CE 1.5 HOURS Continuing Education

Comparing N-PASS and NIPS

Improving Pain Measurement in the Neonate

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ABSTRACT

Background: Proper assessment of pain is essential to allow for safe and compassionate care of infants in the neonatal intensive care unit (NICU). The Neonatal Infant Pain Scale (NIPS) used in an urban level IV NICU addresses acute pain but may not adequately measure chronic neonatal pain.

Purpose: The purpose of this quality improvement study was to improve acute and chronic pain measurements for neonates in an NICU through implementation of the Neonatal Pain, Agitation, and Sedation Scale (N-PASS).

Methods/Search Strategy: An evidence search for a comprehensive tool to assess neonatal pain in the setting of a 45-bed level IV NICU was completed. The N-PASS was found to be inclusive of measuring acute and chronic neonatal pain. Participants for a quality improvement study, including NICU nurses and providers, were educated on the N-PASS. Nurses documented in the N-PASS and the NIPS during routine pain assessments for NICU infants for comparison. Participants completed a survey assessing knowledge of the N-PASS.

Findings/Results: When compared, the N-PASS generated 98% of pain scores greater than the NIPS. Surveys demonstrated an increase in staff knowledge for the N-PASS.

Implications for Practice: Implementation of a multidimensional pain tool that measures acute and chronic pain is essential for proper pain assessment. Providers can manage neonatal pain when accurate documentation is available.

Implications for Research: Further research evaluating guided management of acute and chronic pain scores on the N-PASS would aid hospital policies on therapies for neonatal pain.

Key Words: neonatal pain measurement, neonatal pain tool, NIPS, N-PASS

Neonatal pain assessment, measurement, and documentation are a challenge among many neonatal intensive care units (NICU). Infants in the NICU experience a multitude of acute and chronic painful events. Examples of acute painful events include laboratory draws, intubation, arterial punctures, and intravenous attempts. Examples of chronic painful events neonates endure include frequent suctioning of intubated patients, gastric tube placements, position changes, or respiratory support care with mask/prong changes. Neonates, incapable of verbal self-report, rely on their care providers to accurately assess nonspecific behavioral and physiological cues to identify the presence of their pain.[1,2] Therefore, NICU clinicians must implement a strong evidence-based measurement tool to reflect accurate pain assessment in order to ensure optimal pain management. Failure to adequately measure and manage pain leads to negative short- and long-term physiological, behavioral, and cognitive sequelae.[1,3] Potential detrimental effects include altered pain processing, impaired infant–parent bonding, development of psychosomatic conditions, attention-deficit disorder, impaired visual–perceptual ability or visual–motor integration, and poor cognitive functions.[1,3-5]

Pain assessment, measurement, and management have consequently become a focus of care across the United States. Current mandates and regulatory agencies such as The Joint Commission require healthcare professionals to assess pain each time they record a patient's vital signs.[6] Most of the commonly used neonatal pain tools evaluate acute or procedural pain, not ongoing and chronic pain.[1]

Effective pain assessment is the first step toward relieving pain.[7] Therefore, it is crucial to identify a comprehensive tool that measures neonatal pain and agitation in its entirety, as both acute pain and chronic pain, during routine assessments.[1] The management of pain in the NICU can be driven by the subjective impression of the bedside nurse, which is not consistently measured or documented by the available neonatal pain tool.[8] This is simply because

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the tool is not reflective of the neonate's acute or chronic signs of pain.[8]

The Neonatal Infant Pain Scale (NIPS) is a common pain measure tool utilized in many level IV NICUs to evaluate neonatal pain during routine assessments and with painful procedures. The NIPS can be utilized with preterm infants, term infants, and infants up to 1 year of age.[1,2,9,10] The NIPS has been tested for validity and reliability for the neonatal population.[1,2,9-11] Recently, the quality and accuracy of the NIPS in the setting of a level IV NICU, in an urban teaching hospital, have been debated since the NIPS has not been validated to assess chronic neonatal pain.[1] Also, recent research conducted at the Johns Hopkins NICU concluded that the NIPS, although valid and reliable, did not correlate with the bedside nurse's subjective assessment of pain.[8] The NIPS is a common tool used to document neonatal pain; however, it was developed to address only acute and procedural pain.[8,9] Despite its psychometric property testing, the NIPS has limited reporting of clinical utility to assess beyond acute and procedural pain of an infant.[1] The growing chronic ill infant patient population, including infants who are on prolonged respiratory support such as ventilators, infants who are recovering from postoperative procedures, or even infants with long-term feeding difficulties, imposes the need for a pain tool that is valid and reliable for measuring both acute neonatal pain and chronic neonatal pain. These infants do not necessarily endure acute painful events on a routine basis, rather their chronic state and long-term hospitalizations put them at risk for chronic painful events that an otherwise healthy infant would not endure.

An evidence search revealed that the Neonatal Pain, Agitation, and Sedation Scale (N-PASS) was the only documented neonatal pain scale that was designed for the purpose of measuring acute and ongoing/chronic pain in a critically ill infant.[1,8,12-14] The N-PASS also has established validity, reliability, user feasibility, and sufficient evidence regarding psychometric property testing and is comprehensive enough to have both physiologic variables and behavioral variables that are accurately able to measure pain and agitation.[1,8,12-15] The N-PASS can be utilized for the neonatal population, preterm, and term infants up to 100 days of age.[6,7]

The purpose of this quality improvement project was to improve measurement of acute and chronic pain by obtaining valid and reliable scores for neonates in the setting of a large, urban level IV NICU through implementation of the N-PASS. There were 2 aims to this quality improvement project. The main aim of this project was to compare the types of scores obtained between the NIPS and the N-PASS to determine the most effective tool to utilize in the setting of a level IV NICU to measure acute and chronic pain. The second aim was to improve NICU staff knowledge of the N-PASS.

METHODS

This quality improvement study took place over a 3-month period in a 45-bed level IV NICU at an urban teaching hospital. Participants in this quality improvement project included NICU nurses and medical providers. NICU staff members were asked to complete a pre- and postintervention survey to measure staff knowledge of neonatal pain assessment. Data on neonatal pain assessment and measurement were extrapolated from recent evidence-based studies to determine the pre- and postintervention survey questions.[9,13-17] In addition, a group of 5 neonatal and pediatric experts took the survey to confirm reliability.

A total of 58 participants participated in the preassessment survey and 59 participants participated in the postassessment survey of knowledge. After the preassessment survey was completed, all of the NICU nurses and medical providers (nurse practitioners, attending physicians, and residents) were educated by the designated NICU pain team champions on the N-PASS. This was essential since all NICU staff members would be involved in documenting or interpreting the new tool. The NICU pain team champions comprised nurse practitioners and nurses. The nurse champions involved in educating the NICU providers had all been educated and utilized the N-PASS in a previous unit study.

Education consisted of individualized and group learning sessions that consisted of PowerPoint presentations, posters, and handouts.[17] Education focused on physiological and behavioral aspects of infant pain, types of acute and chronic infant pain experienced in the NICU, and the elements of the N-PASS needed to document and interpret accurately.[9,17,18] All NICU staff members were encouraged to register for group learning sessions. Attendance was noted, and for those who did not attend, the NICU pain committee had individualized training sessions with each staff member (nurses, nurse practitioners, and physicians) to ensure they were checked off for their understanding of neonatal pain. This education process took a month to complete.

The NICU pain committee reviewed general examples of physiological and behavioral signs of neonatal pain. Examples included vital sign changes with assessments on the intubated patient, increased tone and irritability on the infant with a history of hypoxic-ischemic encephalopathy, and also the restless infant who is just beginning to tolerate increased feeding volume after a bowel reanastamosis. The NICU pain committee reviewed types of acute and chronic neonatal pain as well. Infants who were under postoperative care had acute pain. Infants

who were chronically intubated and required suctioning with every care time had chronic pain.

Educational training for the N-PASS included setting up each of the NICU hallways with education posters and including N-PASS education cards within each NICU bedside chart for nurses and medical providers to have as a sheet reference. The printed N-PASS illustrated all the criteria to score neonatal pain for physiological and behavioral signs. The N-PASS assessment criteria included crying/irritability, behavior state, facial expression, extremities/tone, and vital sign changes (heart rate, respirations, blood pressure, oxygen saturations).[13,14] The scores for each criterion ranged from 0 to 2, depending on the severity of the criterion listed on the N-PASS reference sheet. NICU staff members were advised that N-PASS pain scores ranged from a total score of 0 to 10 since there were 5 assessment criteria. The NICU staff members were also educated on levels of severity measured with the N-PASS and with the NIPS, which was currently in use. Total pain score of 0 would indicate "no pain" for both the NIPS and the N-PASS. Scores of 1 to 3 on the NIPS and the N-PASS were in the "mild pain" category and warranted a nursing intervention such as swaddling, holding, or a pacifier. Scores of 4 to 7 were in the "moderate to severe pain" category for the NIPS. Scores of 4 to 10 were in the "moderate to severe pain" category for the N-PASS. Scores that ranged in the "moderate to severe pain" category warranted a notification to the provider, nursing intervention, and also a pharmacologic intervention.[1,9,10,13,14,17] NICU staff members were also advised that for the purposes of this quality improvement project, the sedation element of the N-PASS would not be utilized in order to focus specifically on pain measurement.

NICU staff members were reminded over the course of 3 months that the N-PASS would be implemented within the electronic medical record (EMR) system. After nearly a month of N-PASS education, all NICU nurses were individually taught by members of the NICU pain team to document on the N-PASS in the EMR. There was a drop-down menu for nurses to click on the appropriate pain scores for signs of pain displayed by the infant.

After a month of education on the N-PASS and learning documentation, the N-PASS was launched in the NICU. For 1 week, all nurses documented in both the NIPS and the N-PASS for each patient during all routine pain assessments. Routine pain assessments are generally every 8 hours during patient care times. Painful stimuli neonates experience during care times include suctioning, diaper changes, position changes, laboratory draws, intravenous attempts, or respiratory mask adjustments. Interrater reliability was established for the pain assessment scores since the same nurse would document a score on the NIPS and the N-PASS based on each specific tool. All admitted NICU infants encompassing both acute pain and chronic pain were included in the project. Pain scores that were excluded from the project were those that were incorrectly documented (ie, included sedation scoring or premature pain assessment scoring).

A total of 553 NIPS and 553 N-PASS scores were collected for comparison after data collection and cleaning by the primary investigator of the project. Since each pain tool had different measurement values, the scores documented from each tool were organized into pain categories based on the literature.[1,9,13,14] The categories ranged from no pain—no intervention, mild pain—nonpharmacologic intervention, and moderate to severe pain—pharmacologic intervention. Scores of 0 on both tools were in the "no pain" category. Scores of 1 to 3 on the NIPS and the N-PASS were in the "mild pain" category. Scores of 4 to 7 were in the "moderate to severe pain" category for the NIPS. Scores of 4 to 10 were in the "moderate to severe pain" category for the N-PASS.[1,9,10,13,14,17]

After the implementation of the N-PASS, NICU staff members were asked to participate in a postintervention survey to measure staff knowledge of neonatal pain assessment. The pre- and postintervention surveys were collected through Qualtrics, an online survey tool.

Statistical Methods

The Statistical Package for Social Sciences (SPSS), version 24, was utilized for statistical analysis of the pre- and postintervention knowledge surveys and the comparison of NIPS and N-PASS pain scores. Independent *t* tests were used to analyze the pre- and postintervention survey data for knowledge since the 2 NICU groups surveyed varied. A χ^2 analysis was performed to assess the pain score data.

RESULTS

Demographics

The NICU staff evaluated for level of knowledge data consisted of nurses and medical providers (nurse practitioners and physicians). Demographic data were collected as part of the knowledge and satisfaction pre- and posttest surveys. Since variables were categorical, a χ^2 test was completed to determine statistical significance between pre- and posttest demographic groups. Both demographic data variables were not statistically significant, indicating that the 2 groups were equal. The results are noted in Table 1.

Knowledge of Neonatal Pain

One of the project aims was to improve NICU staff knowledge of the N-PASS. The NICU staff participated in a brief pretest survey on their knowledge of neonatal pain and pain tools. After completion of the neonatal pain education, the NICU staff

TABLE 1. NICU Pre- and Posttest Demographic Data

Demographics	Preimplementation Data, n (%)	Postimplementation Data, n (%)	P[a]
Type of NICU staff	N = 56	N = 58	.284
Nurse	44 (75.9)	50 (84.7)	
Provider	12 (20.7)	8 (13.6)	
Years of NICU experience			
0-3 y	16 (27.6)	16 (27.1)	.980
4-6 y	8 (13.8)	10 (16.9)	
7-10 y	5 (8.6)	5 (8.5)	
>11 y	27 (46.6)	27 (45.8)	

Abbreviation: NICU, neonatal intensive care unit.
[a]*Significance was determined using the χ^2 test.*

participated in a brief posttest survey assessing their level of knowledge of neonatal pain. The neonatal pain knowledge survey consisted of 6 questions and was scored out of a possible total of 6 points. The pretest mean score was 3.72, with a standard deviation of 1.47. The posttest mean score was 4.53, with a standard deviation of 1.33. Since both pre- and posttest groups did not have identifier data, an independent-samples *t* test was completed to assess for statistical significance. Results of the participants' knowledge indicated a statistically significant increase ($P = .003$) after neonatal pain education.

Comparing the NIPS With the N-PASS

The main aim of this project was to compare scores between the NIPS and the N-PASS to determine the most effective tool to be utilized in the setting of a level IV NICU to measure acute and chronic pain. After NICU staff had completed the pretest survey for knowledge and satisfaction for neonatal pain, they received education on the N-PASS. The N-PASS was integrated into the EMR system. For 1 week, all NICU nurses were asked to complete their routine pain assessments on their patients and score each patient using both the NIPS and the N-PASS at the same time in the EMR to ensure interrater reliability. All neonates who were admitted into the NICU during this week were included in the project. There were a total of 44 neonates who were included in the project. The ages ranged from 26 weeks' gestational preterm infants to 2 months old term infants. Over the course of 1 week, a final count of 553 NIPS scores and 553 N-PASS scores were generated for comparison. Incorrectly documented scores (ie, missing values, negative numbers associated with sedation, etc) were excluded. If an N-PASS score was documented incorrectly, the paired NIPS score was also eliminated since there would be no accurate data point for comparison. Scores were collected and cleaned for data analysis by the primary investigator of the project. Table 2 illustrates a distribution of the NIPS and N-PASS scores and how they compared with each other. Figure 1 is a flowchart that illustrates the breakdown of total collected NIPS and N-PASS scores.

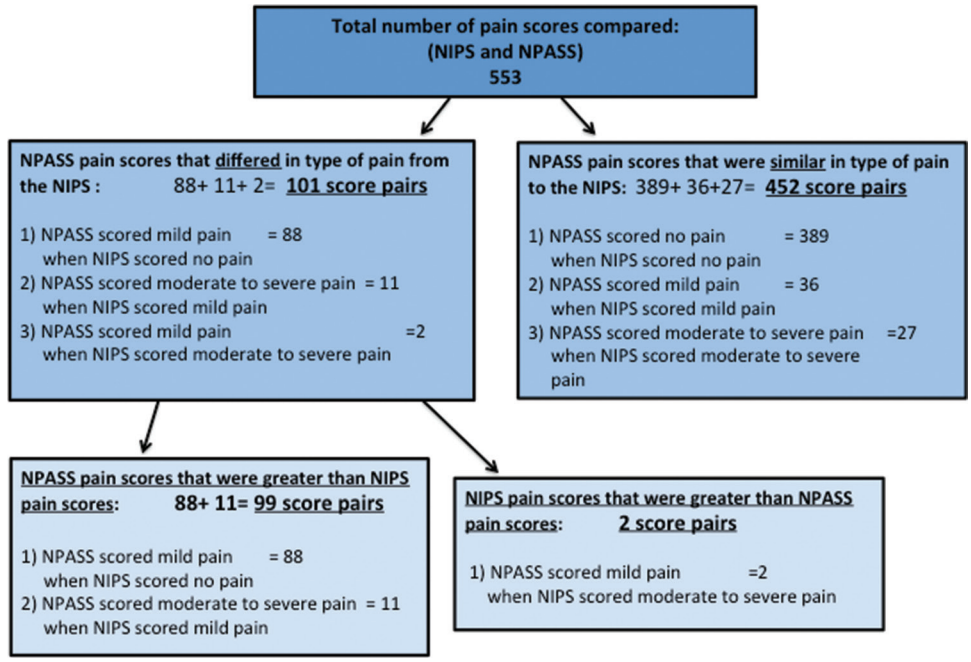
Of a total of 553 score pairs collected, most of the score pairs generated between the NIPS and the N-PASS were equal in level of pain measured (n = 452) (refer to Figure 1). However, of the total of 553 paired NIPS and N-PASS scores, there were pain score pairs that differed in level of pain measured between the NIPS and the N-PASS (n = 101) (refer to Figure 1). Of those 101 compared scores that varied in level of pain between the NIPS and the N-PASS, 98% of the pain scores demonstrated that the N-PASS indicated a higher level of pain than the NIPS (refer to Table 3). Only 1.9% of the 101 compared pain scores that

TABLE 2. Comparison of NIPS With N-PASS Scores

N-PASS: Type of Pain	NIPS: Type of pain			Total
	No Pain (No Intervention)	Mild Pain (Nonpharmacologic Intervention)	Moderate to Severe Pain (Pharmacologic Intervention)	
No pain (no intervention)	389	0	0	389
Mild pain (non-pharmacologic intervention)	88	36	2	126
Moderate to severe pain (pharmacologic intervention)	0	11	27	38
Total	447	47	29	553

Abbreviations: NIPS, Neonatal Infant Pain Scale, N-PASS, Neonatal Pain, Agitation, and Sedation Scale.

FIGURE 1



Flowchart of NIPS and N-PASS pain scores that were compared. NIPS indicates Neonatal Infant Pain Svcale, N-PASS, Neonatal Pain, Agitation, and Sedation Scale.

varied demonstrated that the NIPS indicated a higher level of pain than the N-PASS (refer to Table 3). A single-proportion χ^2 test assessed the results between the differences of the NIPS and the N-PASS. The *P* value reflected a highly statistically significant result that showed the proportion of N-PASS scores that were different or higher than NIPS scores ($P < .0001$, z-statistic = 9.648).

DISCUSSION

Accurate pain measurement in the neonate has been a challenge among many NICUs. Infants in the NICU experience a multitude of acute and chronic painful events. Infants depend on their care providers to accurately assess, measure, and document behavioral and physiological cues to identify the presence of their pain, since they are incapable of verbal self-report of pain. Proper assessment of pain is the first step toward relieving pain. Therefore, the neonatal staff needs to have specialized knowledge, education, and pain measurement tools to be cognizant of physiological and behavioral responses neonates have to pain in order to intervene.

The N-PASS was discovered through an evidence search process and was found to be the only tool inclusive of measuring acute and chronic pain in neonates. The N-PASS has established validity, reliability, user feasibility, and sufficient evidence regarding psychometric property testing in the neonatal population. In this quality improvement project, the N-PASS was implemented within an urban level IV NICU and compared against the currently utilized NIPS. NICU nurses and providers were also evaluated on their knowledge of neonatal pain and between the NIPS and the N-PASS. NICU pain team champions were an integral part in aiding to improve NICU staff knowledge through individualized learning sessions and group sessions using methods such as PowerPoint, handout reminders, and posters. Staff members were educated with the original N-PASS and given the criteria needed to score neonates appropriately. They were also educated with how to document N-PASS pain scores on the EMR by the

TABLE 3. N-PASS Versus NIPS Comparing Differences With Varied Score Pairs[a]

	N-PASS > NIPS	NIPS > N-PASS	Total Varied Scores
Scores	99	2	101
%	98	1.9	100

Abbreviations: NIPS, Neonatal Infant Pain Scale, N-PASS, Neonatal Pain, Agitation, and Sedation Scale.
[a]P < .0001, z-statistic = 9.648). Significance was determined using one-proportion χ^2 test.

TABLE 4. NICU Pain Education and Knowledge Scores[a]

	NICU Pain Education Structure
NICU staff members	Nurses Nurse Practitioners Attending physicians
Education topics	(1) Physiological and behavioral aspects of neonatal pain (2) Types of acute neonatal pain and chronic neonatal pain (3) Understanding the N-PASS: documenting and interpreting
Duration	1 mo
Methods	Group learning sessions Individual (one on one) learning sessions (All NICU staff members were checked off with session)
Resources	PowerPoint Posters N-PASS reference sheet within each bedside chart and each NICU hallway
Results	Knowledge pretest mean score (n = 58) = 3.72 (SD = 1.47) Knowledge posttest mean score (n = 59) = 4.53 (SD = 1.33)

Abbreviations: NICU, neonatal intensive care unit; N-PASS, Neonatal Pain, Agitation, and Sedation Scale.
[a]Results of the participants' knowledge indicated a statistically significant increase (P = .003) after neonatal pain education.

NICU pain team champions. Several methods of how NICU staff knowledge improved were repeated with multiple education modalities, along with daily reminders by NICU pain team champions (Table 4).

Overall, the main outcome that this quality improvement project demonstrated was that the N-PASS was a more clinically sensitive tool than the NIPS for assessing both acute pain and chronic pain in this neonatal population. The N-PASS was sensitive enough to measure higher pain scores in neonates during routine pain assessments, whereas the NIPS scored lower values during the same routine pain assessment. This indicated that the N-PASS was sensitive enough to measure a level of pain that the NIPS could not measure. This could be evidenced by the fact that the N-PASS is noted to be a valid and reliable pain tool that measures both acute pain and chronic pain. There was a very high degree of statistical significance associated with this comparison ($P < .0001$), indicating that the N-PASS was statistically and clinically significant in accurately detecting both acute pain and chronic pain in neonates than the NIPS. The N-PASS provides the NICU with a measurement tool that is sensitive enough to detect both acute pain and chronic pain, more so than the currently utilized NIPS. Results from the NICU staff knowledge assessment of pain indicated a statistically significant increase in knowledge and understanding of neonatal pain and the N-PASS.

CONCLUSION

Pain assessment and measurement in the neonatal population have been progressively studied; however, there is still much discussion about the quality and precision of the tools that are commonly in use. The main outcome of this quality improvement project demonstrates that the N-PASS is more clinically sensitive and effective for measuring both acute pain and chronic pain for our neonatal population by detecting higher pain scores than the NIPS. The N-PASS was sensitive enough to detect a high pain score on a neonate when the NIPS was not able to. This quality improvement project also demonstrated that effective education through the use of champions and individualized/group learning sessions had significant clinical impact on increasing staff knowledge. As infants continue to experience many painful events in the NICU, it is crucial that neonatal pain be effectively measured and managed by the NICU staff. The staff education and implementation of the N-PASS have been shown to be clinically useful in the setting of this level IV NICU. Ultimately, effective pain measurement and subsequent pain management are essential to improve patient outcomes and improve our overall goal of discharging infants home with their families sooner.

FUTURE IMPLICATIONS

The N-PASS is now the primary neonatal pain tool utilized in this urban level IV NICU. Further evaluation or a repeat quality improvement project to assess and verify results of this project is necessary. The N-PASS is also valuable in that it is more than just the function of assessing neonatal pain; it has been used for assessing neonatal sedation.[8,13,14] For the purposes of this quality improvement project, the N-PASS was utilized to evaluate its significance in measuring acute and chronic neonatal pain. Further evaluation and research of the N-PASS to assess its impact on sedation in neonates are needed.

Summary of Recommendations for Practice and Research

What we know:	• Neonatal pain assessment is challenging secondary to various nonspecific signs/symptoms neonates display. • Adequate recognition of neonatal pain signs is essential to properly manage pain. • Pain, especially in the neonatal population, should be inclusive of both chronic and acute symptoms.
What needs to be studied:	• Effectiveness of various neonatal pain tools in the setting of various acuity NICUs. • N-PASS pain scores that vary between chronic ill neonatal patients and acutely ill neonatal patients. • Further evaluation and research in regard to the sedation aspect of the N-PASS need to be studied secondary to lack of a neonatal sedation tool.
What can we do today that would guide caregivers in the practice setting considering use of this evidence for guiding practice:	• Consistently reassess the need for staff education for proper pain assessment. Neonates rely on their care providers to properly assess signs and symptoms of their pain for adequate management. • Assess the need to change the neonatal pain tool to best accommodate the neonatal population. • Assess effectiveness of the N-PASS in guiding care for sedation practices in the NICU.

References

1. Duhn LJ, Medves JM. A systematic integrative review of infant pain assessment tools. *Adv Neonatal Care*. 2004;4(3):126-140.
2. Spasojevic S, Bregun-Doronjski A. A simultaneous comparison of four neonatal pain scales in clinical settings. *J Matern Fetal Neonatal Med*. 2010;24(4):590-594.
3. Committee on Fetus and Newborn and Section on Anesthesiology and Pain Medicine. Prevention and management of procedural pain in the neonate: an update. *Pediatrics*. 2016;137(2):e20154271. doi:10.1542/peds.2015-4271.
4. Hall RW, Anand KJ. Pain management in newborns. *Clin Perinatol*. 2014;41(4):895-924.
5. De Graaf J, Van Lingen R, Simons S. Long-term effects of routine morphine infusion in mechanically ventilated neonates on children's functioning: five-year follow-up of a randomized controlled trial. *Pain*. 2011;152:1391-1397.
6. The Joint Commission. Clarification of the pain management standard. http://www.jointcommission.org/topics/pain_management.aspx. Published 2016. Accessed January 10, 2016.
7. Pölkki T, Korhonen A, Laukkala H, Saarela T, Vehviläinen-Julkunen K, Pietilä A. Nurses' attitudes and perceptions of pain assessment in neonatal intensive care. *Scand J Caring Sci*. 2010;24(1):49-55.
8. Hillman B, Tabrizi M, Gauda E, Carson K, Aucott S. The Neonatal Pain, Agitation and Sedation Scale and the bedside nurse's assessment of neonate. *J Perinatol*. 2015;35(1):128-131.
9. Gallo AM. The fifth vital sign: implementation of the neonatal infant pain scale. *J Obstet Gynecol Neonatal Nurs*. 2003;32(2):199-206.
10. Lawrence J, Alcock D, McGrath P, Kay J, MacMurray SB, Dulberg C. The development of a tool to assess neonatal pain. *Neonatal Netw*. 1993;12(6):59-66.
11. Taddio A, Hogan M, Moyer P, et al. Evaluation of the reliability, validity and practicality of 3 measures of acute pain in infants undergoing immunization injections. *Vaccine*. 2011;29(7):1390-1394.
12. Giordano V, Deindl P, Kuttner S, Waldhor T, Berger A, Olischar M. The Neonatal Pain, Agitation, and Sedation Scale reliably detected oversedation but failed to differentiate between other sedation levels. *Acta Paediatr*. 2014;103:515-521.
13. Hummel P, Puchalski M, Creech SD, Weiss MG. Clinical reliability and validity of the N-PASS: Neonatal Pain, Agitation and Sedation Scale with prolonged pain. *J Perinatol*. 2008;28(1):55-60.
14. Hummel P, Lawlor-Klean P, Weiss MG. Validity and reliability of the N-PASS assessment tool with acute pain. *J Perinatol*. 2010;30(1):474-478.
15. Reavey D, Haney B, Atchison L, Anderson B, Sandritter T, Pallotto E. Improving pain assessment in the NICU. *Adv Neonatal Care*. 2014;14(3):144-153.
16. Khoza SL, Tjale AA. Knowledge, attitudes and practices of neonatal staff concerning neonatal pain management. *Curationis*. 2014;37(2):E1-E9.
17. Deindl P, Unterasinger L, Kappler G, et al. Successful implementation of a neonatal pain and sedation protocol at 2 NICUs. *Pediatrics*. 2013;132(1):211-218.
18. Hatfield LA, Ely EA. Measurement of acute pain in infants: a review of behavioral and physiological variables. *Biol Res Nurs*. 2015;17(1):100-111.

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