-inflammatory agents are used to relieve mild to moderate pain		
29. Ibuprofen is appropriate for relief of mild pain in neonates		
30. When performing a painful procedure, breast feeding will relieve pain in neonates		
31. Neonates do not experience pain		
32. Neonates experience less degree of pain than adults		
33. Analgesia is not critical to neonates because of lack of memory of experiences		
34. Physiological stress to pain can be more dangerous than analgesia side effects		
35. Analgesia is too dangerous to use in neonates		
36. Pain diminishes quicker in newborns than adults .		
37. Neonates require less analgesia than adults in relation to body weight		
38. At 26 weeks, the neonate has all the apparatus needed to perceive pain		
39.There are two types of neonatal pain management : pharmacological and non-pharmacological ?		
40. Non – pharmacological pain management methods such as: Positioning ,pacifiers , & swaddling are effective to manage neonatal pain ?		
41.Neonatal pain management depends on the previous assessment phase ?		
42. Is there a pain assessment tool in your unit?		
43. Is there a pain management guideline in your unit?		

Part three

Attitudes of NICU nurses toward Pain assessment and management among neonates

Item	**Yes**	**No**
1.Neonates and children experience pain equal to that experienced by adults ?		

2. Pain management and pain relief are of priority in neonates' treatment		
3. Neonates have the right to appropriate assessment and management of their pain		
4. The most accurate judge of the intensity of the neonate's pain is the her/his primary nurse		
5. Full treatment of pain is a humanitarian issue		
6. Failure to assess and manage the neonate's pain affects his body and mind in the long term		
7. The nurse's physical and mental fatigue can affect neonate pain relief		
8. Like other vital signs, pain scores should be documented		
9. To ensure patient's comfort and pain relief is one of the most important tasks of nurses		
10. Available tools for measurement of pain are the best for determining pain severity in neonate		
11. When the necessary procedures have been done for the patient, the persistence of pain does not cause problems		
12. Using pain assessment tools for determining neonate's pain lead to an appropriate method of pain relief		
13. Measurement and control of neonate's pain can affect the healing process and reduces the hospital stay		
14. Measurement and control of neonate's pain can improve clinical outcome		
15. Comparable stimuli in different people produce the same intensity of pain		
16. Measurement and control of pain in neonate leads to improved quality of neonate's life		

Part four

Practices of NICU nurses toward Pain assessment and management among neonates

Item	Yes	No
1- Do you refrain from using clinical experience as a basis for neonatal pain assessment?		
2- Do you perform neonatal pain assessment using a pain assessment tool constructed for neonates ?		
3- Do you perform neonatal pain assessment using a pain assessment tool at the start of the shift alongside V/S measurement ?		
4- Do you notice physiological changes in the neonate attributed to their pain (Heart rate, respiratory rate ,&/or O2 saturation) ?		

5- Do you notice behavioral changes in the neonate attributed to their pain, such as : facial expressions , limb movements ,&/or crying ?		
6- Do you perform neonatal pain assessment using a pain assessment tool when needed before, during , & after an invasive painful procedure ?		
7- Do you implement a pain management method according to the score of the assessment tool you used ?		
8- Do you apply non- pharmacological pain management for neonates when needed (Non-nutritive sucking , swaddling,&/or skin to skin care) ?		
9- Do you apply pharmacological pain management for neonates when needed according to their pain intensity (Acetaminophen , opioids) ?		
10- Do you omit reassessing neonatal pain after an intervention if a standardized pain assessment tool is not utilized?		
11- Do you reassess (evaluate) pain in the neonate after application of a management method using a pain assessment tool constructed for neonates ?		
12- Do you document pain assessment for the neonate in his/her medical file ?		
13- Do you document non-pharmacological pain management for the neonate in his/her medical file ?		
14- Do you document pharmacological pain management for the neonate in his/her medical file ?		
15- Do you collaborate with other nurses &/or the NICU's doctor for pain management ?		

Part five

Barriers to in-effective neonatal pain assessment and management in NICUs

Personal barriers	**Yes**	**No**
1- Do you lack the knowledge in regards to neonatal pain assessment & management & their protocols?		
2- Do you lack interest in the field of neonatal pain knowledge and its implementation?		
3- Do you question the importance of neonatal pain assessment and management?		
4- Do you suffer from unclear roles or responsibilities in your unit?		
5- Is there limited collaboration between physicians and nursing staff in your unite regarding neonatal pain assessment & management?		

Organizational barriers	Yes	No
1- Is there a lack of training for NICU nurses in regards to neonatal pain assessment & management protocols?		
2- Are neonatal pain assessment protocols not routinely followed in your unit?		
3- Are neonatal pain management protocols not routinely followed in your unit?		
4- Do you experience challenges due to a lack of adequate nurse-to-neonate ratio (enough working NICU nurses)?		
5- Do you have long working hours (long period shifts more than 10 hours) ?		

Appendix C

IRB Approval Letter

An-Najah National University
Faculty of Medicine & Health Sciences
Institutional Review Board

جامعة النجاح الوطنية
كلية الطب وعلوم الصحة
لجنة أخلاقي البحث العلمي

Ref: Nsg. Nov. 2024/20

IRB Approval Letter

Title of Research:
Knowledge, attitude &[redacted] practice toward neonatal pain assessment and management in NICUs of two hospitals in West Bank: evaluation of educational sessions for NICU nurses

Submitted by:
Lamees Abdel-Wahab Abu asba

Supervisor:
Eman Alshawish

Approved:
13th November. 2024

Your Study Title "*Knowledge, attitude &[redacted] practice toward neonatal pain assessment and management in NICUs of two hospitals in West Bank: evaluation of educational sessions for NICU nurses*". /Reviewed by An-Najah National University IRB committee and was approved 13th November. 2024.

Naim Kittana, Dr.

IRB Chairman

IRB

Nablus - P.O Box :7 or 707 | Tel (970) (09) 2342902/4/7/8/14 | Faximile (970) (09) 2342910 | E-mail : IRB@najah.edu

Appendix D

Distribution of Time & Content of the Educational Sessions

Time	Content to cover in each day
8:00-9:00 AM	Neonatal pain physiology + Effects of under-management of pain on the neonate (neurologically) .
9:00-10:00 AM	Neonatal pain assessment & assessment tools
10:00-10:30 AM	Non – pharmacological neonatal pain management (methods, & way of application) .
10:30 -11:00 AM	Coffee break .
11:00 AM –12:00 PM	Training through groups on the application of non-pharmacological methods, while also using pain assessment tools
12:00 – 12:30 PM	Revision & discussion of respiratory distress in neonates ,& the need for invasive intubation resulting in the administration of pharmacological pain methods .
12:30 – 1:30 PM	Pharmacological neonatal pain management (when to use ,agents , & administration doses, routes , as well as side effects) .
1:30 – 2:00 PM	Revision / discussion & questions .

Appendix E

Normality Test

Table 5.1
Test of Normality and the Skewness coefficients

Variable	Kolmogorov-Smirnov		Shapiro-Wilk		Skewness coefficient
	Statistic	P-value	Statistic	P-value	
Pre Knowledge	0.133	0.028	0.966	0.166	0.307
Pre Attitudes	0.190	0.000	0.904	0.001	0.042
Pre Practices	0.231	0.000	0.891	0.000	1.057
Pre Personal Barriers	0.283	0.000	0.818	0.000	0.407
Pre Organizational Barriers	0.271	0.000	0.758	0.000	-0.955
Pre Barriers	0.192	0.000	0.903	0.001	0.177
Post Knowledge	0.235	0.000	0.756	0.000	-2.570
Post Attitudes	0.419	0.000	0.637	0.000	-1.927
Post 3months Knowledge	0.165	0.002	0.911	0.001	-0.528
Post 3months Attitudes	0.208	0.000	0.885	0.000	-0.935
Post 3months Practices	0.103	0.200	0.962	0.110	-0.221
Post 3months Personal Barriers	0.205	0.000	0.891	0.000	0.466
Post 3months Organizational Barriers	0.249	0.000	0.890	0.000	-0.549
Post 3months Barriers	0.140	0.016	0.963	0.123	0.109

Appendix F

Pairwise Comparisons Tables

Table 6.1

Pairwise Comparisons

Knowledge (I)	Knowledge (J)	Mean Difference (I-J)	Std. Error	P-value
Pre	Immediately Post	-29.953*	1.415	0.000
	Post 3 Months	-22.651*	1.952	0.000
Immediately Post	Pre	29.953*	1.415	0.000
	Post 3 Months	7.302*	2.000	0.002
Post 3 Months	Pre	22.651*	1.952	0.000
	Immediately Post	-7.302*	2.000	0.002

Note * The mean difference is significant at the .05 level
** Adjustment for multiple comparisons: Sidak

Table 7.1

Pairwise Comparisons

Attitude (I)	Attitude (J)	Mean Difference (I-J)	Std. Error	P-value
Pre	Immediately Post	-0.240*	0.025	0.000
	Post 3 Months	-0.154*	0.028	0.000
Immediately Post	Pre	0.240*	0.025	0.000
	Post 3 Months	0.086*	0.024	0.002
Post 3 Months	Pre	0.154*	0.028	0.000
	Immediately Post	-0.086*	0.024	0.002

Note * The mean difference is significant at the .05 level
** Adjustment for multiple comparisons: Sidak

Appendix G

KAP-Related Tables

Table 2.1

Frequencies and percentages of the nurses' knowledge regarding neonatal pain assessment and management (N=50)

Knowledge Items	Pre		Post Immediately (3 – days)		Post 3 Months	
	N	%	N	%	N	%
1. Do you believe full term neonates experience more pain than adults?	20	40%	44	88%	39	78%
2. Do you believe pre-term neonates experience more pain than adults?	19	38%	34	68%	34	68%
3. Pain has an effect on the following V/S in neonates: heart rate, respiratory rate , and O2 saturation (SPO2 level) ?	30	60%	46	92%	45	90%
4. Pain has an effect on the neonates behaviour ,such as : 'facial expressions , limb movements ,& crying ?	34	68%	48	96%	39	78%
5. Nursing procedures such as: venipunctures, I.V cannulation , heel lance & suctioning cause pain in neonates ?	46	92%	49	98%	46	92%
6. Ignoring neonatal pain assessment could lead to consequences such as: neurodevelopmental disorders?	24	48%	43	86%	37	74%
7. Do you use a pain assessment tool?	1	2%	0	0%	2	4%
8. Have you used a pain assessment tool in the past or in a previous job?	5	10%	1	2%	17	34%
9. Neonates who can be distracted from pain usually do not have severe pain	18	36%	18	36%	17	34%
10 . Children sleep in spite of severe pain	28	56%	45	90%	43	86%
11. Children who need to frequently undergo painful procedures, need the maximum treatment for pain control during the first procedure to minimize the anxiety for the next procedures?	37	74%	46	92%	48	96%
12. The World Health Organization pain ladder suggests using a single analgesic rather than combining classes of drugs (e.g., combining an opioid with a non-steroidal agent)	24	48%	39	78%	35	70%
13. Nurses are obligated to routinely assess pain in neonates using pain assessment scales?	22	44%	50	100%	45	90%
14. Neonatal pain assessment should be done at the start of the shift, before, and after any painful invasive procedure?	25	50%	50	100%	46	92%

15. Neonatal pain assessment scales differ according to GA and the baby's birth age?	44	88%	49	98%	45	90%
16. The usual duration of action of Morphine is 4 to 5 hours?	31	62%	48	96%	43	86%
17. After an initial does of opioid analgesic is given, subsequent doses should be adjusted in accordance with the individual patient's response?	36	72%	49	98%	44	88%
18. Neonates respond to drug treatment less than adults?	22	44%	46	92%	22	44%
19. Anti-anxiety drugs, Sedatives, and Barbiturates are suitable for pain relief during painful procedures?	29	58%	49	98%	44	88%
20. Opioids should not be administered for neonate pain relief, due to the high risk of psychological dependence.	14	28%	40	80%	43	86%
21. Non-pharmacologic methods of pain relief have no applications for neonates.	40	80%	42	84%	37	74%
22. Oral administration of glucose to neonates before painful procedures can reduce pain	42	84%	47	94%	40	80%
23. Swaddling the neonate during painful procedures causes limitation of motions which results in increased pain	16	32%	45	90%	31	62%
24. Direct skin contact of mother and neonate is a good way to relieve pain in neonates	41	82%	48	96%	36	72%
25. Intramuscular injection is the recommended route of administration of opioids for neonates with brief, severe pain of sudden onset as trauma or postoperative pain	17	34%	48	96%	45	90%
26. Morphine is not used for neonate pain relief due to the risk of respiratory depression	12	24%	49	98%	41	82%
27. Paracetamol is the most commonly used analgesic in neonates	33	66%	42	84%	43	86%
28. Non-steroidal, anti-inflammatory agents are used to relieve mild to moderate pain	29	58%	41	82%	42	84%
29. Ibuprofen is appropriate for relief of mild pain in neonates	33	66%	50	100%	47	94%
30. When performing a painful procedure, breast feeding will relieve pain in neonates	44	88%	46	92%	48	96%
31. Neonates do not experience pain	33	66%	48	96%	40	80%
32. Neonates experience less degree of pain than adults	15	30%	49	98%	37	74%
33. Analgesia is not critical to neonates because of lack of memory of experiences	21	42%	46	92%	38	76%
34. Physiological stress to pain can be more dangerous than analgesia side effects	26	52%	49	98%	44	88%

35. Analgesia is too dangerous to use in neonates	32	64%	50	100%	42	84%
36. Pain diminishes quicker in newborns than adults.	8	16%	50	100%	27	54%
37. Neonates require less analgesia than adults in relation to body weight	40	80%	49	98%	46	92%
38. At 26 weeks, the neonate has all the apparatus needed to perceive pain	3	6%	21	42%	42	84%
39. There are two types of neonatal pain management: pharmacological and non-pharmacological?	44	88%	49	98%	48	96%
40. Non – pharmacological pain management methods such as: Positioning, pacifiers, & swaddling are effective to manage neonatal pain?	46	92%	49	98%	45	90%
41. Neonatal pain management depends on the previous assessment phase?	28	56%	47	94%	42	84%
42. Is there a pain assessment tool in your unit?	1	2%	1	2%	0	0%
43. Is there a pain management guideline in your unit?	4	8%	1	2%	9	18%
Total	52.0%		82.0%		74.6%	

Table 2.2

Means and standard deviations of the nurses' attitudes toward neonatal pain assessment and management (N=50)

Attitudes Items	Pre		Post Immediately (3-days)		Post 3 Months	
	Mean	SD	Mean	SD	Mean	SD
1. Neonates and children experience pain equal to that experienced by adults?	1.58	0.50	1.22	0.42	1.38	0.49
2. Pain management and pain relief are of priority in neonates' treatment	1.46	0.50	1.96	0.20	1.84	0.37
3. Neonates have the right to appropriate assessment and management of their pain	1.86	0.35	1.98	0.14	1.84	0.37
4. The most accurate judge of the intensity of the neonate's pain is the her/his primary nurse	1.90	0.30	2.00	0.00	1.88	0.33
5. Full treatment of pain is a humanitarian issue	1.54	0.50	2.00	0.00	1.66	0.48
6. Failure to assess and manage the neonate's pain affects his body and mind in the long term	1.46	0.50	1.98	0.14	1.76	0.43
7. The nurse's physical and mental fatigue can	1.84	0.37	2.00	0.00	1.88	0.33

affect neonate pain relief						
8. Like other vital signs, pain scores should be documented	1.72	0.45	2.00	0.00	1.90	0.30
9. To ensure patient's comfort and pain relief is one of the most important tasks of nurses	1.70	0.46	2.00	0.00	1.84	0.37
10. Available tools for measurement of pain are the best for determining pain severity in neonate	1.82	0.39	2.00	0.00	1.92	0.27
11. When the necessary procedures have been done for the patient, the persistence of pain does not cause problems	1.66	0.48	1.94	0.24	1.44	0.50
12. Using pain assessment tools for determining neonate's pain lead to an appropriate method of pain relief	1.72	0.45	2.00	0.00	1.82	0.39
13. Measurement and control of neonate's pain can affect the healing process and reduces the hospital stay	1.46	0.50	1.98	0.14	1.86	0.35
14. Measurement and control of neonate's pain can improve clinical outcome	1.58	0.50	1.96	0.20	1.78	0.42
15. Comparable stimuli in different people produce the same intensity of pain	1.38	0.49	1.14	0.35	1.16	0.37
16. Measurement and control of pain in neonate leads to improved quality of neonate's life	1.46	0.50	1.90	0.30	1.76	0.43
Total of nurses' attitudes	1.63	0.17	1.87	0.04	1.78	0.17

Table 2.3

Frequencies and percentages of the nurses' attitudes toward neonatal pain assessment and management (N=50)

Attitudes Items	Pre		Post Immediately		Post 3 Months	
	No	Yes	No	Yes	No	Yes
	N(%)	N(%)	N(%)	N(%)	N(%)	N(%)
1. Neonates and children experience pain equal to that experienced by adults?	21(42%)	29(58%)	39(78%)	11(22%)	31(62%)	19(38%)
2. Pain management and pain relief are of priority in neonates' treatment	27(54%)	23(46%)	2(4%)	48(96%)	8(16%)	42(84%)
3. Neonates have the right to appropriate assessment and management of their pain	7(14%)	43(86%)	1(2%)	49(98%)	8(16%)	42(84%)

4. The most accurate judge of the intensity of the neonate's pain is the her/his primary nurse	5(10%)	45(90%)	0(0%)	50(100%)	6(12%)	44(88%)
5. Full treatment of pain is a humanitarian issue	23(46%)	27(54%)	0(0%)	50(100%)	17(34%)	33(66%)
6. Failure to assess and manage the neonate's pain affects his body and mind in the long term	27(54%)	23(46%)	1(2%)	49(98%)	12(24%)	38(76%)
7. The nurse's physical and mental fatigue can affect neonate pain relief	8(16%)	42(84%)	0(0%)	50(100%)	6(12%)	44(88%)
8. Like other vital signs, pain scores should be documented	14(28%)	36(72%)	0(0%)	50(100%)	5(10%)	45(90%)
9. To ensure patient's comfort and pain relief is one of the most important tasks of nurses	15(30%)	35(70%)	0(0%)	50(100%)	8(16%)	42(84%)
10. Available tools for measurement of pain are the best for determining pain severity in neonate	9(18%)	41(82%)	0(0%)	50(100%)	4(8%)	46(92%)
11. When the necessary procedures have been done for the patient, the persistence of pain does not cause problems	17(34%)	33(66%)	3(6%)	47(94%)	28(56%)	22(44%)
12. Using pain assessment tools for determining neonate's pain lead to an appropriate method of pain relief	14(28%)	36(72%)	0(0%)	50(100%)	9(18%)	41(82%)
13. Measurement and control of neonate's pain can affect the healing process and reduces the hospital stay	27(54%)	23(46%)	1(2%)	49(98%)	7(14%)	43(86%)
14. Measurement and control of neonate's pain can improve clinical outcome	21(42%)	29(58%)	2(4%)	48(96%)	11(22%)	39(78%)
15. Comparable stimuli in different people produce the same intensity of pain	31(62%)	19(38%)	43(86%)	7(14%)	42(84%)	8(16%)
16. Measurement and control of pain in neonate leads to improved quality of neonate's life	27(54%)	23(46%)	5(10%)	45(90%)	12(24%)	38(76%)
Total of nurses' attitudes	(36.6%)	(63.4%)	(12.1%)	(87.9%)	(26.8%)	(73.3%)

Table 2.4

Frequencies and percentages of the nurses' practices toward neonatal pain assessment and management (N=50)

Practices Items	Pre				Post 3 Months			
	No		Yes		No		Yes	
	N	%	N	%	N	%	N	%
1. Do you refrain from using clinical experience as a basis for neonatal pain assessment?	27	54%	23	46%	37	74%	13	26%
2. Do you perform neonatal pain assessment using a pain assessment tool constructed for neonates?	48	96%	2	4%	35	70%	15	30%
3. Do you perform neonatal pain assessment using a pain assessment tool at the start of the shift alongside V/S measurement?	47	94%	3	6%	27	54%	23	46%
4. Do you notice physiological changes in the neonate attributed to their pain (Heart rate, respiratory rate, &/or O2 saturation) ?	22	44%	28	56%	10	20%	40	80%
5. Do you notice behavioral changes in the neonate attributed to their pain, such as : facial expressions , limb movements ,&/or crying ?	20	40%	30	60%	6	12%	44	88%
6. Do you perform neonatal pain assessment using a pain assessment tool when needed before, during, & after an invasive painful procedure?	50	100%	0	0%	35	70%	15	30%
7. Do you implement a pain management method according to the score of the assessment tool you used?	46	92%	4	8%	30	60%	20	40%
8. Do you apply non-pharmacological pain management for neonates when needed (Non-nutritive sucking, swaddling,&/or skin to skin care) ?	22	44%	28	56%	7	14%	43	86%
9. Do you apply pharmacological pain management for neonates when needed according to their pain intensity (Acetaminophen, opioids) ?	46	92%	4	8%	8	16%	42	84%
10. Do you omit reassessing neonatal pain after an intervention if a standardized pain assessment tool is not utilized?	15	30%	35	70%	30	60%	20	40%

11. Do you reassess (evaluate) pain in the neonate after application of a management method using a pain assessment tool constructed for neonates?	46	92%	4	8%	32	64%	18	36%
12. Do you document pain assessment for the neonate in his/her medical file?	41	82%	9	18%	36	72%	14	28%
13. Do you document non-pharmacological pain management for the neonate in his/her medical file?	43	86%	7	14%	23	46%	27	54%
14. Do you document pharmacological pain management for the neonate in his/her medical file?	36	72%	14	28%	5	10%	45	90%
15. Do you collaborate with other nurses &/or the NICU's doctor for pain management?	35	70%	15	30%	36	72%	14	28%
Total	74.7%		25.3%		43.1%		56.9%	

Appendix H

Correlation between the Study Variables

Table 8.1

Pearson correlations between nurses' knowledge, attitudes, practices and barriers regarding pain assessment and management

		knowledge	Attitudes	Practices	Barriers
knowledge	Pearson Correlation	1	0.526**	0.190	-0.372**
	P-value		0.000	0.187	0.008
Attitudes	Pearson Correlation	0.526**	1	0.277	-0.170
	P-value	0.000		0.052	0.238
Practices	Pearson Correlation	0.190	0.277	1	-0.263
	P-value	0.187	0.052		0.065
Barriers	Pearson Correlation	-0.372**	-0.170	-0.263	1
	P-value	0.008	0.238	0.065	

Note * The variables are the total nurses' knowledge, Attitudes, Practices, and Barriers post three months after the educational sessions

** Correlation is significant at the 0.05 level

Appendix I

Ministry of Health Approval Letter

State of Palestine
Ministry of Health
Education in Health and Scientific
Research Unit

دولة فلسطين
وزارة الصحة
وحدة التعليم الصحي
والبحث العلمي

Ref.: ....
Date:..................

الرقـــم: ....
التـاريخ: ١٨/١١/٢٠٢٤

الأخ مدير عام الادارة العامة للمستشفيات المحترم،،،

تحية واحترام...

الموضـــوع: تسهيل مهمة بحث

يرجى تسهيل مهمة الطالبة: **لميس عبد الوهاب جبريل ابو عصبة- ماجستير تمريض العناية المكثفة- جامعة النجاح**، لعمل بحث الماجستير بعنوان:

" Knowledge, attitude & practice toward neonatal pain assessment and management in NICUs of two hospitals in West Bank : evaluation of educational sessions for NICU nurses"

حيث ستقوم الطالبة بجمع معلومات حول البحث من خلال تعبئة استبانة من الممرضين، وذلك في:

- **مستشفى جنين الحكومي**

مع العلم أن الدراسة باشراف: د. ايمان ابو شاويش.

على ان يتم الالتزام بالمحافظة على اخلاقيات البحث العلمي وسرية المعلومات، وعدم التعرض للمعلومات الشخصية للمشاركين.

على ان يتم تزويد الوزارة بنسخة PDF من نتائج البحث، التعهد بعدم النشر لحين الحصول على موافقة وزارة الصحة.

مع الاحترام...

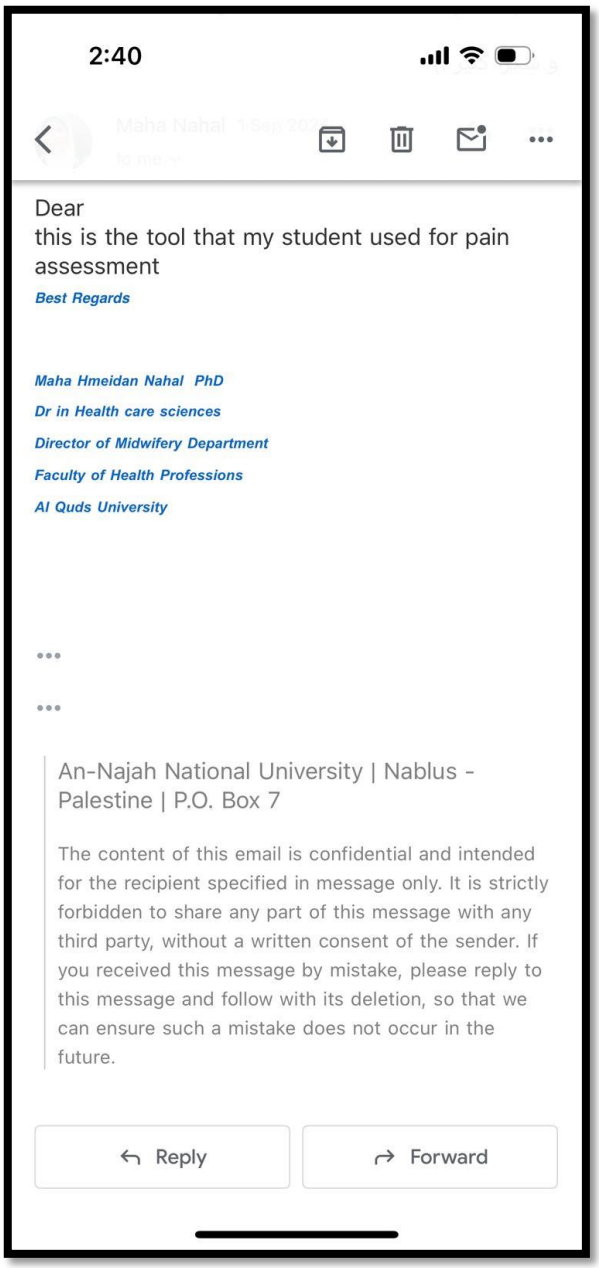
د. عبد الله القواسمي
رئيس وحدة التعليم الصحي والبحث العلمي

نسخة: مديرة دائرة التمريض والقبالة المحترمة/ جامعة النجاح

Telfax.:09-2333901 scientificresearch.dep@gmail.com تلفاكس: 09-2333901

Appendix J

Consent for Questionnaire Use via Email



Appendix K

Private Hospital Approval Letter

بسم الله الرحمن الرحيم

An- Najah National University
Faculty of Medicine & Health Sciences
Department of Nursing

جامعة النجاح الوطنية
كلية الطب وعلوم الصحة
دائرة التمريض

التاريخ: 17th /NOV/ 2024

حضرة د. فواز حماد المحترم ، مدير مدير مستشفى الرازي التخصصي ،

الموضوع: تسهيل مهمة طالبة الماجستير لميس عبد الوهاب جبريل أبو عصبة / ماجستير تمريض العناية لمكثفة

تحية طيبة وبعد،

تهديكم دائرة التمريض والقبالة في كلية الطب وعلوم الصحة / جامعة النجاح الوطنية أطيب التحيات ونشكر لحضرتكم حسن تعاونكم معنا ونرجو العلم بأن الطالبة المذكورة أعلاه تدرس ماجستير تمريض عناية مكثفة وحيث أنها ستقوم بعمل دراسة بغرض البحث العلمي لأطروحة التخرج تحت عنوان:

Knowledge, attitude & practice toward neonatal pain assessment and management in NICUs of two hospitals in West Bank : evaluation of educational sessions for NICU nurses

المعرفة والسلوك والممارسة تجاه تقييم وإدارة آلام حديثي الولادة في وحدات العناية المركزة لحديثي الولادة في مستشفيين في الضفة الغربية: تقييم الجلسات التعليمية لممرضين وحدة العناية المركزة لحديثي الولادة

فنرجو التكرم بالموافقة على تسهيل مهمة الطالبة في مستشفاكم الموقر في قسم الحضانه في الفترة الواقعة ما بين تشرين الثاني 2024 و كانون الأول 2024

تحت اشراف: – د. ايمان احمد شاويش

- مرفق ملخص الدراسه و IRB
- Data Sheet

وتفضلوا بقبول الطلب ولكم فائق الاحترام ، ،

مستشفى الرازي التخصصي
فواز عبدالرحمن حماد حلس
مدير المستشفى

مديرة دائرة التمريض والقبالة

د. عائدة أبو المسعود القيسي

دائرة التمريض وعلوم الصحة

نابلس - ص.ب 7 أو 707 فاكسميل (970) (09) 2342910
(Nablus- P.O.Box: 7 or 707- Tel (970) (09) 2342910
Email: nursing@najah.edu Web Site: www.najah.edu

جامعة النجاح الوطنية
كلية الدراسات العليا

المعرفة والسلوك والممارسة تجاه تقييم وإدارة آلام حديثي الولادة في وحدات العناية المركزة لحديثي الولادة في مستشفيين في الضفة الغربية: تقييم الجلسات التعليمية لممرضين وحدة العناية المركزة لحديثي الولادة

اعداد
لميس عبد الوهاب جبريل أبو عصبة

إشراف
د. ايمان الشاويش

قدمت هذه الأطروحة استكمالا لمتطلبات الحصول على درجة الماجستير في تمريض العناية المكثفة، من كلية الدراسات العليا، في جامعة النجاح الوطنية، نابلس– فلسطين.

2025

المعرفة والسلوك والممارسة تجاه تقييم وإدارة آلام حديثي الولادة في وحدات العناية المركزة لحديثي الولادة في مستشفيين في الضفة الغربية: تقييم الجلسات التعليمية لممرضين وحدة العناية المركزة لحديثي الولادة

اعداد

لميس عبد الوهاب جبريل أبو عصبة

إشراف

د. ايمان الشاويش

الملخص

المقدمة و الهدف يُعدّ ألم حديثي الولادة مصدر قلق بالغ في وحدات العناية المركزة، إذ يمكن أن يؤدي الألم غير المُدار إلى عواقب نمائية خطيرة على المدى القصير والطويل. وعلى الرغم من زيادة الوعي، فإن تقييم وإدارة الألم لا يزالان غير كافيين. تهدف هذه الدراسة إلى استكشاف معارف ومواقف وممارسات ممرضات وحدات العناية المركزة في الضفة الغربية، وتحديد الحواجز التي تعيق التقييم والإدارة الفعّالة، وكذلك تقييم أثر الجلسات التعليمية على تحسين الأداء السريري ونتائج رعاية ألم حديثي الولادة.

الطريقة اعتمدت الدراسة تصميمًا شبه تجريبي من نوع اختبار قبلي–بعدي في مستشفيين بالضفة الغربية، على عينة طوعية من 50 ممرضة في وحدات العناية المركزة لحديثي الولادة. جُمعت البيانات باستخدام استبيان ذاتي يغطي الديموغرافيا والمعرفة والمواقف والممارسات والحواجز. أُقيمت جلسات تعليمية لمدة يومين شملت محاضرات وتدريبًا عمليًا حول فسيولوجيا الألم، أدوات التقييم، واستراتيجيات الإدارة، وأُعيد توزيع الاستبيان بعد ثلاثة أيام وبعد ثلاثة أشهر لتقييم الأثر الفوري وطويل المدى .

النتائج أظهرت النتائج تحسنًا ملحوظًا في المعرفة والمواقف والممارسات بعد التدخل. ارتفعت المعرفة من 52٪ إلى 82٪ بعد الجلسات واستقرت عند 74.6٪ بعد ثلاثة أشهر، بينما ارتفعت المواقف من 63.4٪ إلى 87.9٪ ثم 73.3٪، وتحسنت الممارسات من 27.5٪ إلى 52.4٪. وانخفضت الحواجز المُتصورة

من 69.8٪ إلى 56٪، مع انخفاض ملحوظ في الحواجز الشخصية والتنظيمية. وُجد ارتباط إيجابي بين المعرفة والمواقف، وارتباط سلبي ذو دلالة إحصائية بين المعرفة والحواجز ($r = -0.372$ ، $p = 0.008$) كما ارتبطت الممارسات بالمستوى التعليمي، حيث سجلت الحاصلات على دبلوم درجات أعلى.

الاستنتاج تُبرز الدراسة الأثر الإيجابي للتدخلات التعليمية المستهدفة في تحسين معارف ومواقف وممارسات الممرضات، وتقليل الحواجز المُتصورة، مؤكدةً أهمية التطوير المهني المستمر والبرامج التدريبية المنهجية لضمان تقديم رعاية أكثر فعالية وحداثة قائمة على الأدلة.

الكلمات المفتاحية ألم حديثي الولادة، ممرضات العناية المركزة لحديثي الولادة، تقييم الألم، إدارة الألم، تدخل تعليمي، الحواجز المُتصورة، معرفة الممرضات، المواقف، الممارسات، الضفة الغربية .