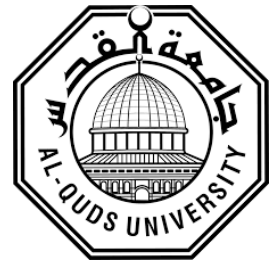


Deanship of Graduate Studies

Al-Quds University

School of Public Health



Evaluating the Use of Neonatal Pain Assessment Tool and Management at Caritas Baby Hospital

Wafa Mazen Ghanem

M.Sc.Thesis

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Evaluating the Use of Neonatal Pain Assessment Tool and Management at Caritas Baby Hospital

Prepared By

Wafa Mazen Ghanem

Supervisor: Dr. Maha Nahal

**A thesis Submitted in Partial Fulfillment of Requirements for
the Degree of Masters in Policies and Health Management,
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Deanship of Graduate Studies

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Thesis Approval

**Evaluating the Use of Neonatal Pain Assessment Tool and
Management at Caritas Baby Hospital**

Prepared by: Wafa Mazen Ghanem

Registration No: 21911695

Supervisor: Maha Nahal, PhD

Master thesis submitted and accepted, Date:

The names and signatures of the examining committee members are as follows:

1. Head of Committee: Maha Nahal Signature: *Maha Nahal*
2. Internal examiner: Maha Nubani Signature: *.....*
3. External examiner: Eman Alshawish Signature: *Dr Eman Alshawish*

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Dedication

This thesis is dedicated to my husband and my children for their endless love, support and encouragement. They have always taught me to believe in myself.

Furthermore, I would like to thank my sisters, brothers, friends and everyone who supported me throughout this exciting journey.

Wafa M. Ghanem

Declaration

I certify that this thesis submitted for the degree of master in nursing, is the result of my own research, except where otherwise acknowledged, and that this thesis (or any part of the same material) has not been submitted for a higher degree to any other university or institution

Wafa M. Ghanem

Wafa Ghanem

Signature: _____

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Abstract

Background: Guidelines and protocols of pain assessment among neonates have been designed to address two main aspects: First: to advocate for the use of valid and reliable neonatal assessment tools in order to prevent, alleviate and manage neonatal pain. Second: to educate and train the neonatal caregivers, mainly medical staff, on pain management.

Purpose: This study aimed to investigate knowledge and attitude of the medical staff toward assessment and management of neonatal pain at Caritas Baby Hospital-Bethlehem (CBH) in Palestine. Further, to modify the Current practice of pain assessment and management among neonates at CBH in Palestine.

Methods: Descriptive cross section study design was used to investigate knowledge and attitudes of the medical staff toward assessment and management of neonatal pain. In addition, an intervention study was conducted to modify the current practices of the medical staff at CBH toward pain assessment and management of neonates. To assess knowledge and attitudes the researcher used the Nurses Knowledge and Attitudes Survey regarding pain (PNKAS) that was modified and used by Asadi- Noghabi et al., (2014). The intervention part includes conducting a workshop to teach the medical staff about the use of modified pain assessment tool mPAT for neonates and to emphasize the need for accurate use of this tool. Then knowledge and attitudes of the medical staff were assessed post workshops and at 6 months of follow up.

Sample: The medical staff, a total of (53) including 46 nurses, 4 pediatricians and 3 resident doctors working in the Neonatal Ward and NICU at CBH participated in this study.

Results. Knowledge of the medical staff, concerning neonatal Pain assessment and management toward neonates showed a mild change from pre-to post-assessment. However, results showed a significant relationship between the educational level of the medical staff and their knowledge of pain assessment and management techniques.

Further, Attitudes toward neonatal pain assessment were changed to positive attitudes after the workshop and remained positive at the follow up period. Overall, participants were very satisfied with the workshop, Although, they reported some obstacles such as lack of support from hospital administration due to shortage of nurses.

Key words: Neonates, Knowledge of the medical staff, Attitudes of the medical staff, Caritas Baby Hospital-Bethlehem, pain assessment tool.

تقييم استخدام أداة تقييم الألم حديثي الولادة وإدارتها

في مستشفى كاريتاس للأطفال

إعداد: وفاء مازن غانم

إشراف: د. مها نهال

الملخص

خلفية الدراسة: تم تصميم القواعد الإرشادية والبروتوكولات الخاصة لتقييم الألم لدى الأطفال حديثي الولادة لمعالجة جانبين رئيسيين: أولاً: تشجيع استخدام أدوات صالحة وموثوقة لتقييم الألم لدى الأطفال حديثي الولادة بهدف إدارة الألم لديهم والتخفيف منه أو منعه. ثانياً: توعية وتدريب القائمين على رعاية الأطفال حديثي الولادة على موضوع إدارة الألم.

هدف الدراسة: هدفت هذه الدراسة إلى الوقوف على مدى معرفة واتجاهات الطاقم الطبي في مستشفى كاريتاس للأطفال - بيت لحم في فلسطين نحو تقييم وإدارة آلام لدى الأطفال حديثي الولادة، إضافة إلى محاولة تطوير الممارسات الحالية لتقييم الألم ومعالجته بين حديثي الولادة في مستشفى كاريتاس للأطفال - بيت لحم).

الطريقة والإجراءات: تم استخدام منهج الدراسة الوصفية المقطعية للتحقق من معرفة واتجاهات الطاقم الطبي تجاه تقييم وإدارة الألم لدى الأطفال حديثي الولادة. إضافة إلى ذلك، تم إجراء دراسة تدخل لتعديل الممارسات الحالية للطاقم الطبي في مستشفى كاريتاس للأطفال - بيت لحم تجاه تقييم وإدارة الألم لدى حديثي الولادة، حيث تم إجراء ورش عمل لتعليم الطاقم الطبي استخدام أداة تقييم الألم (mPAT). وللتأكيد على الحاجة إلى استخدام دقيق لهذه الأداة، وبعد (6) أشهر من ورش العمل، تم تقييم معارف واتجاهات الطاقم الطبي لتحديد مدى التحسن في معارفهم واتجاهاتهم حول الألم.

عينة الدراسة: بلغت عينة الدراسة (53) شخص من الطاقم الطبي في جناح حديثي الولادة ووحدة العناية المركزة لحديثي الولادة في مستشفى كاريتاس للأطفال - بيت لحم، يمثلون 46 ممرضة و4 أطباء أطفال و3 أطباء مقيمين.

نتائج الدراسة: أظهرت نتائج الدراسة ارتفاع بسيط في مستوى معرفة الطاقم الطبي فيما يتعلق بتقييم وإدارة آلام لدى حديثي الولادة مقارنة بين التقييم السابق والتقييم اللاحق، كما أظهرت النتائج وجود علاقة ذات دلالة إحصائية بين المستوى التعليمي للطاقم الطبي ومعرفتهم بتقييم الألم لدى حديثي الولادة وتقنيات إدارته. بينت النتائج أن اتجاهات الكادر الطبي نحو تقييم الألم لدى حديثي الولادة قد تغيرت إلى الاتجاهات الإيجابية بعد ورشة العمل وبقيت إيجابية في فترة المتابعة، ولكنها بحاجة إلى تقييم دوري ومستمر في المستقبل.

الكلمات المفتاحية: حديثي الولادة، المعرفة لدى الطاقم الطبي، اتجاهات الطاقم الطبي، أداة تقييم الألم.

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List of Abbreviations

Number	Abbreviation	Word
1	CBH	Caritas Baby Hospital
2	NICU	Neonatal Intensive Care Unit
3	(mPAT)	modified Pain Assessment Tool
4	SPSS	Statistical Package for Social Sciences
5	PNKAS	Nurses Knowledge and Attitudes Survey regarding pain
6	ROP	Retinopathy of prematurity
7	LBW	Low Birth weight
8	IVH	Intraventricular hemorrhage
9	RDS	Respiratory distress Syndrome

Chapter one

Introduction

This chapter provides the background information regarding the study variables. it illustrates the problem statement, significance, aim and objectives of the current study, and research questions.

1.1 Background

Advances of technology in the field of neonatology have increased the survival rate of neonates (Te Pas, 2017). When admitted to the Neonatal Ward or the NICU, neonates experience invasive diagnostic procedures that undoubtedly induce pain (Carbajal et al., 2008). In the last two decades, research has recognized that clinical knowledge regarding neonatal pain has expanded considerably and neonatal pain assessment and management have gained substantial attention.

Contrary to past beliefs that neonates do not experience pain, Agakidou et al. (2021), demonstrated that even infants born extremely prematurely have the ability to experience and feel pain. Cong et al, (2013), found that neonates do respond to painful stimuli and premature infants may have a 30% to 50% lower pain threshold than adults and a lower pain tolerance than older children.

Polkki & Laukkala, (2018) reported that ineffective treatment and management of pain among neonates can cause short- and long-term effects upon their health. Walker, (2014) highlighted the essential need for identifying, assessing and managing pain among neonates to alleviate their distress and protect the nervous system from persisting sensitization of pain and potential damaging effects of altered neural activities.

Britto et al., (2014), stated that measurable physiologic, behavioral, metabolic and hormonal responses have been detected when neonates experience acute frequent and

prolonged pain. Although more evidence-based data on neonatal pain has been reported in the last ten years concurred with an increase of the medical staff's awareness of pain existence in neonates, Hall & Anand et al., (2014), agreed that pain continues to be untreated when neonates undergo diagnostic procedures and specific treatments. However, the magnitude of inadequate pain management is better understood when assessing the neonates who are exposed daily to invasive and painful procedures through their stay in the NICU.

To emphasize the importance of a systematic pain management, the American Academy of Pediatrics (AAP) and the Canadian Pediatric Society (CPS) published in 2006 a policy stating that, "each healthcare facility should establish a neonatal pain control program aimed at routine assessment of pain, reduction in the number of painful procedures, and also reduction and prevention of acute pain from invasive procedures" (Pediatrics, 2006).

Pain guidelines and protocols among neonates have been designed to address two main aspects: First, to advocate for the use of valid and reliable neonatal assessment tools in order to prevent, alleviate and manage neonatal pain. Second, to educate and to train the neonatal caregivers, mainly medical staff, on pain management (Maciel et al., 2019). However, several studies identified that the mere presence of neonatal pain guidelines did not translate to a consistent and effective pain management technique. The gap between theory and practice still exists with negative consequences for pain management (Craig, 2014). Studies have shown that the inconsistent adherence to the pain guidelines and the underutilization of effective pain management in neonates have been influenced by knowledge, attitudes and perceptions of the neonatal medical staff regarding pain Christoffel, (2017). Asadi- Noghabi et al., (2014), asserted that underutilization and

inconsistent application of these skills and tools might adversely affect the quality of care provided to the neonates, thus neonatal pain remains unrecognized adequately.

1.2 Problem Statement

In the health care field, written clinical guidelines are essential objective guidance tools. Pain assessment and management decisions without a clear clinical pathway will be subject to the staff's interpretations. In addition, as pain relief treatments remain mainly pharmacologic, they can be influenced by the staff's experience, familiarity with and availability of analgesics.

In 2018, Caritas Baby Hospital (CBH), attempted to standardize pain management through a Pain Assessment and Management of Infants and Children Policy. However, the successful adoption and implementation of the policy have not been conducted yet. Furthermore, the current policy at CBH does not include the use of a validated pain assessment tool as well as the medical staff in the NICU and Neonatal Wards may not be aware of the significant use of pain assessment and management techniques.

In the absence of a valid and reliable pain assessment and management tool for neonates at CBH, the question of whether neonatal pain is adequately identified and managed by the doctors as well as the nurses is worth answering. Therefore, assessing the knowledge and attitudes toward assessment and management of the neonatal pain is crucially needed as well as orienting the medical staff to the use of pain assessment and management tool is an essential step to modify the status of pain assessment and management among neonates in the CBH.

1.3 Significance of the study

Beyond the ethical considerations, managing pain is a core responsibility of the medical staff. For an effective and sustainable neonatal pain management, timely recognition and a clear intervention pathway need to take place. Even in the presence of an increased clinical knowledge of pain treatment, the struggle of medical staff regarding when and how to implement pain relief methods effectively and systematically continues to persist. Thus, the pharmacological relief strategies remain underutilized while the non-pharmacological strategies are seldom used.

During my clinical experience as a nurse in the NICU of CBH for more than 13 years, I noticed that the medical staff has not been aware of the neonatal needs for pain assessment. As a newborn undergo for an invasive or painful therapeutic and diagnostic procedure the medical staff did not place and importance on the possibility that a neonate might feel pain. Such observations continue to reflect the current pain management status and the inconsistent and limited use of such strategy.

Caritas Baby Hospital (CBH) was established in 1953. It is the only children's hospital in the West Bank's that offers medical and social services to every child in need, irrespective of origin or religion. It provides treatment for the most basic pediatric illnesses, and for neonatal and congenital disorders. It also provides care to patients with hereditary, neurologic and metabolic diseases. CBH focuses on providing care for these three subspecialties in pediatrics (neurology, pulmonology, and neonatal and pediatric intensive care) in accordance to the rising demand for these services as reflected in the hospital's strategic plan of 2018-2023 (<https://www.cbh.ps>).

1.4 Aim of the study

To investigate knowledge and attitudes of the medical staff toward assessment and management of neonatal pain at Caritas Baby Hospital-Bethlehem (CBH) in Palestine. Further, to modify the status of pain assessment and management among neonates at (CBH) in Palestine.

1.5 Study Objectives

1. Assess the sociodemographic characteristics of the medical staff working in the neonatal and NICU/CBH.
2. Identify knowledge and attitudes of the medical staff at CBH toward the pain assessment and management techniques used in the Neonatal Ward and the NICU.
3. Orient the medical staff about the pain assessment tool mPAT to improve pain management among neonates.
4. Introduce the modified pain assessment tool mPAT and a pain management policy as part of the routine care in the NICU and Neonatal Ward at CBH.
5. Explore the correlation between demographic characteristics of the medical staff and their knowledge and attitudes toward pain assessment and management.
6. Evaluate the implementation process of the pain assessment and management protocol.

1.6 Research Questions

1. Is the study sample knowledge about neonatal pain management increased after applying the pain management tool mPAT?
2. Is there any changes in the attitudes of the medical staff about neonatal pain management after applying the pain management tool mPAT?

3. Is there a statistically significant difference at the level ($0.05 \geq \alpha$) for the mean score of Knowledge and Attitudes items before and after applying pain assessment tool?

4. Is there a statistically significant difference at the level ($\alpha \leq 0.05$) in the average knowledge and attitudes of the medical staff that is attributed to their sociodemographic variables (gender, age, marital status, educational level, work place, experience).

Chapter Two

Literature Review

This chapter will present a review of the scientifically based data on the knowledge and attitudes towards neonatal pain. Several views that have guided neonatal pain assessment and management are presented with their successes and challenges. The presentation of the significance of the medical staff's knowledge about pain, and how attitudes, perception and beliefs do influence how they assess and manage neonatal pain are discussed in this chapter.

2.1 Pain in neonates

Evidence-based research into neonatal pain has addressed traditional beliefs and, in some cases, reversed misconceptions about neonates' perception of and response to pain. A study by Simon & Tibboel, (2006), reported that not only do neonates experience pain, but those born extremely prematurely have the ability to feel pain and their experience is more intense. The study established that "fetuses at 20 weeks gestation have ascending pathways for nociception through unmyelinated nerve fibers which send the signal along the spinal column to the brain and by 32 weeks gestation, the descending pathways necessary to block incoming pain impulses are developed". The study concluded that "since the descending mechanisms develop later than ascending mechanisms, it leads to a window of vulnerability for increased nociception in neonates, and in particular preterm neonates, causing them to experience more intense pain due to their inability to dull the experience".

A study by Grunau et al, (2013) further emphasize that the "blunting of hypothalamic pituitary adrenal (HPA) response in neonates who have undergone numerous painful procedures in the NICU" have been measured and added that "this blunting can be

understood as an attempt to cope with the repeated stress of pain”. In addition, the study found when these neonates were followed, “there was a crossover of HPA response, with this extremely preterm group showing increased cortisol response to novel tasks”.

A Cong et al, (2013) study concurred with these findings and found that “neonates do respond to painful stimuli and premature neonates may have a 30% to 50% lower pain threshold than adults and a lower pain tolerance than older children”. Furthermore, a research study by Johnston, (2011) regarding neonatal early perception of pain confirmed that “all sensory modalities in neonates, including preterm neonates, are significantly over-stimulated when compared to their exposure to stimuli in utero and that primary hypersensitivity is easily elicited in preterm neonates”. Findings from Walker, (2014) & Johnston et al, (2011) concurred with the need to “protect the developing nervous system from persistent sensitization of pain neuropathic pathways and potential damaging effects of altered neural activity on the development of the central nervous system”.

Since (2000), the surge of empirical data on neonatal pain has led to further research into the implications of pain exposure since physiological, behavioral, metabolic and hormonal responses have been documented during and after a painful experience. A McIntosh et al, (2008) study noted that “when neonates’ experience of pain is acute, frequent and or prolonged, it can impact normal growth and triggers changes in long-term neurodevelopment”. Similarly, Anand et al., (2006) study identified that “chronic or repeated acute pain experience may interfere with normal neurodevelopmental trajectory and can have long-term ramifications both physically & behaviorally”. These findings were supported in a recent study by Mehrnough et al (2017) as it emphasized the anticipated lasting effects of pain and indicated that “developmental disabilities, long-term cognitive, social, and emotional dysfunctions are related to frequent and long exposure to pain in neonates”.

The significance of such neurological reality is better appreciated when considering that neonates requiring intensive care may be exposed to as many as 12 to 16 invasive painful procedures each day, (Carbajal et al., 2008); (Simmons et al., 2003).

Polkki & Laukkala (2018) study that “when pain is left untreated or ineffectively managed, it can result in both short- and long-term adverse effects on the health of neonates”. Hence, timely identification, assessment & management of pain is essential to alleviate discomfort and distress in neonatal population.

2.2 Ways to reduce pain in neonates

Although doctors and nurses are equipped to know how to apply the knowledge of pharmacology to control pain, deficiencies in the use of sedatives and analgesics in neonatal units persist. An in-depth analysis by Dodds, (2003) & Simons & Tibboel, (2006), of the failure to treat pain from a pharmacologic standpoint included fear of over medicating, respiratory depression, hypotension, toxicity, and addiction even though addiction is not possible in neonates.

A study by Mehrnoush et al, (2017) revealed that using narcotics created anxiety in the nurses and doctors who expressed their concerns about and justification for not using narcotics on neonates due to the side-effects. The study found that “many procedures are still performed without pain control measures and only 21% of the invasive procedures are controlled by pharmacological and non-pharmacological pain control procedures”. Furthermore, 20% of the participating nurses & doctors believed that “analgesia is not necessary prior to chest drain insertion, elective endotracheal intubation, or lumbar puncture” and noted that “pain relief is still regarded as an optional rather than an essential part of care. One of the study’s conclusions was that” the mere knowledge is not enough for the implementation of changes in the clinical performance”.

A Christoffle et al, (2017) study reached similar findings as it indicated that “the majority of the nurses & doctors never or rarely prescribed or administered non-opioid or opioid analgesics” in neonates undergoing potentially painful procedures and that “the prevention and relief of pain in neonates in the neonatal unit investigated was insufficient and inadequate”.

The other aspect of neonatal care that effectively reduces pain is the application of Non-Pharmacological Methods. Findings of Johnston et al., (2011) study noted that “non-pharmacological interventions used for neonatal pain management have shown varying degrees of efficacy”. They can be categorized into “either sensory stimulation such as swaddling, vestibular action, non-nutritive sucking, or nutritive-based ranging from oral sucrose and maternal voice, breastfeeding, and skin-to-skin contact or Kangaroo Care”.

The underlying mechanisms of the specific pain relieving effect of the non-pharmacological interventions are not totally clear. One hypothesis is based on the Gate Control Theory proposed by (Melzack & Mendell, 2014). It attempts to explain that the stimuli travelling the ascending pathways may inhibit the nociceptive signals from painful stimuli through various endogenous mechanisms located along the spino-thalamic tract. It argues that the stronger these competing stimuli delivered in different modalities, the more effective they are in blocking the perception of pain. This may support the argument that use of multiple modalities is more effective than one.

A Suciu et al., (2015) study concurred with the above hypothesis as they proposed that non pharmacological methods decrease neonatal pain by inhibiting nociceptive pathways, releases endorphins and indirectly reducing the total amount of noxious stimuli to which neonates are exposed. Nonetheless, results of the study found that 25% of nurses versus 9% of doctors reported “rushed care” as an important, statistically significant barrier to adequate application of the non-pharmacologic pain management.

Similarly, Mehrnoush et al, (2017) study showed that the majority of the participants were not aware of non-drug interventions and noted that “routine use of pharmacological and non-pharmacological interventions for painful procedures ranged from 13% for elective tracheal intubation to 68% for chest tube insertion”.

Findings of Christoffle et al., (2017) study, identified that the methods used by the nurses and doctors to relieve the pain of the newborn were related to the use of swaddling, oral sucrose, prescription or administration of non-opioid/opioid analgesics and the use of opioids for neonates on mechanical ventilation. The study identified that the use of swaddling before a painful procedure was performed being often by the majority of the nursing assistants/technicians and always by the nurses, while in the case of the doctors, half of the professionals interviewed reported rarely requesting this intervention.

Another core approach to streamline the staff’s assessment and management of neonatal pain has been the establishment of the clinical pain guidelines. In general, pain guidelines have been designed to address two main aspects. First, to advocate for the use of valid and reliable neonatal assessment tools to prevent, alleviate and manage neonatal pain. Second, to not only educate but to train the neonatal caregivers, mainly doctors and nurses, on pain management.

However, a study by Rouzan in (2001), which was supported by several studies since, concluded that the mere presence of neonatal pain guidelines did not translate to consistent and effective daily routine pain management. “Gaps between theory development and practice still exist with negative consequences for pain management”, (Gardin, 2001) & (Erikson, 2008).

Studies have shown that the inconsistent adherence to the pain guidelines and the underutilization of effective pain management in neonates have been influenced by the

attitudes, perceptions and beliefs held by the neonatal medical staff regarding pain. Asadi-Noghabi et al, (2014) study concluded that “the underutilization and inconsistent application of these skills and tools might adversely affect the quality of care provided to the neonates, thus neonatal pain remains unrecognized adequately”.

Nurses, until recently, have not been consistently aware of pain management guidelines or received, through formal or continuing education, adequate training on pain assessment and the use of pharmacologic and non-pharmacological agents.

In the last twenty years, several societies and professional organizations from western countries have proposed guidelines for assessing, preventing, and managing neonatal pain. To emphasize the importance of a systematic pain management, the American Academy of Pediatrics (AAP) and the Canadian Pediatric Society (CPS) published in 2006 a policy stating that “each healthcare facility should establish a neonatal pain control program aimed at routine assessment of pain, reduction in the number of painful procedures, and also reduction and prevention of acute pain from invasive procedures”, (Britt, et al. 2014).

When painful procedures are unavoidable, the guidelines recommend the application of non- pharmacological comfort care measures (CMs), such as providing sucrose, swaddling, and allowing direct skin-to-skin contact with the mother, or pharmacologic measures (PMs) including analgesics or local anesthetics.

2.3 Pain management in neonates

Although neonatal pain management has received increasing attention over the last four decades, research into the effects of neonatal pain continues to emphasize the professional, ethical and moral obligation of staff to manage the pain of the newborns for positive outcome. However, evaluation studies reported “evidence of inadequate neonatal pain management and a gap between theory and practice” (Jeong, et al, 2014).

In the past, fewer nurses believed that neonates felt pain and they even were not aware that premature neonates were more sensitive to pain than full term. Marchant, (2014). Nurses used comfort measures to manage pain because doctors prescribed pharmacologic agents only during the post-operative period. Even though their knowledge of pain grew, nurses became more aware of and sensitive to pain and found that they still believe that “neonates felt the same amount of pain as an adult” Porter et al (1997), nurses rated pain experiences of full-term neonates significantly higher than those of preterm neonates.

Data from studies done in the last 15 years identified that nurses and doctors did not feel that they had adequate knowledge about pain and pain management in neonates. “Some nurses still believed that neonates experienced the same pain as adults, while others now understood that neonates were more sensitive to pain than older children and adults (Byrd et al, 2009). Dodds (2003) revealed that nurses viewed pain as underestimated, difficult to measure, and poorly managed and preferred to rely on their experience or the infant’s behavioral and physiologic cues for pain assessment. Similarly, doctors did not consistently use pain assessment scales because they did not trust the validity and reliability of the scales (Schultz et al., 2009).

The increase in knowledge of the long-term effects and prognosis of pain exposure in the early days of life as well as the persisting high mortality rates of neonates have instituted a serious focus on the pharmacological and non-pharmacological methods of pain management in the NICU and neonatal care ward.

2.4 Factors affecting pain management in neonates

Advances of technology and medical management breakthroughs in the field of perinatology and neonatology have increased the survival rate of sick and extremely premature neonates. When admitted to the Neonatal Intensive Care Unit (NICU) or the

Neonatal Ward, neonates are frequently subjected to painful invasive diagnostic and therapeutic procedures “that have consistently lowered the threshold of viability and resulted in moderate to severe acute and prolonged pain exposure during essential medical interventions necessary to sustain life” (Anand et al., 2006).

Researchers identified several factors that played a role in the discrepancy between what is known and what needs to be practiced on daily basis. Health personnel’s perception, attitudes and beliefs toward pain in newborns play an essential role in the success or failure of transitioning guidelines & policies to a routine practice.

Perception of pain intensity is one key factor as it is subjective and relies on the interpretation of reactions to the stimuli rather than a reliable tool. “Nurses who do not recognize that an infant is suffering pain are unable to alleviate it (Polkki, et al 2010).

A further review of neonatal pain literature revealed that the increase and dissemination of clinical knowledge of neonatal pain has not been sufficient to explain the gap between how pain should be controlled versus how it is actually managed in daily practice. Studies have shown that knowledge, attitudes and perception are closely intertwined and do impact the care the neonates ultimately receive.

Therefore, it is difficult to marginalize the impact of nurses and doctor’s perception of neonatal pain on their attitude when they face daily pain management decisions. The differences of pain perception have been documented in several studies. For example, studies by Anderson et al., (2007), Porter et al., (1997) & Simons et al., (2003) found that nurses were in agreement about the intensity of pain associated with the most common pain producing procedures and rated those procedures as more painful than the doctors.

A Britto et al, (2014) study of the perception of health care professionals about newborn procedural pain in a level III NICU in India reached a similar conclusion. He

identified that not only did the nurses rate more procedures by a 4:1 ratio more severely painful than doctors but they also perceived every procedure as more painful than doctors. Similarly, a Simons et al, (2003) study found that “neonatal pain perception by doctors was at least 20% lower than nurses” during bladder catheterization, endotracheal intubation and venipuncture”. He added that “this may be of clinical importance that doctors may be unaware of the pain they cause when they are busy doing the procedure, while the nurses assisting in the procedure being more aware and could take maximal pain-relieving measures”.

Furthermore, the Britto et al, (2014) study found that the age and years of experience of doctors and nurses “surprisingly showed inverse relation to pain perception” and that “donning a more supervisory role and doing less hands on with increasing experience could explain the desensitization”. The study concluded that it is “a cause of concern, as the experienced health care providers (HCP) are most often the policymakers, and being insensitive to pain could prevent rigorous implementation of pain reduction protocol (PRP)”.

In addition, the increase in knowledge of the long-term effects and prognosis of pain exposure in neonates has instituted a serious focus on the pharmacological and non-pharmacological methods that can effectively reduce and manage pain in neonates.

2.5 Barriers to pain management in neonates

Byrd et al. (2009) studied barriers that NICU nurses face when attempting to optimally manage neonatal pain as they expressed frustration with inconsistent practice patterns, inappropriate weaning protocols, and inadequate post-operative pain management. The study identified doctor’s practice patterns, nurses and doctors’ resistance to change, availability of and familiarity with pain assessment tools, inadequate pain assessment and management training and the lack of evidence-based protocols to be integral factors that

impede optimal neonatal pain care. Findings of Simons et al., (2003) study also identified that NICU nurses continue to experience barriers to effective management of neonatal pain, chief among them are the unclear unit and organizational policies and procedures, inconsistent pain management practices and doctor's beliefs about pain.

In addition, nurses were not consistently aware of pain management guidelines Akuma & Jordan, (2011); Byrd et al., (2009); Schultz et al., (2009) and received inadequate education regarding pain assessment Byrd, et al., 2009; Reyes, (2003) and use of pharmacologic agents (Akuma & Jordan, 2011).

Results of a survey by Jeong et al., (2014) noted that there was a discrepancy between the recommended guidelines by academic societies and actual healthcare practices. A number of studies reported that not all NICUs have pain management guidelines for newborns. In other cases, even if the guidelines were available, the healthcare professionals did not strictly follow them (Carbajal et al., 2008). In addition, Jeong, (2014) recommended systematic approaches for implementing practical guidelines, such as adaptation of guidelines for each NICU, dissemination of guideline content to all NICU staff, and regular measurements of compliance with the guidelines.

A study by Mehrmouh et al, (2016) found that "48% of the participating nurses were not aware of the pain management guidelines/protocols on their units while only 34% of them felt that the protocols were based on new research evidence".

The same study identified the barriers to effective pain management to be related to "high workload, shortage of personnel, lack of knowledge, absence of pain management protocols, lack of time, and lack of trust in the pain assessment tools". The authors suggested that these barriers can be resolved by developing guidelines and support of nurses, developing clinically feasible pain tools, as well as providing adequate training and proper

supervision. Other studies have also underscored the need for educating the neonatal clinicians regarding the pain assessment and practices and promoting nurse-doctor collaboration.

Consequently, the nurses must be empowered with the knowledge of how to obtain, disseminate, and implement evidence-based protocols within their clinical settings.

2.6 Neonatal nurses' knowledge and competency regarding neonatal pain management

Alongside the improved medical outcomes of neonatal care, the empirical data of neonatal pain has grown. However, and despite the findings of numerous researches, studies and surveys that support the importance of pain assessment and management in the neonatal population, pain remains underestimated and inappropriately managed in neonates (Alburaey et al, 2020).

A study by Jeong, (2014) concluded that even though “research into the effects of neonatal pain emphasizes the professional, ethical and moral obligation of staff to manage the pain of the newborns for positive outcome, the evaluation studies, continuously report evidence of inadequate neonatal pain management and a gap between theory and practice”. Hence, several studies have been conducted to understand what possible factors could be contributing to such discrepancy between theoretical knowledge and practical implementation of neonatal pain management not only on ethical basis but also to avert immediate and long-term adverse outcomes.

Until the 1980s, knowledge of neonatal pain was established on the assumptions that “neonates have an underdeveloped central nervous system coupled with an under established pain receptors which rendered neonates unable to remember painful experiences” (Rouzan,

2001). Such assumptions influenced the medical community to accept that neonates neither felt pain nor remembered painful events.

It is interesting to note that, notwithstanding that both nurses and doctors have been exposed to more neonatal pain-based research and clinical data; they did not feel they had ample knowledge about neonatal pain and its assessment and management. For example, a Byrd et al, (2009) conducted a pilot survey of NICU nurses to explore barriers to pain management found that although more nurses came to accept that neonates felt pain, they were not aware that premature neonates were more sensitive to pain than full term. “Some nurses still believed that neonates experienced the same pain as adults and rated pain experiences of full-term neonates significantly higher than those of preterm neonates”. (Byrd et al, 2009) & (Shultz et al. 2009).

The above pilot survey further revealed that although nurses and doctors concurred that the majority of procedures performed in the NICU were invasive, they diverged in their opinions of the level of pain they elicited. A significant Discrepancy between doctors and nurses when it came to evaluating pain as doctors tended to rate pain intensity lower than nurses and inconsistently used less pharmacological interventions before invasive procedures, which resulted in irregular practice patterns of pain management. Similar survey findings were reached Akuma & Jordan (2011) and a study by Simons et al., (2003) which focused on the nurses’ and doctors’ knowledge and practices regarding assessment and management of pain in the NICUs. It revealed that doctors rated procedures as less painful than nurses did and subsequently analgesia were underutilized, and both reported that pain scales and non-pharmacological methods were rarely used regardless of the perceived level of pain intensity. Consequently, as both nurses and doctors continued to affirm that pain remains undertreated despite the increase knowledge of pain existence in neonates, recent data revealed that in neonates “pain continues to be undertreated up to 65% of the time” (Anand, 2007).

A Further review of neonatal pain literature revealed that the increase and dissemination of clinical knowledge of neonatal pain has not been sufficient to explain the gap between how pain should be controlled versus how it is actually managed in daily practice. Studies have shown that knowledge and personnel's' attitudes and perception are intertwined and do impact care a neonate ultimately receive.

A study by Mehrnoush et al, (2017) looked into the effects of attitude on the implementation of pain management plan found that although most of the study's participants believed that neonatal pain management should be performed, it was not implemented adequately as beliefs, emotions and conscience were found to be the main factors that influenced the implementation of pain control measures. The study high lightened that "the implementation of pain management entails changes in attitudes" and that "the personnel have the knowledge but lack the belief no matter if he/she is a specialist or a chief specialist. It would not happen, without culture promotion work".

Similar conclusions were reached by other studies. In 2017, Christoffle et al, conducted a quantitative study to analyze the attitudes of healthcare professionals and found that "The attitudes of the health professionals did not fully reflect the knowledge acquired" hence "it is a major challenge for neonatology, especially regarding the evaluation and use of non-pharmacological and pharmacological measures".

Another factor that has been shown to impact neonatal pain is the care giver's perception. A study by Polkki et al noted that "Perception of pain intensity is one key factor as it is subjective and relies on the interpretation of reactions to the stimuli rather than a reliable tool" and that "nurses who do not recognize that an infant is suffering pain are unable to alleviate it (Polkki, et al.,2010).

2.7 pain management for neonates in Palestinian hospitals

In Palestine, neonatal pain management guidelines have been adopted in few hospitals in the West Bank. However, the systematic implementation of such guidelines has been inconsistent and scarce. Recently, efforts by the local medical associations and universities have been made to adopt an evidence-based neonatal pain guideline in an effort to standardize pain management.

In 2019, the Palestinian Ministry of Health (MOH) established “The National Neonatal Protocol: A Manual of Neonatal Care in Palestine” to ensure sustainable development in neonatal care and to improve the quality of neonatal care. It recommended routine assessments in order to detect pain using a validated assessment tool.

Limited studies have been designed to address managing neonatal pain. One recent study, which was part of a multi-center clinical audit, was conducted in the Gaza Strip. It involved 40 neonates in the NICU, who experienced mild to moderate pain when exposed to several painful and stressful procedures. The study concluded that these neonates did not receive the adequate care they need (Afifi, 2019).

Another study by Afifi et al, (2018), titled the “Assessment and Management of Neonatal Pain at Neonatal ICUs in the Gaza Strip” was conducted on 120 neonates at 3 Neonatal Intensive Care Units (NICUs); (Nassr Pediatric Hospital, Nasser Medical Complex and the European Gaza Hospital). The sample was selected prospectively over a period of 50 days. The study introduced the modified Pain Assessment Tool mPAT, which is a multidimensional observational scale used to assess or measure pain and is valid to be used for seeing pain among neonates. The mPAT scale was adopted and modified by O’Sullivan, Rowley, Ellis, Faasse, & Petrie (2016), to be used in assessing neonatal pain during daily care procedures. Studies found that the medical staff at the neonatal wards might have adequate

foundation regarding neonatal pain, but some gaps existed between perception of the medical staff toward pain and their actual practice in assessing and managing Pain (Afifi et al, 2018).

Chapter Three

Conceptual Framework

3.1 Introduction

This chapter includes the conceptual framework, the conceptual and operational definitions of the study variables, and the methods used for measuring the study variables

3.2 Conceptual definitions

1. Knowledge of medical staff toward Neonatal Pain: is defined as medical staff opinion about pain assessment and management in neonates. Having personal knowledge and experience with newborns in pain. There is no evidence on what constitutes sufficient knowledge in this phenomenon, and the level of knowledge can't be quantified.

2. Attitudes of the medical staff: A state of mental readiness of the medical staff, organized by experience, which represents their responses to a pain assessment among Neonates.

3. Sociodemographic: It is the set of personal characteristics that distinguish employees working in the workplace in terms of age, educational qualification, level of experience and other characteristics.

3.3 Operational Definitions

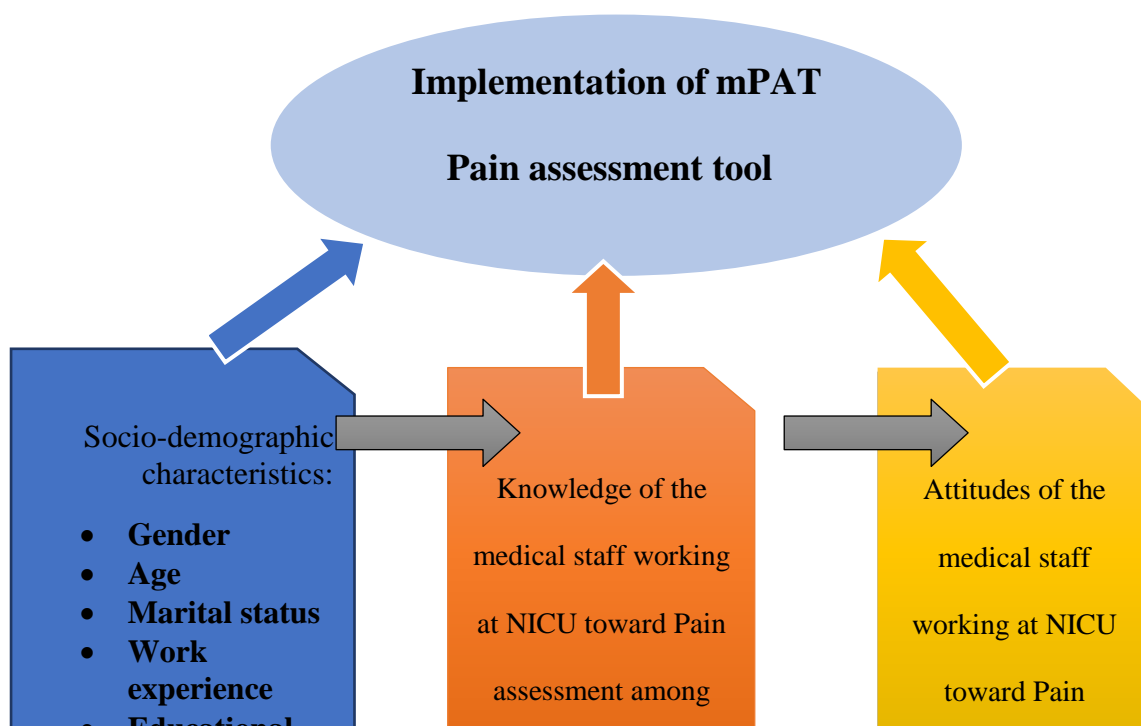
- Knowledge of medical staff toward Neonatal Pain: To assess the level of knowledge among the medical staff toward neonate pain assessment and management, the researcher used the knowledge and attitude questionnaire (PNKAS) that was modified and used by Asadi- Noghabi et al., (2014). It includes 37 items and was categorized into two answers as Yes and No.

- Attitudes of medical staff toward Neonatal Pain: To assess the attitudes among the medical staff toward neonate pain assessment and management, the researcher used the knowledge and attitude questionnaire (PNKAS) that was modified and used by Asadi-Noghabi et al.,(2014). The score for this tool for both knowledge and attitudes are considered as: Poor ($\leq 50\%$ of total score), Fair (50–75% of the total score), and Good ($\geq 75\%$ of the total score).

3.4 Conceptual Framework

The conceptual framework describes the relationship between the main variables of a study. It can be arranged in a logical structure to provide how ideas in a study relate to one another. A framework can add value to the overall research plan; it establishes a map for the study. The framework of this study, explores the relationship between the sociodemographic characteristics of the medical team and their knowledge and attitudes toward Pain assessment and management among neonates in the pre-intervention phase and after the intervention phase which include conducting workshops to introduce the mPAT tool at CBH.

Figure (3.1): Conceptual Framework



This study investigated knowledge and attitudes of the medical staff at CBH toward the pain assessment and management techniques used in the Neonatal Ward and NICU. In addition, it introduced a pain assessment tool to be utilized as part of the routine care in the NICU and Neonatal Ward at CBH. These two steps were essential to facilitate a better understanding and integration of adequate neonatal pain assessment and management to enhance clinical outcomes and quality of service provided in the NICU at CBH.

Chapter four

Methodology

4.1 Introduction

This chapter provides a brief description of the methodology process, study design, tools, sampling and population, data collection, and the data analysis. It described the methods used to design and implement this study. The contingent factors of the setting; participants and processes implementation during the data collection phase are explained; the sections of the instrument used are discussed, including validity and reliability as well as the ethical considerations to ensure the clinical integrity of the study.

4.2 Study Design

Research design reflects the plan to guide the implementation of a study in a process that optimizes control of factors that could interfere with the study's desired outcome (Burns & Grove, 2005). A descriptive cross-sectional design was conducted in this thesis to assess knowledge and attitudes of the medical staff concerning pain assessment and management among neonates in the NICU and the Neonatal Ward at CBH in order to describe the current & actual status in neonatal pain assessment and management. Further, in this study the researcher used intervention method to teach the medical staff about the mPAT tool and its use in pain assessment and management among neonates.

4.3 Population and Sampling

All the medical staff working in the Neonatal Ward and NICU at CBH were involved in this study. The total study sample was 53 staff members including 46 nurses, 4 pediatricians and 3 resident doctors working in the Neonatal Ward and NICU at CBH participated in this study.

4.4 Materials and methods

This study was carried out through the administration of Knowledge and Attitudes Survey regarding pain (PNKAS) that was used in the previous research and modified by Asadi- Noghabi et al., (2014). The questionnaire consisted of questions about the socio-demographic characteristics of the participants in addition to 37 questions to assess knowledge and 20 question to assess the attitudes of the medical staff toward pain assessment and management technique. Further, an intervention method was used to orient the medical staff about the mPAT tool. This was done to emphasize the need for assessing and managing pain among neonates and to implement the mPAT tool as a new policy to be used for caring of the neonates at CBH.

4.5 Data Collection

The data collection was carried out in 3 phases: pre intervention Phase, Intervention Phase, and post intervention Phase.

- **Pre-Intervention phase:** Assessment of knowledge, attitudes and demographic characteristics of the medical staff working in the Neonatal and NICU at CBH was done through the use of Knowledge and Attitudes Survey regarding pain (PNKAS). Data collection in this phase was done by an experienced nurse who was trained and prepared by the researcher for collecting the data. In order to ensure that data collection was carried out objectively, the researcher contacted an experienced neonatal nurse of 10 years experience in the ICU. The researcher then described the objectives & goals of the study and obtained verbal agreement of the experienced nurse to collect the data.

Training of the experienced ICU nurse was done as follows:

Step 1: Explain the purpose of the study and go through all the items of the knowledge and attitudes assessment tool. This required two sessions with the experienced nurse each session consisted of one hour.

Step 2: The researcher trained the ICU nurse on how to collect the data in an objective manner in order to avoid any possible bias or contamination of external factors.

Step 3: The researcher emphasized the importance of ensuring that all the participants understood the purpose of the questionnaire as well as signing the consent form.

Step 4: The ICU nurse was available to the participants in case further explanations & clarifications were needed.

Step 5: The ICU nurse was responsible for collecting and returning the completed questionnaires for the researcher in a period of two weeks.

- **Intervention Phase:** The researcher with the help of four experienced nurses prepared a program of educational activity that consists of 8 sessions distributed in two days period. Each day covered 4 teaching sessions started from 8 Am to 2: PM. This workshop was repeated for three times to enable the researcher to cover all the medical staff included in the study. The selected dates and times of the workshops were suitable for the medical staff in order not to oppose their duty at the hospital, attendants in each workshop were about 15-20 participant. The three workshops were conducted at the same hospital CBH, through March/2021, and were organized by the researcher, Medical and Nursing Directors, and the In-service coordinator.

Teaching sessions were presented for the participants by the researcher with the help of four experienced nurses who were trained in all the lectures that were presented for the medical staff. Schedule of the workshop and topics that were presented for the medical staff is found in the (Appendix E).

Topics that were discussed include common medical problems such as signs and symptoms of respiratory distress syndrome (RDS), causes, diagnosis and treatment and prevention of RDS. Premature babies are at risk for getting breathing difficulties, desaturation, and apnea which require the administration of surfactant and invasive or noninvasive ventilator mode to support the cardiopulmonary system. In addition, appropriate pain assessment and management concerning the RDS was highlighted. The lectures also clarified the importance of an effective Neurodevelopmental assessment and care of premature that is individualized care used to maximize neurological development and reduce long term cognitive and behavioral problems. Before ending the session, the researcher ensured that the medical staff were oriented to the goals of pain assessment for neurodevelopmental care for the neonate through short discussion and evaluation with the attendant staff.

Furthermore, Implementation of pain assessment tool was argued and discussed through the workshops related to its important use in NICU. It Provided neonates with a developmentally supportive positioning to optimize musculoskeletal development and minimize painful procedures was also emphasized. Teaching activities also include the needed information about appropriate pain relief measures which includes non-nutritive sucking as (dummy, cotton bud with breast milk or sucrose) , containment of neonates arms and or legs (swaddle or gently holding hands together on chest and/or hold legs tucked up), grasping a finger with an emphasis on pain assessment and management, feeding methods and encouraging parental involvement.

During the three workshops, the researcher clarified that the hospitalized neonates frequently experience pain during their admission as a result of diagnostic or therapeutic interventions or as a part of the disease process such as blood drawing, central line insertion, peripheral venous catheterization, intubation, endotracheal tube suctioning, chest tube, and

other diagnostic test including lumbar puncture and nasopharyngeal aspiration. The researcher emphasized that neonates cannot verbalize their pain experience from these painful procedures and depend on others to recognize, assess and manage Pain.

Moreover, the workshop addressed other medical problems that continue to be frequently encountered and prevalent in neonates which is hypothermia the major factor of morbidity and mortality in low-birth weight (LBW) infants which could be prevented if high quality of patient care provided. The researcher pointed out the most vulnerable group for hypothermia, the preterm infants who are wet, hypoxic and infected. Simple techniques such as rewarming the incubator in the pre-admission period and/or handling the baby under a radiant warmer may support a better medical clinical management and minimize possible complications. Intraventricular Hemorrhage (IVH) was also covered through the teaching activities. Retinopathy of Prematurity (ROP) and meaning of ROP screening was also clarified. At the same time, pain management that should be considered in the pre and post ROP screening procedure was also clarified because of its painful effect. A special focus was placed on the role of the non-pharmacological measures as an integral part of the pain management process. For example, swaddling which is a soothing technique and nesting which maintains the preterm infant within limits via the flexion posture, while maintaining intrauterine position and posture are used with premature as well as for full-term newborns.

- Introduction of the mPAT: The researcher was able to introduce the mPAT tool during the workshops and to go through the scale of this tool for the purpose of future implementation. The mPAT is an observational scale designed to assess neonatal pain. The mPAT is a modification of the original Pain Assessment Tool (PAT) scale that was first developed and piloted on the Butterfly Ward by Hodgkinson, Bear, Thorn & Blaricum (1994). and piloted at The National Women's Newborn Intensive Care Unit at Auckland City Hospital, New Zealand. It is a multidimensional pain assessment tool that was specifically designed for

neonates undergoing surgical intervention. The mPAT has been validated for surgical and non-surgical neonates, from 24 weeks gestation to full term, up to 6 months old. It is recommended that mPAT is used for all patients admitted to Butterfly Ward at RCH and can be utilised for both medical and surgical infants 3-6 months of age in other ward areas.

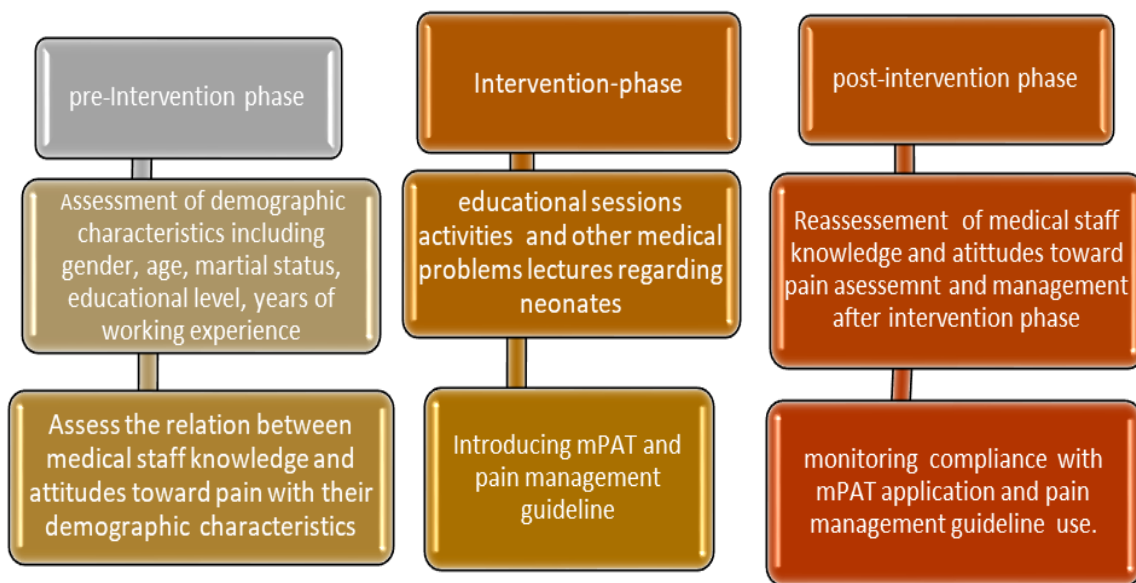
It was clarified that mPAT is a multidimensional pain assessment tool that is specifically designed for neonates undergoing surgical and non-surgical intervention. It can be used for neonates from 24 weeks gestation to full term, up to 6 months old which focuses on behavioral and physiological responses to painful stimuli. The mPAT scale focuses on behavioral responses such as sleep pattern, facial expression, color and cry, and on psychological responses including respiration, heart rate, saturation and blood pressure changes. It also includes a nurse's perception indicator. Concurrently, guideline of the mPAT were administered to the staff to guide them for the use of pain management among neonates in both NICU and Neonatal department at CBH. The researcher taught them how to complete the mPAT Score, the frequency of pain assessment and interpreting the mPAT Score. The mPAT tool was implemented at CBH, see the form in Appendix E.

At the end of each workshop, the medical staff were divided into small groups to discuss the mPAT and its guidelines as well as to give recommendations about the possibility of using this tool at CBH. One week after conducting the three workshops, the researcher asked the administrators about the possibility of starting the use of mPAT in the NICU at CBH and they agreed about it. The future plans for the researcher is to do monitoring for the compliance of using the mPAT tool and managing pain according to pain management guidelines which was approved to be used at CBH in June 2021. The researcher with the help of the quality department developed a monthly basis key performance indicator concerning this issue which includes checking all items concerning neurodevelopmental care techniques, non-pharmacological interventions and the use of mPAT tool.

- **Post-intervention Phase:** Six months after the workshops that were done at CBH, the researcher conducted the post-assessment test which included the use of the same questionnaire PNKAS that was used to assess their knowledge and attitudes from the beginning. The findings were analyzed to assess the extent of change in their knowledge and attitudes toward neonatal pain assessment and Management’s techniques post educational session’s activities and lectures that were held in the three workshops. Data collection of the post assessment was conducted in a period of two weeks.

Figure (4.1)

The three phases of the cross sectional and intervention study



□

4.6 Study tools

1. The Nurses Knowledge and Attitudes Survey regarding pain (PNKAS): The researcher used the knowledge and attitude questionnaire adopted from the (Asadi-Noghabet al., 2014). The questionnaire included 37 knowledge-based questions; 20 questions related to attitudes. In addition, 6 demographic questions were also added.

The researcher used a binary scale to measure the items of the knowledge and attitudes scores, which consisted of two degrees, distributed as follows: score (2) if the answer is True and score (1) if the answer is False. Level of Knowledge and attitudes were considered according to the average percentage of the respondents answers as follows: Poor ($\leq 50\%$ of total score), Fair (50–75% of the total score), and Good ($\geq 75\%$ of the total score).

2. Modified Pain assessment tool (mPAT): The researcher introduced the multi-dimensional pain assessment tool mPAT that has been validated for surgical and non-surgical neonates from 24 weeks gestation to full term and up to 6-month-old. The mPAT is a modification of the original pain assessment tool PAT scale which was developed and piloted by Hodgkinson, Bear, Thorn & Blaricum, (1994). The scale of this tool was modified by O'Sullivan, Rowley, Ellis, Fasse & Petrie in 2016 and was piloted at the National Women's New Born Intensive Care Unit at Auckland City Hospital in New Zealand.

4.7 Validity and reliability of the questionnaire

The researcher used the tool PNKAS with slight modifications that was reviewed by experts in the field. The PNKAS was valid and reliable and was modified to be used for assessing pain among neonates (Asadi- Noghabi et al., 2014). Further, a pilot study was performed and the internal consistency was measured. The value of Cronbach's alpha for all paragraphs was 74.7 percent, so the study tool was described as being stable, and that the data obtained was suitable for measuring variables, and was subject to a high degree of reliability.

4.8 Data Analysis

Once all the 53 questionnaires were completed, they were coded and numbered, and subsequently distributed onto the Microsoft Excel spreadsheet prior entering the findings on

the computer statistical package (SPSS) for data cleaning. Descriptive analysis was performed to determine the mean, standard deviation, percentages, and frequencies of the of the study variables and the items that measure each variable, for both the pre and the post-study. Further an inferential statistical analysis T-Test was used to determine if there is a significant difference between the means of two tests (pre and post test of the participants knowledge and attitudes).

4.9 Normal distribution test

The normal distribution test was performed for the data collected in order to ensure whether the data fell under the normal distribution or not. The Skewness coefficient values, when extracted, indicated less than the value one which meant that the data was naturally distributed (Doane & Seward, 2011).

Table (4.1) The normal distribution of data based on the skewness coefficient

Items	Pre-test			Post-test		
	Mean	Std.	Skewness	Mean	Std.	Skewness
Knowledge toward pain assessment management	1.441	0.096	0.455	1.511	0.075	0.174-
Attitudes toward pain assessment management	1.283	0.147	0.377	1.453	0.137	0.469

Based on the test data referred to in Table No. (4.1), which showed that the data distribution was normal, as the value of the Skewness coefficient for all study variables reached values less than (1). The following figures show the normal distribution of the study variables.

4.10 Ethical Considerations

- An approval was obtained from the Ethical Research Committee (REC) at Al Quds University to begin the study.
- A permission to conduct the study was obtained from the School of Public Health Research Committee for discussion.
- A permission to access the medical staff in the Neonatal Ward & NICU was obtained from the Executive Committee, Chief Executive Officer, manager of the NICU and Neonatal Ward and the medical director at CBH.
- The participants were informed about the purpose and nature of the study, the voluntary nature of the participation and their right to withdraw from the study at any time. The participants were assured that refusal to be part of the study would not carry any penalties.
- A consent form was presented to and signed by each participant.
- The answers and comments of the participants were kept confidential.

Chapter Five

Results

This chapter provides the findings generated through data analysis using (SPSS). It provides an explanation of the rate of response, sample description, descriptive analysis of the variables and answers of questions.

5.1 Description of demographic variables

This part of the study includes a description of the demographic and personal variables of the study sample, which included 5 variables (gender, age, marital status, years of experience, educational level, and work place).

Table (5.1): Socio-demographic characteristic of the medical staff in NICU at CBH (n=53)

Demographic characteristics		n	(%)
Gender	Male	20	(37.7)
	Female	33	(62.3)
Age Group	< 30 years	21	(39.6)
	30-40 years	16	(30.2)
	41-50 years	13	(24.5)
	≥ 50 years	3	(5.7)
Marital status	Single	15	(28.3)
	Married	38	(71.7)
Years of Experience	< 6 years	20	(37.7)
	6-10 years	8	(15.1)
	11-15 years	8	(15.1)
	16- 20 years	8	(15.1)
	>20 years	9	(17)
Education level	Diploma	21	(39.6)
	Bachelor's Degree	24	(45.3)
	High Diploma NICU	6	(11.3)
	Doctor Specialist	2	(3.8)
Work place	NICU	27	(50.9)
	Neonatal ward	26	(49.1)

Out of 53 medical staff (37.7) percent were male and (62.3) were females. The majority of the medical staff working at NICU and Neonatal ward are young, as the percentage of the sample members whose age is less than 40 years was (69.8). Most of the staff have a Bachelor's Degree of nursing (45.3) and (3.2) are doctor specialist in Pediatrics. The clinical experience of less than 6 years was showed in (37.7) of the medical staff, while the years of experience were distributed equally among the other Categories. The medical staff were distributed equally among the two departments as follows: (50.9) percent in NICU .

5.2 Answers to the study Questions

Q1: Is the level of study sample about knowledge of neonatal pain assessment and management increased post the conducted workshops and mPAT application.

Table (5.2) Descriptive Statistic (Mean & St. Deviation) of the medical staff Knowledge towards Neonatal pain assessment and management

No.	Items	Pre-test		Post-test	
		Mean	Std.	Mean	Std.
1	Do you believe neonates experience more pain than adults?	1.250	0.437	1.339	0.478
2	Do you believe neonates experience less pain than adults?	1.529	0.504	1.566	0.500
3	Is there a pain assessment tool in your unit?	1.231	0.425	1.415	0.497
4	Do you use a pain assessment tool?	1.404	0.495	1.434	0.501
5	Have you used a pain assessment tool in the past or in a previous job?	1.442	0.501	1.547	0.502
6	Is there a pain management guideline in your unit?	1.307	0.466	1.509	0.505
7	Do you have pain management experience?	1.134	0.344	1.528	0.504
8	Neonates who can be distracted from pain usually do not have severe pain	1.451	0.502	1.435	0.500
9	Children sleep in spite of severe pain	1.634	0.486	1.679	0.471
10	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	1.327	0.473	1.415	0.497
11	Respiratory depression rarely occurs in neonates who have been receiving opioids over a period of time	1.519	0.504	1.622	0.489
12	The World Health Organization pain ladder suggests using a single analgesic rather than combining classes of drugs (e.g.,	1.346	0.480	1.396	0.493

	combining an opioid with a non-steroidal agent)				
13	The usual duration of action of Morphine is 4 to 5 hours	1.480	0.504	1.471	0.504
14	After an initial does of opioid analgesic is given, subsequent doses should be adjusted in accordance with the individual patient's response	1.313	0.468	1.377	0.489
15	Neonates respond to drug treatment less than adults	1.673	0.473	1.453	0.502
16	Anti-anxiety drugs, Sedatives, and Barbiturates are suitable for pain relief during painful procedures	1.461	0.503	1.283	0.454
17	Opioids should not be administered for neonate pain relief, due to the high risk of psychological dependence.	1.384	0.491	1.547	0.500
18	Non-pharmacologic methods of pain relief have no applications for neonates	1.557	0.501	1.622	0.502
19	Oral administration of glucose to neonates before painful procedures can reduce pain	1.173	0.382	1.321	0.471
20	Research shows that lapping neonates during a painful procedure does not usually have an effect on the child's pain intensity	1.557	0.501	1.559	0.489
21	Swaddling the neonate during painful procedures causes limitation of motions which results in increased pain	1.519	0.504	1.520	0.505
22	Direct skin contact of mother and neonate is a good way to relieve pain in neonates	1.288	0.457	1.547	0.504
23	Intramuscular injection is the recommended route of administration of opioids for neonates with brief, severe pain of sudden onset as trauma or postoperative pain	1.634	0.486	1.638	0.502
24	Morphine is not used for neonate pain relief due to the risk of respiratory depression	1.442	0.501	1.491	0.503
25	Paracetamol is the most commonly used analgesic in neonates	1.423	0.498	1.477	0.505
26	Nonsteroidal, anti-inflammatory agents are used to relieve mild to moderate pain	1.596	0.495	1.599	0.489
27	Ibuprofen is appropriate for relief of mild pain in neonates	1.615	0.491	1.624	0.504
28	The likelihood of drug addiction is less than 40 percent through use of opioid analgesics for pain relief	1.500	0.504	1.547	0.478
29	When performing a painful procedure, breast feeding will relieve pain in neonates	1.307	0.466	1.549	0.503
30	Neonates do not experience pain	1.764	0.428	1.782	0.502
31	Neonates experience less degree of pain than adults	1.653	0.480	1.671	0.504
32	Analgesia is not critical to neonates because of lack of memory of experiences	1.692	0.466	1.712	0.497
33	Physiological stress to pain can be more dangerous than analgesia side effects	1.196	0.401	1.321	0.494
34	Analgesia is too dangerous to use in neonates	1.333	0.476	1.471	0.500
35	Pain diminishes quicker in newborns than adults	1.372	0.488	1.566	0.504
36	Neonates require less analgesia than adults in relation to body weight	1.374	0.478	1.394	0.471
37	At 26 weeks, the neonate has all the apparatus needed to perceive pain	1.431	0.500	1.476	0.491
	Total	1.441	0.096	1.511	0.075

As indicated in Table (5.2), the mean of the items in the pre-study was (1.441) and after applying the second multidimensional pain assessment tool (mPAT), the mean increased to (1.511) which indicate an increase of (0.07). These results also showed that item No. (32) got the highest mean with a value of (1.782). This Item is about “Analgesia is not critical to neonates because of lack of memory of experiences” after applying the pain assessment tool and pain management guideline these results got the highest mean. While item No. (16) “Anti-anxiety drugs, Sedatives, and Barbiturates are suitable for pain relief during painful procedures” got the lowest arithmetic mean with a value of (1.283).

Table (5.3) Descriptive Statistic (frequency & percentage) of the medical staff Knowledge towards Neonatal pain assessment and management

No.	Items in the questionnaire	True answers number (%)		False answers number (%)	
		Pre	Post	Pre	Post
Q1	Do you believe neonates experience more pain than adults?	35(47.9%)	38(52.1%)	17(56.7%)	13(43.3%)
Q2	Do you believe neonates experience less pain than adults?	23(48.9%)	24(51.1%)	29(51.8%)	27(48.2%)
Q3	Is there a pain assessment tool in your unit?	31(43.7%)	29(56.3%)	21(63.6%)	23(36.4%)
Q 4	Do you use a pain assessment tool?	30(49.2%)	31(50.8%)	21(48.8%)	22(51.2%)
Q5	Have you used a pain assessment tool in the past or in a previous job?	22(46.8%)	25(53.2%)	30(52.6%)	27(47.4%)
Q6	Is there a pain management guideline in your unit?	24(39.3%)	25(60.7%)	28(65.1%)	27(34.9%)
Q7	Do you have pain management experience?	24(42.9%)	32(57.1%)	28(58.3%)	20(41.7%)
Q8	Neonates who can be distracted from pain usually do not have severe pain	30(50.8%)	29(49.2%)	22(50%)	22(50%)
Q9	Children sleep in spite of severe pain	17(47.2%)	19(52.8%)	35(51.5%)	33(48.5%)
Q10	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	30(46.2%)	35(53.8%)	22(56.4%)	17(43.6%)
Q11	Respiratory depression rarely occurs in neonates who have been receiving opioids over a period of time	20(45.5%)	24(54.5%)	32(53.3%)	28(46.7%)
Q12	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)	31(47.7%)	34(52.3%)	21(53.8%)	18(46.2%)
Q13	The usual duration of action of Morphine is 4 to 5 hours	27(50%)	27(50%)	25(50%)	25(50%)
Q14	After an initial does of opioid analgesic is given,	32(45.7%)	38(54.3%)	20(60.6%)	13(39.4%)

	subsequent doses should be adjusted in accordance with the individual patient's response				
Q15	Neonates respond to drug treatment less than adults	29(48.3%)	31(51.7%)	23(51.1%)	22(48.8%)
Q16	Anti-anxiety drugs, Sedatives, and Barbiturates are suitable for pain relief during painful procedures	27(49.1%)	28(50.9%)	25(51%)	24(49%)
Q17	Opioids should not be administered for neonate pain relief, due to the high risk of psychological dependence.	30(48.4%)	32(51.6%)	23(53.5%)	20(46.5%)
Q18	Non-pharmacologic methods of pain relief have no applications for neonates	24(51.1%)	23(48.9%)	29(50%)	29(50%)
Q19	Oral administration of glucose to neonates before painful procedures can reduce pain	38(53.5%)	43(46.5%)	15(62.5%)	9(37.5%)
Q20	Research shows that lapping neonates during a painful procedure does not usually have an effect on the child's pain intensity	22(50%)	22(50%)	31(50.8%)	30(49.2%)
Q21	Swaddling the neonate during painful procedures causes limitation of motions which results in increased pain	26(51%)	25(49%)	27(50%)	27(50%)
Q22	Direct skin contact of mother and neonate is a good way to relieve pain in neonates	26(46.4%)	30(53.6%)	27(55.1%)	22(44.9%)
Q23	Intramuscular injection is the recommended route of administration of opioids for neonates with brief, severe pain of sudden onset as trauma or postoperative pain	25(53.2%)	22(46.8%)	28(48.2%)	30(51.3%)
Q24	Morphine is not used for neonate pain relief due to the risk of respiratory depression	24(45.3%)	29(54.7%)	29(55.8%)	23(44.2%)
Q25	Paracetamol is the most commonly used analgesic in neonates	28(48.3%)	30(51.7%)	25(53.2%)	22(46.8%)
Q26	Nonsteroidal, anti-inflammatory agents are used to relieve mild to moderate pain	26(55.3%)	21(44.7%)	27(46.6%)	31(53.4%)
Q27	Ibuprofen is appropriate for relief of mild pain in neonates	23(54.8%)	19(45.2%)	30(47.6%)	33(52.4%)
Q28	The likelihood of drug addiction is less than 40 percent through use of opioid analgesics for pain relief	26(51%)	25(49%)	27(50%)	27(50%)
Q29	When performing a painful procedure, breast feeding will relieve pain in neonates	35(49.3%)	36(50.7%)	18(52.9%)	16(47.1%)
Q30	Neonates do not experience pain	24(45.3%)	29(54.7%)	29(47.5%)	32(52.5%)
Q31	Neonates experience less degree of pain than adults	26(55.3%)	21(44.6%)	27(46.6%)	31(53.4%)
Q32	Analgesia is not critical to neonates because of lack of memory of experiences	27(61.4%)	17(38.6%)	26(42.6%)	35(57.4%)
Q33	Physiological stress to pain can be more dangerous than analgesia side effects	32(46.4%)	37(53.6%)	21(56.8%)	16(43.2%)
Q34	Analgesia is too dangerous to use in neonates	22(45.8%)	26(54.2%)	31(53.4%)	27(46.6%)
Q35	Pain diminishes quicker in newborns than adults	28(46.7%)	32(53.3%)	25(56.8%)	19(43.2%)
Q36	Neonates require less analgesia than adults in relation to body weight	28(46.7%)	32(53.3%)	25(56.8%)	19(43.2%)
Q37	At 26 weeks, the neonate has all the apparatus needed to perceive pain	33(53.2%)	29(46.8%)	20(47.6%)	22(52.4%)
	Average	48.8 %	52.2 %		

In this table the average score of percentage for the medical staff knowledge was 48.8% before the workshops and the introduction of the mPAT ,which indicate poor knowledge of pain assessment among the medical staff at CBH. However, In the post test the average score of percentage was slightly elevated to 52.2 which is considered fair according to the score provided by the PNKAS tool (Poor ($\leq 50\%$ of total score), Fair ($50-75\%$ of the total score), and Good ($\geq 75\%$ of the total score)).

These results indicated that there is, in general, a change in the levels of knowledge of the medical staff toward pain assessment management, after conducted an intervention study to modify the current practices of the medical staff at CBH. Percentage was increased and is evident in most of the items describing the element of knowledge.

Q2: Is the study sample attitudes about neonatal pain management changed after applying the pain management tool (mPAT)?

Table (5.4): Descriptive Statistic (Mean & St. Deviation) of the medical staff Attitudes toward Neonatal pain assessment management

No.	Items	Pre-test		Post-test	
		Mean	Std.	Mean	Std.
1	Neonates and children experience pain equal to that experienced by adults	1.358	0.496	1.408	0.484
2	Parents should not be present during painful procedures	1.367	0.487	1.471	0.504
3	Pain management and pain relief are of priority in neonates treatment	1.102	0.306	1.320	0.471
4	Neonates have the right to appropriate assessment and management of their pain	1.416	0.498	1.434	0.500
5	The most accurate judge of the intensity of the neonate's pain is the her/his primary nurse	1.377	0.421	1.224	0.489
6	Full treatment of pain is a humanitarian issue	1.250	0.437	1.490	0.504
7	To better assess neonate pain, the nurse can discuss with her/his parents	1.453	0.421	1.225	0.502
8	Assessment and control of neonate pain led to improved his/her parent's satisfaction	1.204	0.431	1.509	0.504

9	Failure to assess and manage the neonate's pain affects his body and mind in the long term	1.367	0.487	1.452	0.503
10	The nurse's physical and mental fatigue can affect neonate pain relief	1.244	0.434	1.453	0.502
11	Like other vital signs, pain scores should be documented	1.306	0.465	1.434	0.500
12	To ensure patient's comfort and pain relief is one of the most important tasks of nurses	1.191	0.397	1.491	0.505
13	Communicating with and educating neonate's parents play an effective role in relieving pain	1.224	0.421	1.509	0.505
14	Available tools for measurement of pain are the best for determining pain severity in neonate	1.208	0.410	1.577	0.498
15	When the necessary procedures have been done for the patient, the persistence of pain does not cause problems	1.510	0.505	1.509	0.504
16	Using pain assessment tools for determining neonate's pain led to an appropriate method of pain relief	1.122	0.331	1.302	0.463
17	Measurement/control of neonate's pain can affect the healing process and reduces the hospital stay	1.123	0.332	1.528	0.503
18	Measurement and control of neonate's pain can improve clinical outcome.	1.229	0.424	1.529	0504
19	Comparable stimuli in different people produce the same intensity of pain	1.612	0.492	1.528	0.503
20	Measurement and control of pain in neonate leads to improved quality of neonate's life	1.333	0.476	1.339	0.478
	Total	1.299	0.147	1.436	0.137

Results showed that the mean of the attitude items in the pre-test was (1.299), and after applying the workshops and the mPAT, the mean increased to (1.436), Increase amounted (0.13). The results in the previous table also show that item No. (14) "Available tools for measurement of pain are the best for determining pain severity in neonate pain" got the highest mean with a value of (1.577) after applying the pain assessment tool and pain management guideline.

Table (5.5): Descriptive Statistic (frequency & percentage) of the medical staff Attitudes toward Neonatal pain assessment management

No.	Items	True answers n (%)		False answers n (%)	
		Pre	Post	Pre	Post
1	Neonates and children experience pain equal to that experienced by adults	29(46%)	34(54%)	20(51.3%)	19(48.7%)
2	Parents should not be present during painful procedures	25(48.1%)	27(51.9%)	24(48%)	26(52%)
3	Pain management and pain relief are of priority in neonates treatment	28(43.7%)	36(56.3%)	21(55.2%)	17(44.8%)
4	Neonates have the right to appropriate assessment and management of their pain	28(48.3%)	30(51.7%)	21(47.7%)	23(52.3%)
5	The most accurate judge of the intensity of the neonate's pain is the her/his primary nurse	37(51.4%)	35(48.6%)	12(40%)	18(60%)
6	Full treatment of pain is a humanitarian issue	34(48.6%)	36(51.4%)	15(48.4%)	16(51.6%)
7	To better assess neonate pain, the nurse can discuss with her/his parents	34(53.1%)	30(46.9%)	15(39.5%)	23(60.5%)
8	Assessment and control of neonate pain led to improved his/her parent's satisfaction	38(48.1%)	41(51.9%)	11(50%)	11(50%)
9	Failure to assess and manage the neonate's pain affects his body and mind in the long term	32(53.3%)	28(46.7%)	17(40.5%)	25(59.5%)
10	The nurse's physical and mental fatigue can affect neonate pain relief	32(51.6%)	30(48.4%)	17(42.5%)	23(57.5%)
11	Like other vital signs, pain scores should be documented	28(48.3%)	30(51.7%)	21(47.7%)	23(52.3%)
12	To ensure patient's comfort and pain relief is one of the most important tasks of nurses	25(47.1%)	28(52.9%)	24(48.9%)	25(51.1%)
13	Communicating with and educating neonate's parents play an effective role in relieving pain	24(48%)	26(52%)	25(48.1%)	27(51.9%)
14	Available tools for measurement of pain are the best for determining pain severity in neonate	23(48.9%)	24(51.1%)	26(57.7%)	28(42.3%)
15	When the necessary procedures have been done for the patient, the persistence of pain does not cause problems	24(49%)	25(51%)	25(47.2%)	28(52.8%)
16	Using pain assessment tools for determining neonate's pain led to an appropriate method of pain relief	35(48.6%)	37(51.4%)	14(46.6%)	16(53.4%)
17	Measurement/control of neonate's pain can affect the healing process and reduces the hospital stay.	18(40.9%)	26(59.1%)	31(53.4%)	27(46.6%)
18	Measurement and control of neonate's pain can improve clinical outcome.	19(42.2%)	26(57.3%)	30(52.6%)	27(47.4%)
19	Comparable stimuli in different people produce the same intensity of pain	19(45.2%)	23(54.8%)	30(50%)	30(50%)
20	Measurement and control of pain in neonate leads to improved quality of neonate's life	28(45.2%)	34(54.8%)	21(52.5%)	19(47.5%)
	Average	46.2%	52.3%		

In this table the average score of percentage for the medical staff attitudes was 46.2% before the workshops and the introduction of the mPAT ,which indicate poor knowledge of pain assessment among the medical staff at CBH. However, In the post test the average score of percentage was slightly elevated to 52.3 which is considered fair according to the score provided by the PNKAS tool. Results also showed changes in the levels of the medical staff attitudes toward pain assessment in each item of the attitudes scale. The highest percentage of change in the attitudes level was related to the item number (17) about the extent of the role of Measurement/control of neonate’s pain on the healing process and duration of the hospital stay, where the percentage change amounted to (15.1%). The number of those who answered true before applying the pain management tool was (18) person while this number increased to (26) after applying the tool. Further, the Item number (3) about “Pain management and pain relief are of priority in neonates’ treatment?” showed high percentage of change. The number of those who answered true before applying the pain management tool was (28) person while this number increased to (36) after applying the tool.

Q3a Is there a statistically significant difference at the level ($0.05 \geq \alpha$) for Knowledge and before and after applying pain assessment tool?

To verify if there is a statistically significant difference at the level ($0.05 \geq \alpha$) for Knowledge before and after applying pain assessment tool the researcher used inferential statistics T test.

Table (5.6) Differences in the mean of Knowledge before and after applying pain assessment tool.

	Mean	Std.	t	Df	Sig.
Pre- test	1.441	0.096	4.100	52	0.000*
Post-test	1.511	0.075			

Results in table (5.6) showed that there is a statistically significant difference at the level ($0.05 \geq \alpha$) for Knowledge items before and after applying the workshop and pain assessment tool. Where the value of (t) was a statistical function with a value of (4.100), and the significance level is (0.000) which is less than (0.05). The results also showed that the differences are in the interest of the post test, where the arithmetic mean of the posttest reached (1.511), which is higher than the arithmetic mean of the pre-test which reached (1.441).

Q3.b: Is there a statistically significant difference at the level ($0.05 \geq \alpha$) for Attitudes before and after applying pain assessment tool?.

To verify if there is a statistically significant difference at the level ($0.05 \geq \alpha$) for attitudes before and after applying pain assessment tool the researcher used inferential statistics T test.

Table (5.7) Differences in the mean of the Attitudes before and after applying pain assessment tool

	Mean	Std.	t	Df	Sig.
Pre- test	1.299	0.147	5.682	52	0.000*
Post-test	1.436	0.137			

Results in table (5.7) show that there is a statistically significant difference at the level ($0.05 \geq \alpha$) for Attitudes items before and after applying pain assessment tool. Where the value of (t) was a statistical function with a value of (5.682), and the significance level is (0.000) which is less than (0.05). The results also showed that the differences are in the interest of the post test, where the arithmetic mean of the post_test reached (1.436), which is higher than the arithmetic mean of the pre-test which reached (1.299).

Q4.a: Is there statistically significant differences at the level ($\alpha \leq 0.05$) in the averages of the study sample participants regarding the knowledge toward pain assessment and management that are attributable to the variables (gender, age, marital status, educational level, work place, experience)?

Table (5.8): Results of ANOVA analysis of knowledge toward pain assessment management attributed to personality variables

		Sum of square	Df	Mean square	F	Sig.
Gender	Within groups	4.197	13	0.323	1.572	0.141
	Between groups	7.190	35	0.205		
	Total	11.388	48			
Age	Within groups	8.763	13	0.674	0.785	0.670
	Between groups	30.054	35	0.859		
	Total	38.816	48			
Marital status	Within groups	1.996	13	0.154	0.760	0.694
	Between groups	7.065	35	0.202		
	Total	9.061	48			
educational level	Within groups	17.835	13	1.372	2.042	0.046
	Between groups	23.512	35	0.672		
	Total	41.347	48			
work place	Within groups	3.281	13	0.252	0.990	0.480
	Between groups	8.923	35	0.255		
	Total	12.204	48			
Experience	Within groups	24.307	13	1.870	0.745	0.708
	Between groups	87.815	35	2.509		
	Total	112.122	48			

The data in Table No. (5.8) indicates that there is no statistically significant differences in the knowledge toward pain assessment and management that attributed to the variables (gender, age, marital status, work place, experience). It was evident by the decrease in the calculated (F) values, which amounted to (1.572, 0.785, 0.760, 0.990, 0.745) respectively. These findings were less than their tabular values due to the significance level which is more than (0.05). The data revealed statistically significant differences in the knowledge toward pain assessment and management. Such differences were attributed to the

educational level variable as evident by the high values of (F) calculated at (2.042), which is more than its tabular value, and due to the significance level, which is less than (0.05).

Q4.b : Is there a statistically significant differences at the level ($\alpha \leq 0.05$) in the averages of the study sample respondents about the Attitudes toward pain assessment management, attributable to the variables (gender, age, marital status, educational level, work place, experience)?

Table (5.9): Results of ANOVA analysis of Attitudes toward pain assessment and management attributed to personality variables

		Sum of square	Df	Mean square	F	Sig.
Gender	Within groups	3.541	11	0.322	1.481	0.189
	Between groups	6.738	31	0.217		
	Total	10.279	41			
Age	Within groups	9.916	11	0.901	1.357	0.242
	Between groups	20.595	31	0.664		
	Total	30.512	41			
Marital status	Within groups	3.294	11	0.299	1.733	0.112
	Between groups	5.357	31	0.173		
	Total	7.651	41			
educational level	Within groups	11.532	11	1.048	1.176	0.342
	Between groups	27.631	31	0.891		
	Total	39.163	41			
Experience	Within groups	5.113	11	0.465	2.559	0.020
	Between groups	5.631	31	0.182		
	Total	10.744	41			
Work place	Within groups	22.844	11	2.077	1.002	0.467
	Between groups	64.226	31	2.072		
	Total	87.070	41			

The data in Table No. (5.9) indicated that there were no statistically significant differences in the Attitudes toward pain assessment and management attributed to the variables (gender, age, marital status, educational level, work place), as evidenced by a decrease in the calculated (F) values, which amounted to (1.481, 1.357, 1.733, 1.176, 1.002) respectively. The findings were less than their tabular values, and due to the significance level, which is more than (0.05). However, the statistical data indicated in the same table

revealed statistically significant differences in the Attitudes toward pain assessment and management attributed to the variable (experience), as evidenced by the high values of (F) calculated (2.559), which is more than its tabular value, and due to the significance level, which is less than (0.05).

Chapter six

Discussion of findings

6.1 introduction

This chapter explains and discusses the research findings and conclusions as well as makes recommendations based on the results obtained in chapter four.

6.2 Knowledge of the staff toward pain assessment and management tool (mPAT)

Results of this study indicated that the mean of knowledge toward pain assessment management before applying the workshop and the modified pain assessment tool (mPAT) was (1.441) which mean that participants did not have sufficient knowledge about neonatal pain management, and this was also evident through the discussions and questions raised by the participants during the presentation of the workshop that was conducted on this topic. Results also showed an increase in the mean of the participants knowledge toward pain assessment management to (1.511) after applying the modified pain assessment tool (mPAT).

These findings showed a statistically significant difference between the means in the pre and post-test in the interest of the post test, where the P value was less than (0.05). These results are found to be congruent with the study of Christoffel (2017), which reported that the utilization of effective pain management in neonates is largely influenced by the knowledge of the neonatal medical staff regarding the essential tool used to assess the neonatal feelings of pain. Although the percentage of increase for knowledge towards pain assessment and management post (mPAT) tool utilization was low (0.07), but it reflected an indication of the potential effectiveness of applying the mPAT tool in increasing the awareness of doctors and nurses about pain assessment and management in the future. In addition, it might enhance the administrators of different Palestinian hospital to increase the awareness and knowledge of

their staff about this tool and to be used as essential policy in the NICU of the Palestinian hospitals in the future.

Changes in the levels of knowledge of the study participants toward pain assessment management, after conducting the workshops to modify the current practices of the medical staff at CBH toward the pain assessment and management of neonates was evident in most of the items assessing knowledge. However, the highest percentage of change in the level of knowledge was related to the extent of the participants experience on pain management. The percentage of change was about (%15.1). When the participants were asked “Do you have pain management experience?”. The number of those who answered that they had experience before applying the pain management tool was (24) person while this number increased to (32) after applying the tool, which mean that the knowledge of (8) person out of 53, has changed towards this item. This indicate that a Considerable clinical experience is needed to interpret physiological signs and symptoms in neonates and a formal tool of pain assessments is recommended (Association of Paediatric Anaesthetists of Great Britain and Northern Ireland 2008).

Moreover, in the item that assess the adjusting use of opioid analgesic dose, the percentage of change was increased by (%11.3) after applying the tool. When the participants were asked “After an initial does of opioid analgesic is given, subsequent doses should be adjusted in accordance with the individual patient’s response?”. The number of those who answered true before applying the pain management tool was (32) person while this number increased to (38) after applying the tool, which mean that the knowledge of (6) person only out of 53, has changed towards this item. This means that the respondents were not knowledgeable about neonatal analgesia. This result was in congruent with the study of Mackenzie (2006), which showed that despite receiving little relevant education about pain management of neonates only 19 out of 137 nurses stated that they had knowledge about this

topic, suggesting that neonatal pain and analgesia are not prioritized in the care provided by nurses at the neonatal care units.

However, changing the knowledge of the medical staff at NICU about some aspects related to pain management in neonates indicate more emphasis and education sessions about the usual duration of action of Morphine and the non-pharmacologic methods of pain relief. Moreover, they need to understand that swaddling the neonate during painful procedures causes limitation of motions which results in increased pain (Dezhdar, Jahanpour, Bakht, & Ostovar, 2016). This requires the necessity of explaining the tool more to the medical staff in these aspects and activating more the practical practice of the pain management tool. It is worth mentioning that Item number (16) got the lowest mean with a value of (1.283). It stated that “Anti-anxiety drugs, Sedatives, and Barbiturates are suitable for pain relief during painful procedures”. The lowest mean for this item could be related to the poor experience of the medical staff concerning pharmacological intervention, this item is mainly a physicians and pharmacists interesting.

On the other side, the results showed an increase in the percentage of the medical staff correct answers after conducting the workshops. It was 48.2% before the intervention and becomes 52.2 after the workshops and the introduction of the mPAT. According to Asadi-Noghabi et al., (2014), and the score of the scale used in this study, Knowledge of the participants toward pain among neonates was increased from Poor knowledge to Fair knowledge.

However, it was noticed that knowledge of the medical staff in some aspects related to pain management in neonates, did not change at all, or showed a little change after applying the tool. These aspects include (1) The usual duration of action of Morphine. (2) Neonates who can be distracted from pain usually do not have severe pain. (3) Non-pharmacologic methods of pain relief have no applications for neonates. And (4) Swaddling the neonate

during painful procedures causes limitation of motions which results in increased pain. (5) anti-anxiety drugs, sedatives and barbiturates are suitable for pain relief during pain procedures. The possible explanation for these results is that the teaching activities in the workshops did not cover all these topics in details. The researcher didn't concentrate on these items as the decision for the administration of the pharmacologic drugs is only done by the neonatologist. These items that did not show any changes in the medical staff knowledge might be related to the condensed information provided in each workshop and the short duration of the teaching activities so the medical staff didn't have the ability to grasp all the presented material regarding pain assessment and management and this arises the essential and crucial needs for conducting further neonatal workshops to confirm their understanding.

6.3 Attitudes of the staff toward pain assessment and management tool (mPAT)

Results of this study indicated that the mean of attitudes toward pain assessment management before applying the modified pain assessment tool (mPAT) was (1.299) which mean that the medical staff at the CBH have negative attitudes toward neonatal pain management, and this was also evident through the discussions and questions raised by the participants during the presentation of the workshop that was conducted on this topic. The results also show that the mean of the attitudes toward pain assessment management increased to (1.436) after applying the modified pain assessment tool (mPAT). Although the percentage of increase for attitudes towards pain assessment and management post (mPAT) tool utilization was low (0.13), but it reflected the effectiveness of applying the (mPAT) tool in the Palestinian hospitals and subsequently increasing the awareness of doctors and nurses about pain assessment and management in the future. These findings showed a statistically significant difference between the means of the attitudes in the pre and post-test in the interest of the post test, where the P value was less than (0.05).

The highest percentage of change in the level of attitudes among the participants was related to the item about the extent of the role of measurement and control of neonate's pain on the healing process and reduce duration of hospital stay, where the percentage change was (%15.1). When the participants were asked about "Measurement and control of neonate's pain can affect the healing process and reduces the hospital stay?". The number of those who answered true before applying the pain management tool was (18) person while this number increased to (26) after applying the tool, which mean that the attitudes of (8) person out of 53, has changed towards this item. This result was similar to the study of Mehrnoush et al (2017) which confirms that implementation of pain management tool in NICU entails changes in perception and attitudes of the medical personnel.

The medical staff believed that Pain management and pain relief are not of priority in neonates' treatment, but after being briefed and explaining all the details about pain management to them, it was found that these attitudes were changed and the percentage of change was only (15.1%) after applying the tool. However, failure of the medical staff to prioritize neonatal pain management might be related to the lack of knowledge, lack of time, uncertainty about the needs of this method, and concerns that pain assessment tool might measure sub-cortical reflexes rather than neonates' conscious perception of pain (Slater et al. 2010).

The current study also showed a little change of (1.8%) in the attitudes of the participants toward certain aspects related to pain management in neonates after applying the mPAT tool. These aspects were about believing that the available tools for measurement of pain are the best for determining severity of pain in neonate. and that persistence of pain does not cause a problem when the procedure to be done is necessary for the neonates. This little percentage of change requires the necessity of explaining the tool more to the medical staff in these aspects and activating more the practical practice of the pain management tool. These

findings are coincided with a study of Asadi- Noghabi et al., (2014), which concluded that underutilization and inconsistent application of pain management tools might adversely affect the quality of care provided to the neonates, thus neonatal pain remains unrecognized adequately. According to Asadi- Noghabi et al., (2014), attitudes of doctors and nurses can be changed after applying pain management tool for neonate and therefore measuring and controlling pain can improve quality of care provided in the NICU.

. It was seen in some items of the knowledge and attitudes scale that there is a little change in the post test. This little change could be related the medical staff and their believes about the effectiveness of the pain assessment tool and its essential use in determining pain management to protect the central nervous system of neonates. According to Walker,2014 , neonates have the right to appropriate assessment and management of their pain. However the presenter highlighted that pain assessment and pain management as an ethical and humanitarian consideration. It was reported that failure to assess and manage neonate's pain affects the body and mind in the long term (Polkki and Laukkala (2018). This was specifically clarified several times to the medical staff in the workshop in regards to its significant effect on the neonatal neurodevelopmental outcome and can cause short- and long-term effects upon their health. Although a little change was seen in the medical staff knowledge and attitudes as related to the mean of the scale before and after the intervention, but this change was significant. Which can be said that the medical staff got some benefit from the workshops and the introduction of the mPAT to CBH

6.4 Association of sociodemographic characteristics with knowledge

Results of this study indicated that there is a statistically significant differences in the knowledge of medical staff (sample members) toward pain assessment management attributed to the educational level variable. But there is no statistically significant differences in the knowledge of medical staff toward pain assessment and management that attributed to

the variables (gender, age, marital status, work place, experience). This can be explained by the fact that the knowledge possessed by the medical staff is usually related to their educational level. Thus, there is a positive relationship between knowledge and educational level, as the higher educational level of doctors and nurses leads to an increase in their knowledge of the medical tools used at work, including the pain management tool. This result agreed with the study of Mlambo, Sklen, McGrath (2021), which showed that continuing education is necessary to develop nurses' professional work and increased their satisfaction.

Moreover, knowledge of medical staff toward pain assessment technique will not necessarily be affected by gender or age or marital status. perhaps what might make a difference is being oriented to this policy or the administrator's adoption and utilization of this tool. This is also congruent with the study of AbuBaker, Salim et al (2019) which showed no significant relationship between knowledge toward pain management and the sociodemographic characteristics of the participants as (gender, age, marital status) for registered Nurses in the Governmental Hospitals in Dubai, UAE.

6.5 Association of sociodemographic characteristics with attitudes

Results of this study showed that there is a statistically significant difference in the attitudes toward pain assessment and management among neonates attributed to the experience of the medical staff working at the neonatal ward of CBH. It is logical to see a positive relationship between Attitudes and experience level, as the higher experienced doctors and nurses leads to a change in their Attitudes for applying medical tools, such as pain management tool. This result agreed with the results of Ejeh et al (2020) study which show that there is a significant relationship between Attitudes and experience level for healthcare workers in Nigeria.

Results of this study also indicated that there were no statistically significant differences in the attitudes toward pain management attributed to the variables (gender, age, marital status, educational level). This mean that attitudes toward pain management possessed by the medical staff is usually not related to their age or gender or marital status or educational level, but it related directly with their experience. This result agreed with the results of AbuBaker, Salim et al (2019) study which show that there is no significant relationship for Attitudes toward pain management and variables (gender, age, marital status, educational level) for Registered Nurses in the Governmental Hospitals in Dubai, UAE.

Chapter seven

Conclusions and Recommendations

7.1 Conclusion

This study was conducted at the NICU of CBH to assess the level of knowledge and attitudes of the medical staff working at these units. Results of this study provide basis for the use of pain assessment and management techniques through the introduction of the (mPAT) tool. It highlights the level of knowledge and attitudes of the medical staff toward pain assessment and management. It's worth mentioning that level of education of the medical staff showed a significant relation with their knowledge about the pain assessment and management of neonates. Moreover, years of experience showed a positive relation with the medical staff attitudes toward pain assessment and management of neonates.

The study reached a number of results which led to several recommendations that would improve the medical staff's awareness of the importance of assessing pain, identifying the appropriate tool and applying it in a timely and correct manner to maximize positive outcomes to alleviate the pain and improve quality of care.

7.2 Recommendations

Based on the findings, the study recommends the following:

1. The Palestinian hospital administration needs to consider promoting training and awareness programs for doctors and nurses about current and potential pain assessment and management tools.
2. Encourage the use of neonatal pain assessment and management tools for their effects on promoting quality of care, improving healing process and reduction of the hospital stay, thus an increase of the parents' satisfaction with the hospital's medical services.

3. Conduct studies that focus on addressing the barriers to effective pain management including concerning workload, shortage of personnel, lack of knowledge, absence of pain management protocols, lack of time, and lack of trust in the pain assessment tools.
4. To implement workshops for the NICU's medical staff to modify the current pain assessment and management policies.
5. To conduct further studies, either observational or qualitative, to evaluate the participants' use of the (mPAT).

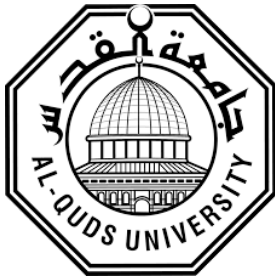
References

- AbuBaker N. A, Salim N. A, Joshua R, Jose A. (2019). Registered Nurses' Perception about Pain Management of Hospitalized Patients in One of the Governmental Hospitals in Dubai, UAE: A Cross-Sectional Study, *Dudai Medical Journal* 2, 102-106.
- Afifi T (2019). Assessment and Management of Neonatal Pain at Neonatal ICUs in Gaza Strip, Palestine: A Multicenter Clinical Audit, *EC Pediatrics*, 8, 820-827.
- Afifi T, Alaqad A, Abu-Alhatel H, Elblbessy M, Obeid M, Abed S, Bottcher B, Elessi K (2018). Assessment and Management of Neonatal Pain at Neonatal ICUs in Gaza Strip, *EC Paediatrics* 8, 820-827.
- Agakidou, E., Tsoni, K., Stathopoulou, T., Thomaidou, A., Farini, M., Kontou, A., . . . Sarafidis, K. (2021). Changes in Physicians' Perceptions and Practices on Neonatal Pain Management Over the Past 20 Years. A Survey Conducted at Two Time-Points. *Frontiers in pediatrics*, 9, 529.
- Akuma A. O & Jordan S (2011). Pain management in neonates: a survey of nurses and doctors, *Journal of Advanced Nursing*, 1288-1301.
- Alburaey A. M, Al-Qurashi F. O, Aljohar A. Y, et al (2020). Pain Assessment and Management in Neonatal Intensive Care Units in the Eastern Province of Saudi Arabia: A Survey of Doctors and Nurses. *Saudi J Med Med Sci*, 8(2),140-145.
- American Academy of Pediatrics, Committee on Fetus and Newborn and Section on Surgery, Section on Anesthesiology and Pain Medicine, Canadian Pediatric Society, Fetus and Newborn Committee. *Pediatrics* Nov 2006, 118 (5) 2231-2241.
- Anand K.J.S (2017). Defining pain in newborns: need for a uniform taxonomy?, *Acta Paediatr.* 106(9):1438-1444.
- Anand K.J.S, Aranda J. V, Berde C. B, Buckman S. et al (2006). Summary proceedings from the neonatal pain-control group, *Pediatrics* 117, 9-22.
- Asadi-Noghabi F, Tavassoli-Farahi M, Yousefi H, Sadeghi, T (2014). Neonate pain management: what do nurses really know?, *Glob J Health Sci*, 6(5), 284-293.
- Britto, C. D., Rao S, Nesarg S, Nair S, Rao Sh, ,Thilagavathy T, Ramesh A, and Bhat S. (2014). Pain-Perception and Assessment of Painful Procedures in the NICU. *Journal of tropical pediatrics*, 60(6), 422-427.
- Burns, N. and Grove, S.K. (2005). *The Practice of Nursing Research: Conduct, Critique and Utilization*. 5th Edition, Elsevier Saunders, Missouri.
- Byrd P, Gonzales I, Parsons V (2009). Exploring barriers to pain management in newborn intensive care units: A pilot survey of nicu nurses. *Advances in Neonatal Care*, 9(6), 299-306.
- Carbajal R, Rousset A, Danan C, Coquery S, Nolent P, Ducrocq S, Saizou C et al (2008). Epidemiology and treatment of painful procedures in neonates in intensive care units. *JAMA*. 300(1), 60-70.
- Christoffel M. M, & Castral T. C, Dare M. F, Montanholi L. L, Gomes A. L, Scochi C. G (2017). Attitudes of healthcare professionals regarding the assessment and treatment of neonatal pain. *Escola Anna Nery*, 21(1), 1-8.

- Cong X, McGrath J.M, Cusson R.M, Zhang D (2013). Pain assessment and measurement in neonates: An updated review, *Advances in Neonatal Care*, 13 (6), 379-395,
- Craig J. A. (2014). **Nursing Knowledge and Attitudes toward Pain Management**, master Theses, Gardner-Webb University.
- Dezhdar, S., Jahanpour, F., Bakht, S. F., & Ostovar, A. (2016). The effects of kangaroo mother care and swaddling on venipuncture pain in premature neonates: A randomized clinical trial. *Iranian Red Crescent Medical Journal*, 18(4).
- Dodds E (2003). Neonatal procedural pain: A survey of nursing staff, *Pediatric Nursing*, 15(5), 18-21.
- Ejeh F. E, Saidu A. S, Owoicho S. et al (2020). Knowledge, attitude, and practice among healthcare workers towards COVID-19 outbreak in Nigeria, *Heliyon* 6, 1-10.
- Grunau R. E, Cepeda I. L, Chau C. M. Y, Brummelte S et al (2013). Neonatal Pain-Related Stress and *NFKBIA* Genotype Are Associated with Altered Cortisol Levels in Preterm Boys at School Age, *PLoS One*. 8(9), 1-10.
- Hall R & Anand K (2014). Pain Management in Newborns, *Clin Perinatol*, 41(4), 895-924.
- Jeong, I.S, et al (2014). Perceptions on pain management among Korean nurses in neonatal intensive care units. *Asian Nurs Res (Korean SocNursSci)*, 8(4).
- Johnston C. C, Fernandes A. M, Campbell-Yeo M (2011). Pain in neonates is different, *Pain* 152, 65-73.
- Maciel, H. I. A., Costa, M. F., Costa, A. C. L., Marcatto, J. d. O., Manzo, B. F., & Bueno, M. (2019). Pharmacological and nonpharmacological measures of pain management and treatment among neonates. *Revista Brasileira de terapia intensiva*, 31, 21-26.
- Mackenzie A. (2006) Guideline statements on the management of procedure-related pain in neonates, children and adolescents. *Journal of Paediatrics and Child Health* 42, 14–15.
- Marchant A (2014). Neonates do not feel pain?: a critical review of the evidence, *The International Journal of Student Research*, Volume 7.
- Mehrnoush N, Ashktorab T, Heidarzadeh M, Momenzadeh S.K.J. (2017). Pain Management Perceptions of the Neonatal Nurses in NICUs and Neonatal Units in Ardebil, Iran. *Iran J. Neonatol*, 8, 5–12.
- Mlambo M, Sklen C, McGrath C. (2021). Lifelong learning and nurses' continuing professional development, a met synthesis of the literature, *BMC Nursing*, 20(62), 1-13.
- O'Sullivan, A. T., Rowley, S., Ellis, S., Faasse, K., & Petrie, K. J. (2016). The validity and clinical utility of the COVERS scale and pain assessment tool for assessing pain in neonates admitted to an intensive care unit. *The Clinical journal of pain*, 32(1), 51-57.
- Palestinian Ministry of Health. (2019). "National Neonatal Protocol A Manual of Neonatal Care in Palestine". (2020, April). <https://www.pmc.ps>

- Polkki T, Korhonen A & Laukkala H (2018). Nurses' perceptions of pain assessment and management practices in neonates: a cross-sectional survey, *Scand J Caring*. 32(2), 725-733.
- Porter F, Wolf C, Gold J, Lotsoff D, Miller J (1997). Pain and Pain Management in Newborn Infants: A Survey of Physicians and Nurses. *Pediatrics* 100. 626-232.
- Rouzan I. A (2001). An analysis of research and clinical practice in neonatal pain management, *Journal of the American Academy of Nurse Practitioners*, 13(2), 57–60.
- Schultz M, Loughran-Fowlds A, Spence K (2010). Neonatal pain: a comparison of the beliefs and practices of junior doctors and current best evidence, *Journal of Pediatrics and Child Health*, 46(1-2), 23-28.
- Simons S.H.P, Dijk M, Anand K.S, Roofthoof D, Lingen R. A, Tibboel D (2003). Do We Still Hurt Newborn Babies? A Prospective Study of Procedural Pain and Analgesia in Neonates. *Arch Pediatr Adolesc Med*. Vol.157, 1058–1064.
- Simons S.H. P & Tibboel D (2006). Pain perception development and maturation, *Semin Fetal Neonatal Med*, 11(4), 227-231.
- Slater R., Cornelissen L., Fabrizi L., Patten D., Yoxen J., Worley A., Boyd S., Meek J. & Fitzgerald M. (2010) Oral sucrose as an analgesic drug for procedural pain in newborn infants: a randomised controlled trial. *The Lancet* 376(9748), 1225–1232.
- Suciu L. M, Cucerea M, Simon M, Avasiloaiei A, Petrescu O, Andrei S. B (2015). Health Care Professional's Attitude Towards the Effective Management of Pain in the Critically Ill Neonate, *The Journal of Critical Care Medicine*, 1(3), 107-112.
- Te Pas, A. B. (2017). Improving neonatal care with technology. *Frontiers in pediatrics*, 5, 110.

APENDIX (A)



AL-QUDS UNIVERSITY

School of Public Health

Questionnaire

This study entitled, "Evaluating the Use of Neonatal Pain Assessment Tool and Management at Caritas Baby Hospital: An Intervention study" is being conducted by Wafa M. Ghanem who is a Master's Quality Management Program student.

This study aims to introduce a pain assessment tool to facilitate adequate pain management of neonates in the NICU & Neonatal Ward at Caritas Baby hospital.

In order to qualify for this study, you must be a medical staff (doctor or nurse), working in the Neonatal Ward and NICU, with no less than two years of experience.

The questionnaire has three sections: demographic data, knowledge and attitudes toward pain assessment and management. Completion of the questionnaire takes approximately (15 – 20mins).

Participation in this study is voluntarily. Refusal to participate or withdrawal from the study is optional. All identifying information obtained will be kept strictly confidential, and data will be utilized for scientific research purposes only.

Consent: I have read and understood the above information and I willingly consent to participate in this study.

Thank you for your cooperation

Researcher: Wafa M. Ghanem

Email: wafaa_awad2015@hotmail.com

Wafa.ghanem@cbh.ps

APENDIX (B)

Part A: Demographic Data

- **Gender:** Male Female
- **Age:** 21-30 31-40 41-50 51-60
- **Marital Status:** Single Married
- **Educational Level:** Diploma Bachelor degree High Diploma in
NICU
- **Work Place:** NICU Neonatal Ward
- **Years of working experience:** 0-5 years 6-10 years 11-15 years
 16 -20 years +21 years

APENDIX (C)

Tool one : Assessing Knowledge of the medical staff toward Pain assessment and management among neonates.

Items	True	False
1. Do you believe neonates experience more pain than adults?		
2. Do you believe neonates experience less pain than adults?		
3. Is there a pain assessment tool in your unit?		
4. Do you use a pain assessment tool?		
5. Have you used a pain assessment tool in the past or in a previous job?		
6. Is there a pain management guideline in your unit?		
7. Do you have pain management experience?		
8. Neonates who can be distracted from pain usually do not have severe pain		
9. Children sleep in spite of severe pain		
10. 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		
11. Respiratory depression rarely occurs in neonates who have been receiving opioids over a period of time		
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. The usual duration of action of Morphine is 4 to 5 hours		
14. After an initial dose of opioid analgesic is given, subsequent doses should be adjusted in accordance with the individual patient's response		
15. Neonates respond to drug treatment less than adults		
16. Anti-anxiety drugs, Sedatives, and Barbiturates are suitable for pain relief during painful procedures		
17. Opioids should not be administered for neonate pain relief, due to the high risk of psychological dependence.		
18. Non-pharmacologic methods of pain relief have no applications for neonates		
19. Oral administration of glucose to neonates before painful procedures can reduce pain		

20. Research shows that lapping neonates during a painful procedure does not usually have an effect on the child's pain intensity		
21. Swaddling the neonate during painful procedures causes limitation of motions which results in increased pain		
22. Direct skin contact of mother and neonate is a good way to relieve pain in neonates		
23. Intramuscular injection is the recommended route of administration of opioids for neonates with brief, severe pain of sudden onset as trauma or postoperative pain		
24. Morphine is not used for neonate pain relief due to the risk of respiratory depression		
25. Paracetamol is the most commonly used analgesic in neonates		
26. Nonsteroidal, anti-inflammatory agents are used to relieve mild to moderate pain		
27. Ibuprofen is appropriate for relief of mild pain in neonates		
28. The likelihood of drug addiction is less than 40 percent through use of opioid analgesics for pain relief		
29. When performing a painful procedure, breast feeding will relieve pain in neonates		
30. Neonates do not experience pain		
31. Neonates experience less degree of pain than adults		
32. Analgesia is not critical to neonates because of lack of memory of experiences		
33. Physiological stress to pain can be more dangerous than analgesia side effects		
34. Analgesia is too dangerous to use in neonates		
35. Pain diminishes quicker in newborns than adults		
36. Neonates require less analgesia than adults in relation to body weight		
37. At 26 weeks, the neonate has all the apparatus needed to perceive pain		

APENDIX (D)

Tool two : Assessing Attitudes of the medical staff toward Pain assessment and management among neonates.

Items	True	false
1. Neonates and children experience pain equal to that experienced by adults		
2. Parents should not be present during painful procedures		
3. Pain management and pain relief are of priority in neonates' treatment		
4. Neonates have the right to appropriate assessment and management of their pain		
5. The most accurate judge of the intensity of the neonate's pain is the her/his primary nurse		
6. Full treatment of pain is a humanitarian issue		
7. To better assess neonate pain, the nurse can discuss with her/his parents		
8. Assessment and control of neonate pain lead to improved his/her parents satisfaction		
9. Failure to assess and manage the neonate's pain affects his body and mind in the long term		
10. The nurse's physical and mental fatigue can affect neonate pain relief		
11. Like other vital signs, pain scores should be documented		
12. To ensure patient's comfort and pain relief is one of the most important tasks of nurses		
13. Communicating with and educating neonate's parents play an effective role in relieving pain		
14. Available tools for measurement of pain are the best for determining pain severity in neonate		
15. When the necessary procedures have been done for the patient, the persistence of pain does not cause problems		
16. Using pain assessment tools for determining neonate's pain lead to an appropriate method of pain relief		

17.Measurement and control of neonate's pain can affect the healing process and reduces the hospital stay		
Measurement and control of neonate's pain can improve clinical outcome.		
19.Comparable stimuli in different people produce the same intensity of pain		
20.Measurement and control of pain in neonate leads to improved quality of neonate's life		

APENDIX (E)

Schedule of the two days workshop

Time	Educational activity day 1	Time	Educational activity day 2
8:30_ 9:00	Registering and welcoming attendees	8:30_ 9:00	Registering and welcoming attendees
9:00_10:00	Pain management in neonates mPAT score and interpretation	9:00_10:00	Central venous catheterization in neonates
10:00_10:30	Respiratory distress syndrome and surfactant	10:00_10:30	Intraventricular Hemorrhage (IVH)
10:30_11:00	Coffee break	10:30_11:00	Coffee break
11:30_ 12:00	Therapeutic and diagnostic painful procedures in NICU	11:30_ 12:30	Endotracheal suctioning in neonates and Pharmacological intervention in neonates
12:00_12:30	Screening of Retinopathy of prematurity	12:30_13:00	Group session (Evaluation mPAT understanding)
12:30_13:00	Neurodevelopmental care (Non _pharmacological interventions)	13:00_14:00	lunch
13:00_14:00	lunch		

Neonatal Pain Assessment Tool (Mpat TOOL)

		Date																										
		Time																										
Posture/Tone:	Flexed and/or tense	2																										
	Extended	1																										
Sleep Pattern:	Agitated or withdrawn	2																										
	Relaxed	0																										
Expression:	Grimace	2																										
	Frown	1																										
Cry:	Yes	2																										
	No	0																										
Color:	Pale/Dusky/Flushed	2																										
	Pink	0																										
Respirations:	Apnea	2																										
	Tachypnoea	1																										
Heart rate:	Fluctuating	2																										
	Tachycardia	1																										
Saturations:	Desaturating	2																										
	Normal	0																										
Blood Pressure:	Hypotensive/ Hypertensive	2																										
	Normal	0																										
Nurses Perception:	Yes Pain	2																										
	No Pain	0																										
Total Score																												
Initial																												
Comments																												

APENDIX (F)

Description of scoring/ Interventions

Physical		
Posture/Tone	Flexed and/or tense	Fists Clenched, Trunk guarded, limbs adducted, head and shoulders resist positioning
	Extended	Digits widespread, trunk rigid, limbs abducted, shoulders raised from bed
Sleep Pattern	Agitated or withdrawn	Wakes with startle, easily woken, restlessness, squirming, no clear sleep/wake cycles, eye aversion “shut out”
	Relaxed	R.E.M sleep, eyes closed lightly
Expression:	Grimace	Deep brow furrows, eyes tightly closed, pupils dilated
	Frown	Shallow brow furrows, eyes lightly closed
Cry	Yes	When disturbed, doesn't settle after handling, loud, whimper, whining
	No	
Colour	Pale/Dusky/Flushed	Pale, dusky, palmer sweating
	Pink	Well perfused, pink
Physiological		
Respirations	Apnoea	At rest or with handling
	Tachypnoea	At rest
Heart rate	Fluctuating	< or > than normal for this baby
	Tachycardia	At rest
Saturations	Desaturating	With or without handling
	Normal	
Blood Pressure	Hypotensive/ Hypertensive	At rest
	Normal	
Nurses Perception	Yes Pain	I think the baby has pain
	No Pain	

PAT Score	Intervention	Nursing Comfort measures- repositioning, wrap/ containment, tactile soothing, talking to baby, change nappy, offer dummy/ feedand decrease environmental stimuli
Less than 5	Nursing comfort measures (NCM)	
Greater than 5	Paracetamol, NCM	
Greater than 10	Paracetamol, opioid, NCM/ analgesia dose adjustment	

(Please refer to RCH clinical practice guidelines on Neonatal pain assessment and sucrose)

Adapted from the PAT score developed by Hodgkinson et al, 1994. Updated June 2012, RCH, Melbourne

APENDIX (G)

The Modified Pain Assessment Tool (MED_FO_028)

Posture/Tone	Normal/Relaxed	0
	Extended	1
	Flexed and/or Tense	2
Sleep Pattern	Relaxed	0
	Easily Woken	1
	Agitated or Withdrawn	2
Expression	Normal/Relaxed	0
	Frown	1
	Grimace	2
Cry	No	0
	Yes, Consolable	1
	Yes	2
Colour	Pink/Normal	0
	Occasionally mottled/Pale	1
	Pale/Dusky/Flushed	2
Respirations	Normal baseline rate	0
	Tachypnoea	1
	Apnoea/Splinting	2
Heart Rate	Normal baseline rate	0

	Tachycardia	1
	Fluctuating	2
Oxygen Saturation	Normal	0
	Fleeting desaturation	1
	Desaturating	2
Blood Pressure	Normal	0
	Fluctuates with Handling	1
	Hypotensive/Hypertensive	2
Nurses Perception	No Pain	0
	Pain with Handling	1
	Yes Pain	2
Total Score		

APENDIX (H)

NEONATAL NEURODEVELOPMENTAL CHECKLIST

QPS_CL_013

Targeted Place: _____

Date: _____

Time: _____

Indicator	hospital #	yes	No	N/A	Signature
Curtains closed(Partial opening allowed during feeding					
Lights off (except during exam/procedure or pm feeding/care)					
Alarm sound going off(not attended to) on pulse oximeter alarm/cardiac monitor/ feeding pump					
Head Of Bed at 30 ⁰ (unless contraindicated)					
Correct soft swaddling (unless contraindicated)					
Correct boundaries (nest/tube)					
Correct size pacifier & in use					

Hands to face & mouth				
Infant in Left semi-side position during tube feeding				
Infant awake & quiet				
No personal phone use by caregiver/mother during direct care				
Eye mask on baby during procedure				
Appropriate phone volume				
staff speaking softly near infant				
Staff phone ringer on lowest volume				
Appropriate Neonatal Development				
Proper O2 concentration via NC/flow				
When Tube feeding is on, baby is swaddled, in semi-left position & pacifier in				
No use of bleach/cleaning bed inside room				
Pain assessment tool and management guideline followed				

APENDIX (I)

The suggested policy to be used at CBH in the NICU

1. Purpose:

- 1.1. To standardize pain assessment and management policy among health care professional.
- 1.2. To provide appropriate pain management and adequate comfort measures for vulnerable neonates, using an appropriate assessment tool.
- 1.3. To increase the awareness of the importance of pain Assessment among neonates in the NICU.
- 1.4. To minimize the short and long term adverse effects of pain
- 1.5. Pain assessment should be considered a 5th vital sign

2. Policy statement:

- 2.1. The policy aims to provide nursing and medical staff an outline for pain assessment in neonates and infants up to 3 months corrected gestational age, admitted to NICU and Neonatal Wards to ensure effective and consistent pain assessment.
- 2.2. This policy focuses on the use of the modified Pain Assessment Tool (mPAT) that is currently used to assess behavioral and physiological responses to painful stimuli and includes a Nurse's perception indicator.
- 2.3. The mPAT can be utilized for surgical and non-surgical neonates, from 24weeks gestation to full term, up to 6 month old.
- 2.4. Medical and Nursing Staff should be aware of the indications of the pain assessment tool and lack of behavioral responses does not exclude pain.
- 2.5. Initial Pain Assessment should be done within 1 hour of admission.
- 2.6. Frequency of assessment will depend on baby's clinical condition, underlying diagnosis and pain assessment score.
- 2.7. Medical and Nursing staff should document pain assessment score, management, and the response to pharmacologic and non-pharmacologic intervention.
- 2.8. They should educate parents about pain assessment, pain management plan and side effects of pain upon admission/discharge, and they should be frequently reinforced.
- 2.9. All Medical and Nursing Staff should receive orientation, training and education about basic concepts of pain assessment and management.
- 2.10. Painful procedures should not be performed at the same time as other non-emergency routine care (V/S, Changing a diaper).
- 2.11. An interdisciplinary approach to pain management should be encouraged and Pain medications should be administered according to the medical order.

3. Responsibilities:

- 3.1. It is the responsibility of Neonatal Nurses, Staff Nurses and Doctors to follow the pain assessment score and pain management intervention.
- 3.2. QPS Director and ICU Manager should monitor the compliance.

4. Procedure:

5.1. Pain Assessment:

5.1.1. Before using the pain assessment tool, nursing staff should be aware about the painful procedures performed in the NICU. They should be familiar with the prevention strategies, interventions, treatment plan and follow up assessment.

5.1.2. Frequency of pain assessment:

- a. Baseline mPAT scores should be completed at least once per shift for all neonates.
- b. Score immediately post any therapeutic or diagnostic procedure and continue hourly mPAT scores until stabilized and analgesia optimal.
- c. mPAT scores should be completed prior to and following any invasive procedures
- d. Score 30 min after any analgesic interventions to establish effectiveness.
- e. Neonates who are ventilated or receiving analgesia should have mPAT scores recorded at a minimum of 4 hourly
- f. Long term ventilated patients should have at least one mPAT score at commencement of each shift.
- g. Generally all babies within 1 hour of admission, then score generated will detect the frequency of assessment.
- h. Critically ill patients: hourly with other vital signs
- i. Intermediate care: four hourly or if signs of distress or discomfort.
- j. Postoperatively : hourly for the 1st 8 hours, then 4 hourly until 48 hours (more frequently if there are signs of distress or discomfort).

5.1.3. **Interpreting the mPAT Score:** pain management must be individual to each patient and situation.

- a. mPAT scores should provide a trend for each patient, allowing analgesia to be titrated as required.
- b. Nursing Comfort measures should be provided as a first step of management and in addition to any analgesia required.
- c. A stepped approach should be used for pain management:
 - Non-opioid analgesia should be considered for mild to moderate pain
 - Opioid analgesia in combination of non-opioid analgesia is reserved for moderate to severe pain.

- The following is to be used as a guide only, clinical judgment and collaboration with the multidisciplinary team is advised.

The mPAT Score

mPAT Score	Intervention
<5	Nursing comfort Measures (NCM)/ (Neurodevelopmental care).
>5	Paracetamol/Clonidine /Other Non-Opioid Analgesia with NCM. - For short-term management of mild to moderate pain in neonates. - For continuous pain that results from inflammatory conditions
>10	Opioids with Non-Opioid Analgesia/Analgesia Dose Adjustment with NCM.

The mPAT score for muscle-relaxed neonates is out of 10, so the threshold to intervene is lower. The threshold to intervene is also lower for heavily sedated neonates.

If baby is on continuous muscle relaxed medication, it is preferred to start him on continuous pain relief medication.

- mPAT scores should be discussed as part of both nursing and medical handovers.
- Nurses can also initiate more frequent pain assessment scoring if they believe a neonate is in pain.
- If mPAT scores are consistently low then weaning analgesia should be considered. However, a low mPAT score does not mean that a neonate is ready for their analgesia to be weaned; it indicates that the neonate has adequate analgesia for their current condition.
- Likewise, a high mPAT score does not 'justify' the requirement for analgesia. It indicates that the current analgesia being provided is inadequate for the neonate's current condition.
- Clinical judgment and collaboration with the multidisciplinary team may also be used in conjunction with the mPAT scores to ensure adequate pain management.

5.1.4 Pain Management

- Non -Pharmacological pain relief: Neurodevelopmental care/ NCM.**

Nursing comfort measures are non-pharmacological interventions that are very relevant to neonatal and infant pain management. Both healthcare professionals and parents can implement nursing comfort measures prior to or alongside analgesic interventions.

- **Breastfeeding** by mother as appropriate
- **Non-nutritive sucking** - refers to the use of a dummy or gloved finger to promote sucking without breast milk or infant formula.
- **Repositioning** - positioning the neonate, appropriate to their gestational maturation, supporting limbs/ trunk and taking care with any attached lines or equipment (i.e. supine or side lying). Rolls or position aids (or nests) can also be used.
- **Skin to skin care for the newborn (Kangaroo Care)** - nursing of the neonate on the bare skin of their mother or father, upright at a 40-60 degree angle and covered by parent's shirt/gown, with an additional blanket as required.
- **Nesting** - a positioning aid or roll that is placed around the neonate to help contain them and make them feel safe and secure by imitating a womb-like environment. It also helps keeps the neonates limbs in alignment when they cannot be wrapped or swaddled.
- **Swaddling** - neonates can be wrapped in a cloth or blanket, with their arms and legs tucked in, to make them feel secure. (**Note: prolonged restrictive swaddling maybe associated with increased risk of developmental hip dysplasia**).
- **Containment holding** - the caregiver can use two hands to hold the baby and make them feel secure (i.e. one hand on the baby's head and one on their feet).
- **Facilitated tucking** - holding a neonate so that their limbs are in close proximity to the trunk. The neonate is held side lying in a flexed position. This technique involves touch and positioning, and promotes a sense of control and security for the neonate.
- **Decreasing environmental sensors (noise/ light):** use of incubator cover, and dimming of lights.
- **Tactile soothing** - still gentle touch can be provided by caregivers placing their hand on the neonate's head and abdomen/back.
- Multisensory stimulation as eye contact with the baby, massaging face and back, talking to neonate gently.
- **Clustering, developmental or cue based care** - grouping care to minimize the number of times a neonate is handled. By reducing episodes of handling, periods of sleep can be protected and stress can be minimized. If neonates are displaying signs of stress (such as increased heart rate or facial expression), fewer procedures can be clustered on the next occasion and comfort measures can be provided. Unless urgent

,procedures should be performed around care times to encourage developmental care

- **Dextrose**
- Reassess after 30 minutes, if pain score still high, go to the pharmacological treatment.

DEXTROSE

- Dextrose 25% solution and breast milk provide a quick, short-term analgesia effect.
- Dextrose is short acting and peaks after 2 minutes. Allow 2 minutes for sucrose to work before commencing the procedure.
- It lasts 5-8 minutes
- Should always be used in combination with other comfort measures
- Ineffective if not given orally.
- It absorbed in the buccal membrane, it does not affect blood sugar level.

Required documentations:

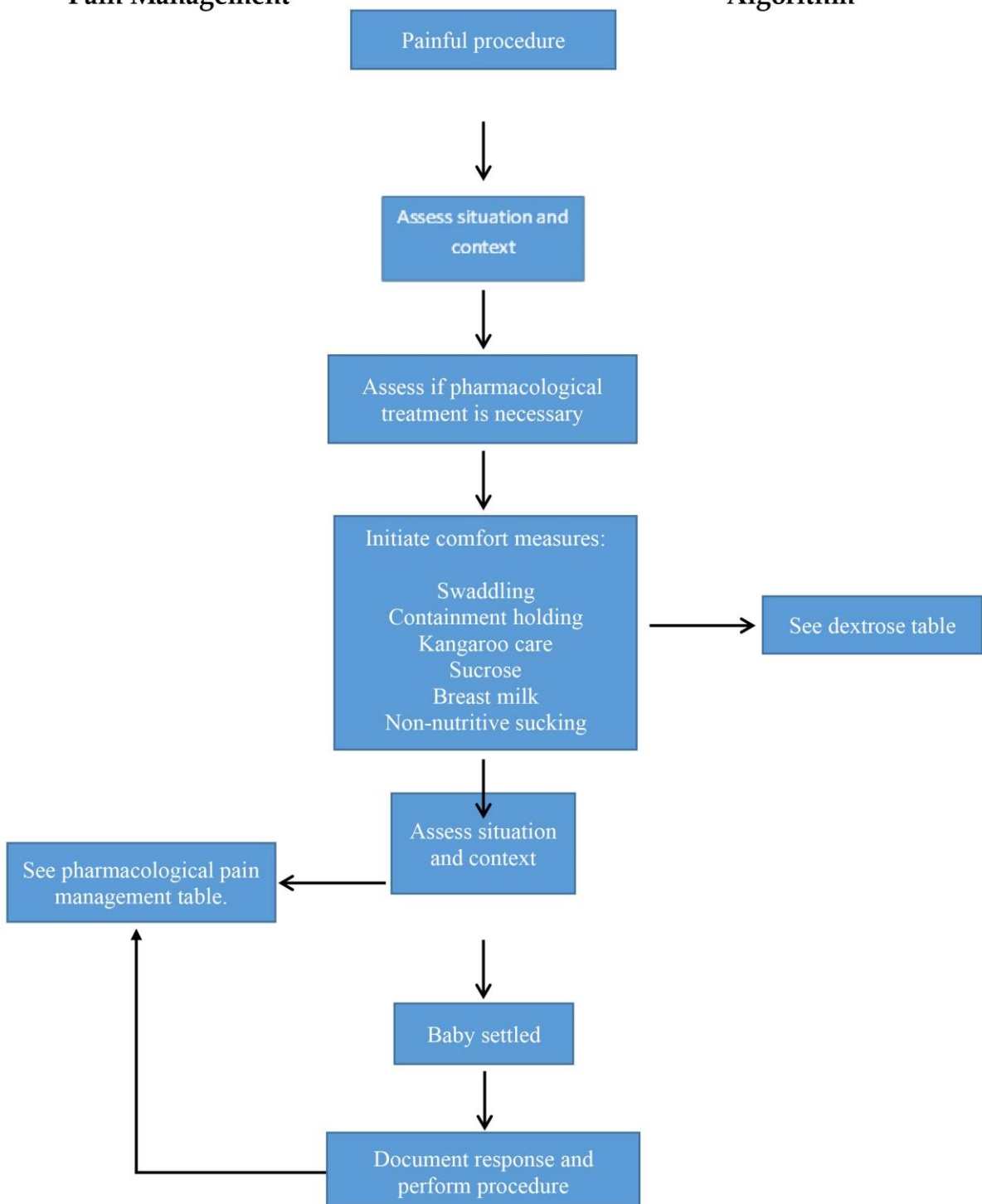
5.1. Pain Assessment Tool -mPAT :(MED_FO_028)

5.2. Pain management Bundle :(MED_BU_001)




Pain Management

Algorithm



5.3. Pain management algorithm :(pain management policy in neonates:(MED_PP_001)

Prepared by	Verified by	Qualified by QPS	Approved by CEO
Dr. Micheline Al Qassis Abeer Taweel Wafa Ghanem	Dr. Hiyam Marzouqa Dr. Nader Handal Suhair Qumsieh Dr. Rafat Alawi Dr. Jamal Shamma' Dr. Issa Abed Rabbo Jihad Al-Yateem	Wafa Ghanem	Issa Bandak 
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