

FACTORS THAT INFLUENCE IMPLEMENTATION OF PAIN
MANAGEMENT STRATEGIES IN THE NEONATAL INTENSIVE CARE
UNIT

by

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Abstract

In the United States, 10% to 15% of newborns are admitted to the neonatal intensive care unit (NICU). Painful procedures are unavoidable during NICU care; the neonate experiences approximately 12 painful procedures per day. Inconsistent and/or inappropriate pain management in the NICU remains a problem. The purpose of this study is to identify the prevalent factors that influence the implementation of pain management strategies among nurses who work in a NICU setting in a Central Florida hospital. This study was conducted using a voluntary and anonymous electronic survey. The survey was divided into two sections; the first section designed to describe the sample, and the second section containing a Likert-type scale that assessed the nurses' general pain knowledge, knowledge of pain assessment, and awareness of accepted pain management strategies. The survey was adapted from previously published research. Results indicate pain was more likely to be addressed when nurses collaborated closely with the attending physician. The majority of nurses were aware of current protocols for pain management on the unit but not all nurses agreed those protocols were adequate. Results also indicated pain assessment education is being provided in the NICU and the nurses feel confident in their skills to assess pain, however, not all nurses agreed that pain is being well managed in their unit. There appears to be a gap between the nurse's knowledge/skill to assess pain and implementation of strategies to decrease pain. Although it is the nurse's responsibility to prevent and treat newborn pain in the NICU, not all nurses agreed that newborn pain is well managed in their unit and some believe pain to be an unavoidable experience in the NICU. Nurse-physician collaboration is key to evidence based newborn pain management.

Dedication

To Nebula, my niece and reason for conducting this study. You are my little hero!

To my loving husband, thank you for keeping me calm and motivated through this whole process. You believed in me when I did not believe in myself. Thank you for proofreading everything countless times. I could not have done it without your unconditional support.

To my family and friends, thank you for your continuous support and words of encouragement.

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TABLE OF CONTENTS

CHAPTER 1: INTRODUCTION	1
CHAPTER 2: METHODS	6
Design	6
Human Subjects	6
Sample.....	6
Setting	6
Procedures.....	6
Measurement.....	7
CHAPTER 3: RESULTS	8
Demographic Data	8
Quantitative Data	9
CHAPTER 4: DISCUSSION.....	13
Limitations	17
Recommendations for Practice	17
Recommendations for Education.....	18
Recommendations for Future Research	18
APPENDIX A: UCF IRB APPROVAL	20
APPENDIX B: EXPLANATION OF RESEARCH.....	22
APPENDIX C: DATA COLLECTION INSTRUMENT	25
APPENDIX D: DEMOGRAPHIC RESULTS	28
APPENDIX E: LIKERT SCALE RESULTS	30
REFERENCES	32

CHAPTER 1: INTRODUCTION

Pain is an unpleasant experience felt by patients of all ages in all health care settings. Although the level of pain may be different in each patient, it is the responsibility of the nurse to develop a pain management plan to address the pain. A successful pain management plan includes an accurate and timely assessment of the patient, an appropriate intervention to decrease the pain, an evaluation of the intervention to determine its effectiveness, re-intervention if necessary, and accurate documentation of every step of the plan.

In the United States, 10% to 15% of newborns are admitted to the neonatal intensive care unit (NICU) (March of Dimes Foundation [March of Dimes], 2009). The NICU is divided into three levels of care according to the needs of the infant (American Academy of Pediatrics, 2004). Level I provides well-newborn care, evaluation and post-natal care, and neonatal resuscitation until the ill infant can be transferred to a higher level of care. The level II NICU is a more specialized unit. In this unit, infants weigh more than 1500 grams, and although they are ill, they are expected to make a fast recovery. A level II NICU is also a step down unit for babies that are transferred from a higher level of care. A level III NICU attends to infants who are critically ill. At this level the infant may need mechanical ventilation or major surgical procedures (American Academy of Pediatrics, 2004). A newborn can be admitted to the NICU for many reasons such as premature birth, difficult or lengthy delivery, respiratory problems, infections, and congenital defects (March of Dimes, 2009). During the NICU stay, the clinical care of the neonate includes painful but necessary procedures such as heel sticks to draw blood for lab studies and venipuncture to establish intravenous (IV) lines. In some cases, the neonate needs more intensive

care that involves chest tube insertion, tracheostomy suctioning, and post-operative care after surgery. All of these procedures may provoke pain of varied intensity (Walker, 2005).

Painful procedures are unavoidable during the care of the neonate in the NICU. Depending on the specific situation, the infant admitted to the NICU can experience multiple painful procedures per day. According to Carbajal et al. (2008), the estimated number of painful procedures that an infant experiences in the NICU is 12 per day. According to Simons et al. (2003), during the first two weeks of life in the NICU, the infant can experience an average of 196 painful procedures. According to Anand and Scalzo (2000), repetitive and unrelieved painful experiences can create long-term adverse neurological effects in the neonate that can include anxiety and stress disorders, altered pain sensitivity, and hyperactivity attention deficit disorder, which in term can cause impaired social skills. This is why it is of critical importance that neonatal pain is managed appropriately and in a timely manner.

Nurses are presented with many challenges when assessing pain in the NICU. Infants are unable to communicate their pain verbally and are therefore dependent on their caregivers to recognize and treat it (Dilen & Elseviers, 2010). While infants are in the NICU, the nurse is the caregiver and therefore the “key agent in recognizing and treating pain” (Byrd, Gonzales, & Parsons, 2009, p. 299).

There are several validated pain assessment scales that can be used in the NICU (Maxwell, Malavolta, & Fraga, 2013), but there is no identified gold standard or indication of which tool is the best. A recent study conducted by Gyland (2012) in a level III NICU compared the most popular pain assessments tools used with the purpose of identifying the most appropriate choice for their patients. The tools compared in the study were the Bernese Pain

Scale for Neonates, the Neonatal Infant Pain Scale (NIPS), an assessment scale developed to determine post-operative pain that assesses crying, oxygen requirement, increased vital signs, expression, and sleeplessness (CRIES), the Premature Infant Pain Profile (PIPP), and the Neonatal Pain, Agitation, and Sedation Scale (N-PASS). Initially, the NICU Evidence-Based Practice (EBP) Committee at the study hospital performed an analysis where strengths, weaknesses, opportunities and threats (SWOT) of each of these tools were identified. Based on the SWOT analysis and review of the literature, the committee chose to further study PIPP and N-PASS using a case study approach. The NICU nurses who participated in the study were asked to assign pain scores to two case patients using both pain scales. Then they were asked to complete a Likert scale survey to rate both pain scales in terms of ease of use, time it required to complete, accuracy, and helpfulness in decision-making with regard to pain interventions. At the end of the study the comparison between PIPP and N-PASS yielded no statistically significant difference in their clinical utility. Consequently, the EBP Committee in the study hospital recommended N-PASS because the tool is more comprehensive and therefore more appropriate to the ill infant (Gyland, 2012).

A study conducted by Latimer, Johnston, Ritchie, Clarke, and Gilin (2009) in two level III NICUs in Canada surveyed 93 nurses with the purpose of examining the effects that the nurse, the patient, and the organization have on the delivery of evidence-based procedural pain care. Information about the infant was collected from the chart which included pain care data as well as demographic data. Nurse demographic data and their knowledge about pain care were also collected. The pain management care that nurses provided the infants was divided into three categories: no pain care (no assessment, management, or documentation), low pain care (non-

pharmacological intervention), and evidence-based pain care (assessment, pharmacological intervention, and documentation). The study found that most infants were getting low pain care (55%) or no pain care at all (17%), and only 28% were receiving evidence-based pain care with pharmacological and non-pharmacological strategies. The nurses that delivered high pain management to their patients also scored high for pain knowledge, high for nurse-physician collaboration, and cared for patients with higher complexity score in comparison to those nurses who provided low to zero pain care. Interestingly, the nurses' knowledge of evidence-based practice did not necessarily translate into their nursing care, indicating an issue of translating knowledge into practice (Latimer et al., 2009).

A study conducted by Byrd et al. (2009) with the purpose of identifying the barriers to pain management in the NICU was conducted in California by means of a survey directed to NICU nurses (n=90). The study found that only 45% of the nurses agreed that neonatal pain was well managed in their units. Additionally, 91% said they are aware of pain management protocols in their unit, but only 63% admitted that these protocols were clear, comprehensive or based on research. When assessing pain in their patients, 36% of the nurses expressed that they rely on their instincts to tell whether an infant was in pain or not, regardless of the pain scales used in their units. This contributes to inaccurate pain assessment and therefore inadequate and/or inappropriate pain management. Only 55% of nurses reported that their unit provides continuing education in the area of pain management, but at the same time they expressed resistance to change practices when it is needed (Byrd et al., 2009).

Inconsistent, inadequate, and/or inappropriate pain management in the NICU remains a problem. Regardless of the plethora of literature that currently supports the importance of pain

management in the NICU, there seems to be a gap between the determination that pain management is needed and the implementation of pain reducing strategies. Physicians and nurses recognize that pain management is fundamental. However, pain regimens continue to be underutilized (Byrd et al., 2009).

CHAPTER 2: METHODS

Design

This descriptive study was conducted using an electronic, voluntary and anonymous survey. The survey was used to evaluate various aspect of pain management in the NICU.

Human Subjects

Approval was obtained from the Institutional Review Board (IRB) at the University of Central Florida (Appendix A) after the health care institution's IRB determined that was their preference. Identifying information was not collected when participants completed the survey. Participants were able to withdraw from the study at any time without penalty.

Sample

A convenience sample of nurses working in a NICU setting was invited to participate in the survey. There were approximately 200 NICU nurses invited, 52 nurses completed the survey, giving a response rate of 26%.

Setting

This research was conducted at a large NICU with multiple levels of care in a large metropolitan acute care hospital. The participant was able to complete the survey during a break at work or at home.

Procedures

An email with an invitation to participate in this study was sent to the nurse manager of the unit with the web link to the self-administered survey and an explanation of research

document (Appendix B). The nurse manager then delivered the survey link and explanation of research electronically through the hospital email system to all nurses working in the unit.

Measurement

The measure used in this study was a survey. The survey was developed partially by the researcher and adapted partially from a survey previously used by Byrd et al. (2009) (Appendix C).

The survey was divided into two sections with the first section covering demographic data, educational background, and years of experience as a NICU nurse. The second section of the survey was a Likert-type scale that assessed knowledge related to pain in general, pain assessment, and awareness of accepted pain management strategies. There were a total of 17 questions on this portion of the survey. The answer choices included "Strongly Agree", "Agree", "Neutral", "Disagree", and "Strongly Disagree".

Descriptive statistics of the survey data were completed on 2014 Research Suite, Qualtrics.

CHAPTER 3: RESULTS

Demographic Data

A total of 52 registered nurses from a NICU in a large metropolitan hospital in central Florida participated in this study. The sample was 2% male (n=1) and 98% female (n=51). Ethnic backgrounds included 81% Caucasian (n=42), 8% Hispanic (n=4), 6% African American (n=3), and 6% Asian/Pacific Islander (n=3). Ages ranged from less than 35 years old (49%, n=25), 35-50 years old (22%, n=11), and more than 50 years old (29%, n=15). Results related to experience as a NICU nurse showed 50% of participants had 2-10 years of experience (n=26), 38% had more than 10 years of experience (n=20), 6% had 1-2 years of experience (n=3), 4% had less than 6 months of experience (n=2), and 2% had 6-12 months of experience as a NICU nurse (n=1). Seventy five per cent of the participants (n=39) worked 26-38 hours per week, 21% worked more than 39 hours per week (n=11), and 4% worked 13-25 hours per week (n=2). Sixty-two per cent of participants worked day shift (7am-7pm) (n=32) and 38% worked night shift (7pm-7am) (n=20). Educational background included 59% had a Bachelor of Science in Nursing (n=30), 24% had an Associate Degree in Nursing (n=12), 8% had a Master Degree in Nursing (n=4), 6% reported having another type of degree (n=3), and 4% had a Diploma (n=2). Bar graphs representing some the demographic data can be found in Appendix D.

When asked about continuing education related to pain management in the NICU patient population, 62% agreed that they have received such education (n=32), and 20% said they had not (n=10). Of the nurses who had received continuing education on the subject, 42% reported receiving 1-3 hours of education (n=13), 39% reported receiving 4-6 hours of education (n=12), 19% reported receiving more than 10 hours of education (n=6).

Quantitative Data

Means and standard deviations for each question can be found in Table 1 (Appendix E). Question 1 asked participants if a key responsibility of the NICU nurse was to prevent and treat pain. A total of 84% (n=42) strongly agreed and 16% (n=8) agreed a key responsibility of NICU nurse is to prevent and treat pain. Question 2 asked participants if they were aware of the pain management guidelines/protocols on their unit. Results showed 70% (n=35) strongly agreed and 30% (n=15) agreed to be aware of their unit's pain management protocol. Question 3 asked participants if they felt confident with their skills recognizing and assessing newborn pain. A total of 67.35% (n=33) strongly agreed and 32.65% (n=16) agreed on feeling confident on their skills recognizing and assessing newborn pain. Question 4 asked participants if infants who are exposed to repetitive painful stimuli experience adverse, long-term neurologic effects. Results showed 60% (n=30) strongly agreed that infants who are exposed to repetitive, unrelieved, painful stimuli experience adverse, long-term neurologic effects while 36% (n=18) agreed, and 4% (n=2) did not agree or disagree. Question 5 asked if newborns experience less pain than older children or adults due to their immature neurologic system. Results indicated 54% (n=27) strongly disagreed and 38% (n=19) disagreed that newborns experience less pain than older children or adults. Question 6 asked participants if they felt apprehensive when giving newborns opiates due to the risk of respiratory depression and/or addiction. A total of 24% (n=12) strongly disagreed and 46% (n=23) disagreed to be apprehensive on giving a newborn opiates due to the risk of respiratory depression and/or addiction. On the other hand, 16% (n=8) neither agreed nor disagreed, 10% (n=5) agreed, and 4% (n=2) strongly agreed to be apprehensive on giving newborn opiates due to the risk of respiratory depression and/or addiction. Question 7 asked

participants if non-pharmacological pain relief measures (oral sucrose, pacifiers, blanket-swaddling) were effective to decrease newborn pain. Results showed 40% (n=20) strongly agreed, while 54% (n=27) only agreed that non-pharmacological pain relief measures are effective in decreasing newborn pain. On the other hand, 2% (n=1) neither agreed nor disagreed and 4% (n=2) disagreed that non-pharmacological pain relief measures were effective. Question 8 asked participants if it was not necessary to premedicate for pain since most invasive procedures (intubation, blood draws) are completed quickly. A total of 18% (n=9) strongly disagreed and 46% (n=23) simply disagreed that is not needed to premedicate for pain since invasive procedures are done quickly. Meanwhile, 28% (n=14) neither agreed nor disagreed, 6% (n=3) agreed, and 2% (n=1) strongly agreed that it is not necessary to premedicate for pain since invasive procedures are done quickly. Question 9 asked participants if it was difficult to manage newborn pain due to heavy assignment and time restrains. Results showed 30% (n=15) strongly disagreed and 42% (n=21) disagreed that it was difficult to manage newborn pain due to heavy assignments or time restrains. However, 14% (n=7) neither agreed nor disagreed, 12% (n=6) agreed and 2% (n=1) strongly agreed that heavy assignments and time constrains makes it difficult to manage newborn pain. Question 10 asked participants if procedural pain was unavoidable in the NICU. A total of 14% (n=7) strongly disagreed, while 46% (n=23) disagreed that procedural pain is unavoidable in the NICU. On the other hand, 14% (n=7) neither agreed nor disagreed, 24% (n=12) agreed and 2% (n=1) strongly agreed that procedural pain is unavoidable in the NICU. Question 11 asked participants if they believed newborn pain is well managed in their unit. Results showed 59.2% (n=29) agreed, 18.4% (n=9) neither agreed nor disagreed, and 14.29% (n=7) disagreed that newborn pain is well managed in their unit. Question

12 asked participants if they have received adequate training regarding newborn pain recognition/assessment. The results indicated 30.6% (n=15) strongly agreed, 55% (n=27) agreed, and 12.2 (n=6) neither agreed nor disagreed about having received adequate pain recognition training. Question 13 asked participants if the pain management protocols in their unit were clear, comprehensive, and based on current research. Results indicated 28% (n=14) strongly agreed, 58% (n=29) agreed, and 12% (n=6) neither agreed nor disagreed that the pain management protocols in their unit are clear, comprehensive and based on current research. Question 14 asked participants if nurses and physicians in the unit were receptive to new evidence based practices. Results showed 18% (n=9) strongly agreed, 66% (n=33) agreed that physicians and nurses were receptive to new evidence based practices. However, 8% (n=4) neither agreed nor disagreed and 8% (n=4) disagreed that physicians and nurses were receptive to new evidence based practices. Question 15 asked participants if they relied on their own instinct/other doctors/other nurses/journals to tell them if a newborn was in pain. Approximately 14% (n=7) strongly agreed, 46% (n=23) agreed, and 20% (n=10) neither agreed nor disagreed on relying on their own instinct/other doctors/other nurses/journals to tell them if a newborn was in pain. However, 12% (n=6) disagreed and 8% (n=4) strongly disagreed on relying on their own instinct/other doctors/other nurses/journals to tell them if a newborn was in pain. Question 16 asked participants if working closely with the attending physician to accurately manage pain encouraged them to provide high-level care. The results showed 46.94% (n=23) strongly agreed, 44.90% (n=22) agreed, and 6.12% (3) neither agreed nor disagreed that working with the attending physician to accurately manage pain encouraged them to provide high-level care. Question 17 asked participants if they were more likely to administer more pain medication

when the patient was more ill. The results indicated 14% (n=7) strongly agreed and 32% (n=16) agreed that the more ill the patient was the more pain medication they were likely to administer. On the other hand 34% (n=17) neither agreed nor disagreed and 20% (n=10) disagreed that the more ill the patient was the more pain medication they were likely to administer.

CHAPTER 4: DISCUSSION

Question one asked participants if a key responsibility of the nurse was to prevent and treat pain. This question was asked first to determine if the participants understood the role of the nurse in pain management. All participants strongly agreed or agreed that the nurse has the obligation to prevent and treat pain in the NICU, which was not surprising given that in most cases of hospitalization the patients experience some kind of pain and the pain is reported to the nurse. The second question asked participants if they were aware of the pain management protocols of their unit so it could be established whether the nurses knew the current unit protocols to manage newborn pain. All the nurses who took the survey strongly agreed or agreed they were aware of the protocols that the unit has put in place in order to better manage newborn pain. In a related question the participants were asked if the protocols in the unit were clear, comprehensive, and based on current research. This question was asked to determine how adequate the nurses find such protocols to be. The majority of the participants believe the protocols to be adequate (clear, comprehensive, based on research), however, a small percentage neither agreed nor disagreed or simply disagreed on the adequacy of the current protocols for newborn pain management. This indicates that all nurses are aware of the protocols currently being utilized in the unit but not all of them find these protocols to be clear, comprehensive, and based on research.

The question that asked participants if they had received adequate training to recognize/assess newborn pain was included to determine if nurses were being educated in relation to this aspect of care. The majority of the participants reported having received training but a small percentage neither agreed nor disagreed on having training on pain

recognition/assessment. In a related question the participants were asked if they felt confident in their skills to recognize and assess pain in the newborn. This question was asked specifically to measure the confidence the nurse has on her/his own skills. All the participants felt very confident on their ability to identify and assess pain. However, the confidence in their skills to assess pain did not reflect on the perceived management of pain in their specific unit. When participants were asked if they believed that newborn pain was well managed in their unit, the majority of participants believed that it was, but 18% neither agreed nor disagreed and 14% disagreed. There appears to be a gap between knowledge/skill and implementation of strategies to manage pain.

Participants were specifically asked if infants who were exposed to repetitive, unrelieved painful stimuli experience adverse, long-term neurologic effects. This question was asked to assess the nurses' knowledge of this concept, and the majority of participants agreed that unrelieved painful events could have an adverse effect in the nerve system of the infants. However not everyone reported they believed pain is well managed in their unit.

Another concept explored in the survey related to newborns experiencing less pain than adults or older children due to their immature neurologic system. The majority of the participants agreed that newborns experience as much pain as other patients. This is not surprising due to the pain education and physiology taught in undergraduate nursing programs, which establishes that even infants can feel pain and it is the responsibility of the nurse to prevent and treat it.

Participants were asked if they felt apprehensive when giving newborns opiates due to the risk of respiratory depression and/or addiction and the majority of the nurses denied feeling apprehensive about this. However, 16% neither agreed nor disagreed while 14% agreed to feel

concerned with the administration of opiates. Participants were also asked if non-pharmacologic pain relief measures were effective, and the majority of the nurses do believe non-pharmacologic pain management measures such as oral sucrose, pacifiers, and blanket swaddling are effective in decreasing pain in the newborn.

Participants were asked if it was not necessary to pre-medicate for pain since most invasive procedures could be done quickly, and the majority of the nurses supported that is necessary to pre-medicate for pain even when procedures can be completed quickly. However, 28% neither agreed nor disagreed and 8% agreed not to pre-medicate as long as invasive procedures were to be completed fast. This information correlates to another question in which participants were asked if procedural pain was unavoidable in the NICU. The majority of the participants disagreed that pain resulting from procedures is unavoidable but an alarming 26% agreed that pain couldn't be avoided in the NICU even though all nurses identified the prevention and treatment of pain as a key role of the NICU nurse.

It was asked if heavy patient assignments and time restraints made it difficult to manage newborn pain. The majority of the participants said it was not difficult to manage pain in regards to heavy patient assignment or/and time constrains. This was expected as NICU nurses have a one-to-one or one-to-two nurse to patient ratios. However, 14% neither agreed nor disagreed on whether patient assignment or time restraints played a role in pain management in their unit and another 14% agreed to have difficulties in regards to these two factors. This is concerning and should be further explored to determine what the nurses consider as heavy related to patient assignments, and what they might define time restraints so the unit leadership can work toward eliminating these issues as barriers to optimal pain management.

Participants were asked if nurses and physicians working in the unit were open to new evidence based practices, which was asked specifically to assess the level of adherence to change in response to new evidence in the unit. The majority of the participants agreed that changes in unit are welcome by nurses and physicians to achieve evidence based practice. These results were expected since healthcare is an ever-changing discipline in which new discoveries/improvements are being made every day. It is therefore imperative that healthcare professionals be receptive to changes and adhere to the best evidence available in order to achieve better patient outcomes.

When participants were asked if they relied on their instinct/other nurses/doctors/journals to tell them whether a newborn was in pain the majority of the participants agreed they relied on instinct/other nurses/doctors/journals to recognize newborn pain. On the other hand, 20% neither agreed nor disagreed, while another 20% denied relaying on these things to determine if a newborn was in pain. The responses to this question seem alarming since the majority of the participants are relying on something besides known valid pain assessment tools to identify pain, which can also mean they have little confidence in the tools used in the unit. It is worth noting that “instinct” may mean different things to different people and should be further explored.

Participants were asked if working closely with the attending physician was encouraging towards high level of care (evidence based) and the majority of participants agreed to be more prone to provide high level of care when they worked closely with the physician on pain management. Since the healthcare team is composed of many disciplines, including but not limited to nurses, doctors, and pharmacists, it is essential for all team members to be on the same page and collaborate with each other for better patient outcomes.

The final question in the survey asked participants if they were likely to administer more pain medication to those newborns that are more severely ill. This question was asked to see if the nurses were compelled to give more pain medication to a severely ill newborn versus a less severely ill newborn. The responses to this question showed that 46% agreed that the more ill the patient is the more pain medication they are likely to give. However, 34% neither agreed nor disagreed and 20% disagreed. This result was very interesting. The more severely ill a newborn is, the more likely it is that painful invasive procedures (diagnostic/life support, etc.) might need to be performed to ensure complete care and optimal patient outcomes. It is not clear if nurses know or understand that, so it remains unclear if they might treat pain more aggressively when merely defining a newborn as severely ill.

Limitations

The sample size was small and included nurses from only one hospital. This limits the generalizability of the study results. Due to limited time available to collect data only 52 nurses participated in the study. This limitation impacted the study by decreasing the diversity among participants; the great majority of the participants were Caucasian females.

Another limitation was the complete anonymity of the study, making it difficult to create correlations between education/experience, and results.

Recommendations for Practice

Current pain management protocols/guidelines need to be reviewed often to ensure these protocols are clear, comprehensive and based on current research. All nurses should be thoroughly educated in the current protocols of the unit to manage newborn pain in order to

increase adherence to such protocols. Working closely with the health care team to manage pain should be emphasized and expected.

Recommendations for Education

Education on the negative long-term neurological effects that newborns can experience due to repetitive unrelieved pain experiences should be part of the student nurses' education for pre-licensure students, or continuing education for those already in practice. Nurses should continue to be educated and trained in the recognition/assessment of pain in newborn patients. Education and further training should include the correct utilization of pain assessment tools, current protocols/guidelines to address pain, and the re-assessment of pain once there has been an intervention to relieve pain. Education should also focus on the use of pharmacologic as well as non-pharmacological interventions to relieve pain and the management of possible side effects.

It is important to educate student nurses on pain management from the beginning of their nursing education in their undergraduate program. Student nurses should be educated on the recognition of pain and the subtle evidence of pain in the non-verbal patient. Student nurses should also study the effects of pain in the neurological system and the possible sequelae of non-relieved pain. In addition, student nurses need to be able to properly identify and implement pain management strategies that reflect the latest evidence based practice.

Recommendations for Future Research

There is much research that can be done to provide evidence to support the best pain management practices in the NICU. First, it must be ensured that the pain assessment tools that

are used are reliable and valid for the newborn in the NICU according to the infant's developmental state. Research to establish this is required. Additionally, determining the best timing of interventions for procedural pain is needed. Evidence to support when non-pharmacological interventions are enough, or when opioids are necessary is needed. Additional research should be done to determine nurses' ability to use appropriate pain assessment tools and their ability to implement pain management strategies. This research could be replicated where results would allow for the determination of a correlation between education (MSN, BSN, ASN, Diploma), years of experience as NICU nurse, and results to the Likert scale questions in order to better understand the factors or barriers that lead to poor pain management in the newborn. From these results, experts might determine how to address these factors or barriers and ultimately lead to a better pain experience for the newborn in the NICU.

APPENDIX A: UCF IRB APPROVAL



University of Central Florida Institutional Review Board
Office of Research & Commercialization
12201 Research Parkway, Suite 501
Orlando, Florida 32826-3246
Telephone: 407-823-2901 or 407-882-2276
www.research.ucf.edu/compliance/irb.html

Approval of Exempt Human Research

From: UCF Institutional Review Board #1
FWA00000351, IRB00001138

To: Kelly D. Allred and Co-PI: Geraldine Martinez

Date: February 10, 2014

Dear Researcher:

On 2/10/2014, the IRB approved the following activity as human participant research that is exempt from regulation:

Type of Review: Exempt Determination
Project Title: Factors that Influence Implementation of Pain Management
Strategies in the Neonatal Intensive Care Unit
Investigator: Kelly D Allred
IRB Number: SBE-14-10014
Funding Agency:
Grant Title:
Research ID: N/A

This determination applies only to the activities described in the IRB submission and does not apply should any changes be made. If changes are made and there are questions about whether these changes affect the exempt status of the human research, please contact the IRB. When you have completed your research, please submit a Study Closure request in iRIS so that IRB records will be accurate.

In the conduct of this research, you are responsible to follow the requirements of the Investigator Manual.

On behalf of Sophia Dziegielewski, Ph.D., L.C.S.W., UCF IRB Chair, this letter is signed by:

Signature applied by Joanne Muratori on 02/10/2014 12:41:53 PM EST

A handwritten signature in black ink that reads "Joanne Muratori".

IRB Coordinator

APPENDIX B: EXPLANATION OF RESEARCH



EXPLANATION OF RESEARCH

Title of Project: Factors that Influence Implementation of Pain Management Strategies in the Neonatal Intensive Care Unit

Principal Investigator: Kelly Allred, PhD, RN-BC, CNE, Assistant Professor/College of Nursing

Co-Investigator: Geraldine Martinez, UCF Student Nurse, Honors in the Major Student Nurse

You are being invited to take part in a research study. Your participation is voluntary.

- The purpose of this study is to identify the most prevalent factors that currently influence the implementation of pain management strategies among nurses who work in the NICU setting in a central Florida community and provide direction to overcome barriers.
- Participants are asked to complete a brief survey delivered via work email. The survey is completely anonymous and confidential. It can be taken during lunch, break time, or at home.
- The questionnaire should take no more than 5 minutes to complete, but feel free to take as much time as you need. This is a one-time commitment and you will not be contacted regarding this study in the future. The results of this research study will be confidential.

You must be 18 years of age or older and a Registered Nurse to take part in this research study.

Completion of this survey will imply your consent to participate in this research study.

Study contact for questions about the study or to report a problem:

If you have questions, concerns, or complaints please contact Kelly Allred, Assistant Professor, College of Nursing, University of Central Florida at Kelly.Allred@ucf.edu or 407-823-0160

IRB contact about your rights in the study or to report a complaint:

Research at the University of Central Florida involving human participants is carried out under the oversight of the Institutional Review Board (UCF IRB). This research has been reviewed and approved by the IRB. For information about the rights of people who take part in research, please contact: Institutional Review Board, University of Central Florida, Office of Research & Commercialization, 12201 Research Parkway, Suite 501, Orlando, FL 32826-3246 or by telephone at (407) 823-2901.

APPENDIX C: DATA COLLECTION INSTRUMENT

Data Collection Instrument

Section I: Demographics

Gender: Male ___ Female ___

Ethnicity: Caucasian ___ African American ___ Hispanic ___ Asia/Pacific Islander ___

Age in years: <35 ___ 35-50 ___ >50 ___

Years as NICU nurse: 6-12 months ___ 1-2 years ___ 2-10 years ___ ≥10 years ___

Hours worked per week in the NICU? 1-12 ___ 13-25 ___ 26-38 ___ > 39 ___

What shift do you typically work? 7A – 7P (Days) ___ 7P – 7A (Nights) ___

Educational Background: Diploma ___ Associate Degree in Nursing ___ Bachelor of Science in Nursing ___ Master Degree in Nursing ___ ~~Other~~ ___ (please list)

Have you had any continuing education related to pain management in the NICU patient population? ~~yes~~ ___ no ___

If yes, please indicate how many hours. 1-3 ___ 4-6 ___ 7-9 ___ >10 ___

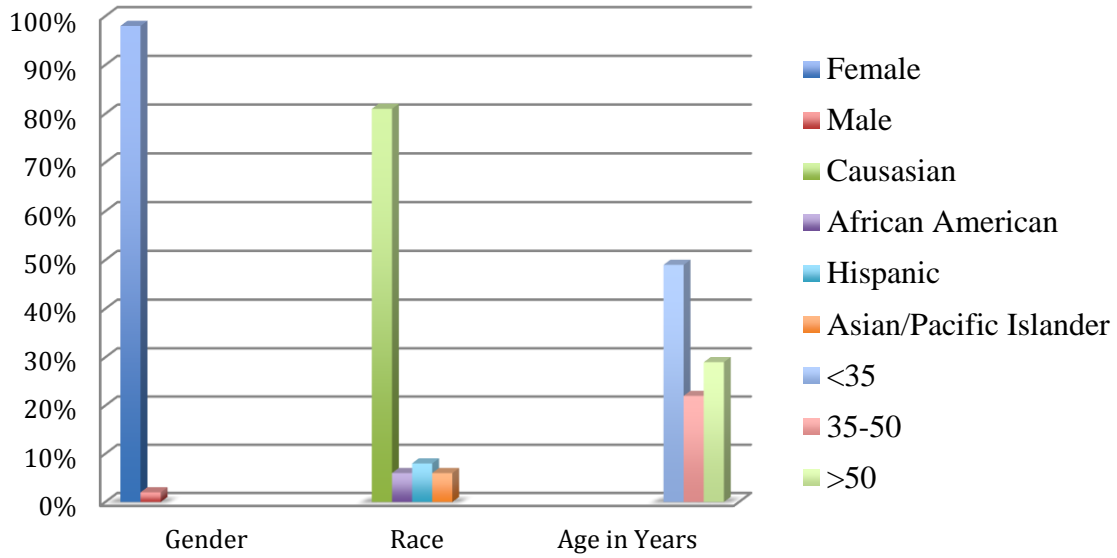
Section II: Likert-type Items

Question	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
A key responsibility of the NICU nurse is to prevent and treat pain	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am aware of pain management guidelines/protocols on my unit	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I feel confident with my skills in recognizing and assessing newborn pain	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Infants who are exposed to repetitive, unrelieved painful stimuli experience adverse, long term neurologic effects	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Because of their immature neurologic system, newborns experience less pain than older children and adults	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

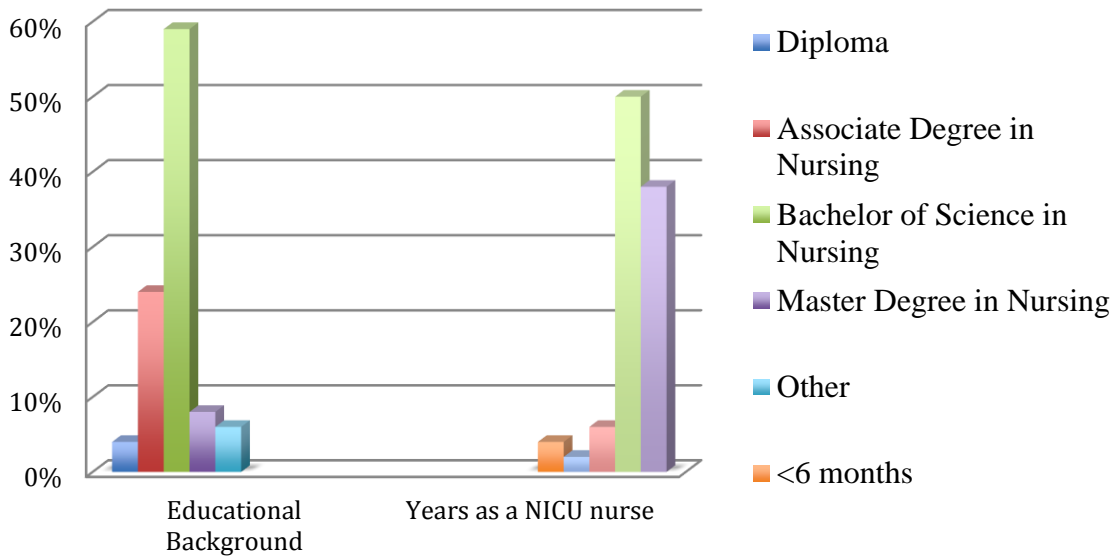
Question	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
I feel apprehensive when giving newborns opiates due to the risk of respiratory depression and/or addiction	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Non-pharmacological pain relief measures (oral sucrose, pacifiers, blanket-swaddling) are effective to decrease newborn pain	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Since most invasive procedures (such as intubation and blood draws) can be completed quickly, it is not necessary to pre-medicate for pain	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
It is difficult to manage newborn pain due to heavy assignment and time restraints	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Procedural pain is unavoidable in the NICU	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I believe that newborn pain is well managed in my unit	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I have received adequate training regarding newborn pain recognition/assessment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My unit's pain management protocols are clear, comprehensive, and based on current research	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The nurses and physicians in my unit are receptive to new, evidence based practices	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I rely on my own instinct/other nurses/doctors/ journals to tell me whether or not a newborn is having pain	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Working closely with my attending physician to accurately manage pain encourages me to provide high level care	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The more ill my patient is, the more pain medication I am likely to administer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

APPENDIX D: DEMOGRAPHIC RESULTS

Demographics 1



Demographics 2



APPENDIX E: LIKERT SCALE RESULTS

Table 1: Likert Scale Results

Question	Mean (n=52)	SD (n=52)
1. A key responsibility of the NICU nurse is to prevent and treat pain	1.16	0.37
2. I am aware of pain management guidelines/protocols on my unit	1.30	0.46
3. I feel confident with my skills in recognizing and assessing newborn pain	1.33	0.47
4. Infants who are exposed to repetitive, unrelieved painful stimuli experience adverse, long term neurologic effects	1.44	0.58
5. Because of their immature neurologic system, newborns experience less pain than older children and adults	4.38	0.90
6. I feel apprehensive when giving newborns opiates due to the risk of respiratory depression and/or addiction	3.76	1.06
7. Non-pharmacological pain relief measures (oral sucrose, pacifiers, blanket-swaddling) are effective to decrease newborn pain	1.70	0.71
8. Since most invasive procedures (such as intubation and blood draws) can be completed quickly, it is not necessary to pre-medicate for pain	3.72	0.90
9. It is difficult to manage newborn pain due to heavy assignment and time restrains	3.86	1.05
10. Procedural pain is unavoidable in the NICU	3.46	1.07
11. I believe that newborn pain is well managed in my unit	2.47	0.89
12. I have received adequate training regarding newborn pain recognition/assessment	1.86	0.71
13. My unit's pain management protocols are clear, comprehensive, and based on current research	1.86	0.69
14. The nurses and physicians in my unit are receptive to new, evidence based practices	2.06	0.77
15. I rely on my own instinct/other nurses/doctors/ journals to tell me whether or not a newborn is having pain	2.54	1.13
16. Working closely with my attending physician to accurately manage pain encourages me to provide high level care	1.65	0.78
17. The more ill my patient is, the more pain medication I am likely to administer	2.60	0.97

REFERENCES

- American Academy of Pediatrics. (2004). Level of neonatal care. *Pediatrics*, *114* (5), 1341-1347.
<http://dx.doi.org/10.1542/peds.2004-1697>
- Anand, K.J.S., & Scalzo, F. M. (2000). Can adverse neonatal experiences alter brain development and subsequent behavior? *Biological Neonate*, *77* (2), 69-82.
- Byrd, P. J., Gonzales, I., & Parsons, V. (2009). Exploring barriers to pain management in newborn intensive care units: A pilot study of NICU nurses. *Advances in Neonatal Care*, *9* (6), 299-306.
- Carbajal, R., Rousset, A., Canan, C., Coquery, S., Nolent, P., Ducrocq, S., ... Breart, G. (2008). Epidemiology and treatment of painful procedures in neonates in intensive care units. *JAMA*, *300* (1), 60-70. <http://dx.doi.org/10.1001/jama.300.1.60>.
- Dilen, B., & Elseviers, M. (2010). Oral glucose solution as pain relief in newborns: Results of a clinical trial. *Birth: Issues in Perinatal Care*, *37* (2), 98-105.
<http://dx.doi.org/10.1111/j.1523-536X.2010.00389.x>
- Gyland, E. A. (2012). Infant pain assessment: A quality improvement project in a level III neonatal intensive care unit in northeast Florida. *Newborn & Infant Nursing Reviews*, *12*(1), 44-50. <http://dx.doi.org/10.1053/j.nainr.2011.12.007>
- Latimer, M. A., Johnston, C. C., Ritchie, J. A., Clarke, S. P., & Gilin, D. (2009). Factors affecting delivery of evidence-based procedural pain care in hospitalized neonates. *Journal of Obstetric, Gynecologic & Neonatal Nursing*, *38* (2), 182-194.
<http://dx.doi.org/10.1111/j.1552-6909.2009.01007.x>

March of Dimes Foundation. (2009). In the NICU: Which babies need care in the NICU?

Retrieved July 5, 2013, from <https://www.marchofdimes.com/baby/which-babies-need-care-in-the-nicu.aspx>

Maxwell, L.G., Malavolta, C.P., & Fraga, M.V. (2013). Assessment of pain in the neonate.

Clinics in Perinatology, 40, 457-469.

Simons, SH., VanDijk, M., Anand KS., Roofhooft, D., VanLingen RA., & Tibboel D. (2003).

Do we still hurt newborn babies? *Archives of Pediatric and Adolescent Medicine*, 157(11), 1058-1064.

Walker, S. M. (2005). Management of procedural pain in NICUs remains problematic. *Pediatric*

Anesthesia, 15, 909-912. <http://dx.doi.org/10.1111/j.1460-9592.2005.01758.x>