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Validity of behavioral and physiologic parameters for acute pain assessment of term newborn infants

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ABSTRACT

Context: The subjectivity of pain causes enormous difficulties in evaluating neonatal pain with a single, practical and easy-to-apply tool. Pain evaluation in the neonatal period should be performed by valid, safe, useful and feasible methods.

Objective: To evaluate the validity of the Neonatal Facial Coding System (NFCS), Neonatal Infant Pain Scale (NIPS), heart rate (HR) and O_2 saturation (O_2sat) for neonatal pain assessment.

Design: Prospective, double-blind randomized trial.

Setting: A secondary level maternity hospital.

Participants: 70 healthy neonates requiring bilirubin dosage were randomly assigned to receive a venous puncture (P: n=33, BW 3.2kg, SD 0.6; GA 39wk, SD 1; 59h of life, SD 25) or an alcohol swab friction (F: n=37; BW 3.1kg, SD 0.5; GA 39wk, SD 1; 52h of life, SD 17).

Intervention: All measurements were taken prior to (PRE), during (T0), and 1(T1), 3(T3), 5(T5) and 10(T10) minutes after the procedure.

Measurements: A neonatologist evaluated NFCS, NIPS, HR and O_2sat by pulse oxymetry.

Results: Median NFCS and NIPS results at T0, T1 and T3 were higher in P group, compared to F. More P neonates presented NFCS >2 and/or NIPS >3 at T0, T1 and T3. HR was lower in P group at T1. Average O_2sat was above 90% during the whole study period in both groups.

Conclusion: NFCS and NIPS are suitable instruments for neonatal pain evaluation. Heart rate and O_2 saturation can be used only as auxiliary methods.

Key Words: Newborn-infant. Pain. Pain Assessment.

INTRODUCTION

Treating the pain of pre-verbal patients with different cognitive levels and with a similar reaction to several types of stimulus is a big challenge. The cornerstone to adequate pain treatment in this population is the availability of adequate pain assessment methods.[1,2] The subjectivity of pain causes enormous difficulties in evaluating neonatal pain with a single, practical and easy-to-apply tool. Pain evaluation in the neonatal period should be performed by valid, safe, useful and feasible methods.[3,4,5]

Several physiologic parameters can be used to evaluate, measure and qualify the pain stimulus in the neonate. Their specificity, sensitivity and workability are variable, but in general they are easily available in Neonatal Intensive Care Units (NICU).[6] These parameters include: heart rate, respiratory rate, blood pressure, O_2 arterial saturation, transcutaneous oxygen and carbonic dioxide pressures, vagal tone, palmar sweating, intracranial pressure and hormones associated with the endocrine-metabolic response to stress. Most of them do not change specifically in response to pain.[7] These physiologic parameters can help to determine the presence or absence of pain, but generally they do not help to qualify

the pain. Moreover, most of the studies that relate pain to modifications in physiologic variables evaluate these changes after an acute and short pain stimulus, which is not the only or the main pain source for patients admitted to NICU.[8]

Study of neonatal behavior seems a promising way of evaluating pain in pre-verbal patients,[9-13] and such behavior includes crying, motor activity, and the facial expression of pain. The cry is considered to be the primary way of communication for newborn infants.[14,15] The message of distress sent by the infant through the cry sensitizes the adult, either the child's mother or another adult who is taking care of it.[16,17] Several studies have tried to relate pain to different characteristics of the cry.[18,19] But the main problem in using the cry as a measure of pain is that approximately 50% of newborn infants do not cry during or after a painful procedure.[1,10,20] Moreover, crying is not a specific pain assessment tool and can be elicited by other non-painful stimuli, such as discomfort and hunger.[21] Therefore, the cry is useful in evaluating pain in the infant's environmental context associated with other pain assessment methods.[21,22]

After a pinprick in one foot, the neonate withdraws the opposite leg in 0.3 seconds, the affected leg in 0.4 seconds, and he cries in 1.8 seconds.[23] Term and preterm newborn infants have an organized repertoire of movements in response to a painful stimulus.[24,25] Motor activity is a sensitive method of pain assessment and its specificity is enhanced by the concurrent use of other physiologic and behavioral pain evaluation tools.[21]

Several studies have indicated that the observation of facial expression seems to be a non-invasive, sensitive, specific and useful method of pain evaluation in term and preterm newborn infants.[9,10,24] The facial activity of pre-verbal infants is expressive and can inform the observer about the emotional status of the neonate, beyond the pain, fulfilling the pain-subjective criteria of the International Association for the Study of Pain's definition.[28] There are several ways of evaluating pain from facial features, but the most studied is the Neonatal Facial Activity Coding System (NFCS). NFCS evaluates eight parameters: brow bulge, squeezed eyes, naso-labial furrow, open lips, stretched mouth, lip purse, taut tongue, and chin quiver. Studies show that brow bulge, squeezed eyes, deepening of naso-labial furrow and open lips are present in more than 90% of the neonates exposed to a painful stimulus.[10] Analysis of facial expression allows an effective communication between the neonates and the professionals that take care of them.

Multidimensional pain assessment is considered ideal because it gives information about individual responses to pain and their interaction with the environment.[8] Among several published neonatal pain scales, the most studied are the Neonatal Infant Pain Scale – NIPS[12] and the Premature Infant Pain Profile – PIPP.[29] The NIPS assesses five behavioral pain parameters (facial expression, cry, position of arms and legs and state of arousal) and one physiologic (breathing pattern). It is a neonatal adaptation of the Children's Hospital of Eastern Ontario Pain Scale – CHEOPS.[30] Evaluations are performed at one-minute intervals prior to, during and after a painful procedure. NIPS seems to be a valid pain assessment method because it is based on known behavioral responses to pain, widely reported in the literature.[12] The scale is able to differentiate term and preterm newborn infants that received a painful stimulus from those that had a distressing non-painful stimulus.[11]

The PIPP was developed by Stevens et al[29] to evaluate acute pain in term and preterm neonates. In this scale the neonate is observed for 15 seconds and the following parameters are scored: gestational age, behavioral state, heart rate increase from baseline, oxygen saturation decrease from baseline and percentage of time that the infant remains with brow bulge, eye squeeze and naso-labial furrow. PIPP is an accurate tool for differentiating painful and distressing stimuli in the neonatal period.[8] This sensitive, specific and useful tool is the only one that takes into account the fact that preterm newborn infants can express less pain than term neonates.[20]

Although a great number of neonatal pain assessment tools are available, none is concomitantly specific, sensitive and valid.[21] Therefore we designed this prospective study to verify whether the Neonatal Facial Coding System, the Neonatal Infant Pain Scale, the heart rate and the arterial oxygen saturation are valid tools for assessing acute pain in term neonates.

METHODS

After Hospital Ethical Committee approval, 70 neonates from a secondary level maternity hospital in the Brazilian state of São Paulo were studied. Inclusion criteria consisted of:

1) Written maternal consent prior to enrollment;
2) Gestational age between 37 weeks and 41 weeks and 6 days;
3) Healthy neonates admitted to rooming-in with their mothers, with post-natal age greater than 24 hours. At this time their stress response to delivery should have become attenuated;[31]
4) Newborn infants with late non-hemolytic jaundice[32] and indication for venous puncture for bilirubin dosage by the clinical staff;
5) 30 to 45 minutes interval between last feeding and study in order to have a calm and reactive patient to observe.

Patients were excluded from the study when:

1) Their mothers had used any opioid during pregnancy, labor or delivery, since this class of drugs can cross the placenta and alter fetus and newborn infant nociception;[33]
2) Their mothers had had general anesthesia during delivery, because anesthetics can readily cross the placenta and interfere with neonatal nociception;[34]
3) Apgar scores[35] at 1 and 5 minutes were less than 7. The low Apgar score could be related to alterations in pain afference to the central nervous system or to central integration of the noxious stimuli;[36]
4) Major malformation[37-39] or neurologic abnormalities were present.

After patient enrollment, the following neonatal data were registered: birth weight in grams, gestational age, gender, relationship between birth weight and gestational age,[40] Apgar scores at 1 and 5 minutes, post-natal age in hours, and minutes after the last feeding.

Neonates were randomly assigned to receive one of the following procedures: venous puncture in the back of the hand (P), considered as a painful stimulus; or alcohol swab friction on the back of the hand (F), considered as a distressing but not painful stimulus. A neonatologist blind to the procedure (P or F) evaluated physiologic and behavioral pain parameters.

After allocation, the patient was placed under a radiant warmer and a shield was positioned between the hand to be punctured or frictioned and the rest of the body, in order to obstruct the vision of the neonatologist in charge of pain assessment. At this time, a pulse oxymeter probe was located in the foot and asepsis of the hand was performed. Then, the neonates rested for five minutes prior to puncture or friction. Only one attempt at venous puncture was made, for all patients, and one milliliter of blood was collected, followed by a quick compression of the hand with dry gauze for hemostasis. F neonates received an alcohol swab friction in the back of the hand followed by a quick compression with dry gauze, simulating the hemostatic phase. After puncture or friction, the newborn infants were observed for 10 minutes. During this period, no pain relief attempts were performed.

The following pain parameters were evaluated:

1) Neonatal Facial Activity Coding System (NFCS) score, defined by the presence or absence of the following facial features: brow bulge, eye squeeze, naso-labial furrow, open lips, stretched mouth, lip purse, taut tongue and chin quiver. One point was given to each feature present (total score = 8). Pain was considered present when at least three features were observed.[9]
2) Neonatal Infant Pain Scale (NIPS) score, defined by the following parameters: facial expression (0/1 point), cry (0/1/2 points), breathing pattern (0/1 point), position of arms (0/1 point), position of legs (0/1 point), and

state of arousal (0 / 1 point). The possible total score was seven, and pain was considered present when the score was greater than three.[12]

3) Heart rate was evaluated by pulse oxymetry, and considered only when the quality of the wave registered was adequate. Bradycardia was defined by heart rate less than 80 bpm and tachycardia by heart rate above 160 bpm;[41]
4) Oxygen saturation was also evaluated by pulse oximetry, taking into account the quality of the wave registered. Hypoxia was defined by oxygen saturation below 90%.[42]

These physiologic and behavioral pain parameters were evaluated at six different times: immediately prior to the procedure (PRE), during hand puncture or friction (T0), one (T1), three (T3), five (T5) and ten (T10) minutes after the procedure.

Statistical Methods. Statistical analysis of data included the Student t test or Mann-Whitney test to compare quantitative variables between the P and F groups at each study time; chi-square or Fisher tests to compare qualitative variables between the P and F groups at each study time; and the Friedman test to compare the results obtained at the different study times for the P and F groups. The results were considered significant when $p < 0.05$.[43]

RESULTS

The study population consisted of 70 newborn infants divided into two groups with the following characteristics (Table 1). The two groups were similar in relation to all these characteristics, except for time after last feeding (t test - P > F: $p = 0.02$).

Comparison of median NFCS scores (Table 2) revealed significant differences between the various study times for the P and F groups. P group median NFCS scores were higher than F during the procedure, one minute, and three minutes after the procedure. When presence of pain was considered as NFCS > 2 (Table 3), significantly more P patients showed signs of pain during the procedure, one minute, and three minutes afterwards.

Comparison of median NIPS scores (Table 2) revealed significant differences between the various study times for the P and F groups. P group median NIPS scores were higher than F during the procedure, one minute, and three minutes after the procedure. When presence of pain was considered as NIPS > 3 (Table 3), significantly more P patients showed signs of pain during the procedure, one minute, and three minutes afterwards.

Comparison of average heart rate values (Table 4) revealed significant differences between the various study times for the P and F groups. The heart rate of P neonates was lower than the heart rate of F patients only at one minute after the procedure. Three minutes after the procedure, 21% of P neonates presented bradycardia or tachycardia versus 3% of F neonates (Table 5).

Comparison of average oxygen arterial saturation values (Table 4) revealed significant differences between the various study times for the P and F groups. Oxygen saturation values were lower in the P group prior to the procedure, one minute, three minutes, and 5 minutes after the procedure. More P patients showed hypoxia (Table 5) one minute, and three minutes after the procedure.

DISCUSSION

The focus of this prospective study was to evaluate the use of physiologic and behavioral

Table 1 – Demographic data

Data	Puncture group (n=33)	Friction group (n=37)	p-value
Birth weight (g)	3160 (SD 556)	3052 (SD 479)	0.38[a]
Gestational age (wk)	39 (SD 1)	39 (SD 1)	0.93[a]
Apgar 1min	8 (SD 1)	9 (SD 1)	0.09[a]
Apgar 5min	9 (SD 0)	9 (SD 0)	0.36[a]
Males	19 (58%)	25 (68%)	0.39[b]
AGA	25 (76%)	28 (76%)	0.99[b]
Hours of life (h)	59 (SD 25)	52 (SD 17)	0.18[a]
Last feeding (min)	33 (SD 5)	31 (SD 2)	0.02[a]

a: t test; b: chi-square test; SD = Standard Desviation

parameters as valid assessment tools for acute pain in healthy term newborn infants. In order to achieve this goal, the two study groups were comparable in terms of their main demographic characteristics. A statistical difference in the interval between feeding and observation was detected between the groups: the fact that the P group was last fed on average 33 minutes prior to the study and the F group 31 minutes does not, however, seem large enough to interfere with the clinical status of the neonates and the results here obtained.

The facial response of neonates to pain was well-documented in the present research. The Neonatal Facial Activity Coding System was able to differentiate term neonates who received the painful stimulus from those who had the non-painful stimulus. Not only were the median NFCS scores higher during puncture, compared to friction, but also there were significantly more P patients showing signs of pain during the procedure, and at one and three minutes afterwards. Therefore, evaluation of facial movements seems to be a valid and specific tool for acute pain assessment in term neonates and these findings are consistent with the literature.[9,11,24,27] However, the modifications of facial mimic in response to pain were transient, and after three minutes they could not be seen anymore in their full expression. This finding raises difficulties for the clinical application of NFCS to pain evaluation at the bedside. New studies should clarify how often the facial movements should be monitored and for how long they should remain altered before analgesic therapeutic intervention is initiated or prior to analgesic dose adjustments. Further studies should analyze the frequency of each facial movement recorded during NFCS assessment, and verify whether there is any association between a set of facial movements, namely brow bulge, eye squeeze, deepening of naso-labial furrow and open lips, with the painful procedure, as

Table 2 - Median (range) of the Neonatal Facial Activity Coding System and Neonatal Infant Pain Scale scores at the six study times

Score	Group		Mann-Whitney
Times	Puncture(n=33)	Friction(n=37)	P-value
NFCS			
Pre	0 (0 to 0)	0 (0 to 0)	1.00
T0	5 (0 to 8)	1 (0 to 8)	< 0.00001
T1	8 (0 to 8)	0 (0 to 8)	< 0.00001
T3	0 (0 to 8)	0 (0 to 8)	0.006
T5	0 (0 to 8)	0 (0 to 8)	0.80
T10	0 (0 to 0)	0 (0 to 0)	1.00
NIPS			
Pre	0 (0 to 0)	0 (0 to 0)	1.00
T0	5 (0 to 7)	1 (0 to 7)	< 0.00001
T1	7 (0 to 7)	0 (0 to 7)	< 0.00001
T3	0 (0 to 7)	0 (0 to 7)	0.074
T5	0 (0 to 7)	0 (0 to 7)	0.77
T10	0 (0 to 0)	0 (0 to 0)	1.00

NFCS: Friedman test

- P group (Pre vs. T0 vs. T1 vs. T3 vs. T5 vs. T10): $p < 0.00001$
- F group (Pre vs. T0 vs. T1 vs. T3 vs. T5 vs. T10): $p = 0.002$

NIPS: Friedman test

- P group (Pre vs. T0 vs. T1 vs. T3 vs. T5 vs. T10): $p < 0.00001$
- F group (Pre vs. T0 vs. T1 vs. T3 vs. T5 vs. T10): $p = 0.0003$

Table 3 - Number (percentage) of patients with NFCS > 2 or NIPS > 3 at each study time

Cut-off point	Group		X^2 or Fisher
Time	Puncture(n=33)	Friction(n=37)	P-value
NFCS >2			
Pre	0	0	1.00
T0	25 (76%)	12 (32%)	0.0003
T1	27 (82%)	9 (24%)	< 0.00001
T3	16 (48%)	1 (3%)	< 0.00001
T5	3 (9%)	2 (5%)	0.60
T10	0	0	1.00
NIPS >3			
Pre	0	0	1.00
T0	25 (76%)	12 (32%)	0.0003
T1	26 (79%)	9 (24%)	< 0.00001
T3	13 (39%)	1 (3%)	< 0.00015
T5	4 (12%)	2 (5%)	0.66
T10	0	0	1.00

previously described.[10] Furthermore, the adoption of a higher cutoff to define the presence of pain by NFCS could increase its sensibility and specificity for neonatal pain assessment.

Among the several multidimensional pain scales described when this study was started, the Neonatal Infant Pain Scale was chosen because it was a simple and easy-to-apply tool, with great potential for clinical use. NIPS was able to differentiate term neonates who received the painful stimulus from those who had a non-painful stimulus. Similarly to NFCS, not only were median NIPS scores higher during puncture, compared to friction, but also there were significantly more P patients showing NIPS greater than three during the procedure, and at one and three minutes afterwards. Therefore, this multidimensional pain scale seems to be a valid and specific tool for acute pain assessment in term neonates and these results are consistent with the literature.[11,12] It should be noted again that after three minutes NIPS scores returned to baseline. Therefore the relationship between the duration of pain responses and the necessity for therapeutic interventions is not clear. Moreover, further studies should establish whether this cutoff (NIPS > 3 = pain) is the ideal one, in order to achieve the maximum sensitivity and specificity for the tool. In relation to its clinical use, the Neonatal Infant Pain Scale is an easier method than NFCS, and requires less personnel training. Also, NIPS scores the facial expression as a whole and values other behavioral parameters and one physiologic pain parameter, i.e. NIPS takes into account the notion that the best tool for evaluating pain is the one that considers its multiple dimensions.[8]

The Premature Infant Pain Profile (PIPP) is another structured and validated multidimensional pain scale recently described.[29] However, PIPP was not available when this study was completed. Perhaps the use of the Premature Infant Pain Profile could give more consistent information about pain, especially in premature infants. It would be interesting to compare the performance of both scales, the NIPS and the PIPP, in a neonatal intensive care unit context.

As shown in the literature, both tools, NFCS and NIPS, were valid for differentiating the neonates who received the painful stimulus from those who had a distressing non-painful stimulus.[9-12,24,26] More studies should be done to evaluate these scales in the presence of various factors that could modulate the pain sensation in term and preterm newborn infants, for instance, the sleep / alert status, the neonatal clinical status and the patients' previous experience of pain, among others.

In both groups the heart rate values decreased during and one minute after the puncture or friction and increased afterwards.

Table 4 - Mean and standard deviation heart rate (HR) and arterial oxygen saturation (O_2 sat) values at the six study times

Data	Group		Mann-Whitney
Time	Puncture(n=33)	Friction(n=37)	P-value
HR (bpm)			
Pre	131 (SD 14)	128 (SD 14)	0.31
T0	98 (SD 42)	106 (SD 36)	0.57
T1	88 (SD 39)	113 (SD 30)	0.01
T3	120 (SD 33)	125 (SD 17)	0.95
T5	128 (SD 18)	124 (SD 17)	0.31
T10	131 (SD 13)	127 (SD 12)	0.26
O_2 sat (%)			
Pre	95 (SD 2)	97 (SD 2)	0.0066
T0	96 (SD 7)	93 (SD 7)	0.13
T1	90 (SD 8)	95 (SD 4)	0.0002
T3	93 (SD 5)	95 (SD 2)	0.045
T5	95 (SD 3)	96 (SD 2)	0.01
T10	96 (SD 2)	97 (SD 1)	0.107

HR: Friedman test

- P group (Pre vs. T0 vs. T1 vs. T3 vs. T5 vs. T10): p = 0.0006
- F group (Pre vs. T0 vs. T1 vs. T3 vs. T5 vs. T10): p = 0.03

O_2 sat: Friedman test

- P group (Pre vs. T0 vs. T1 vs. T3 vs. T5 vs. T10): p = 0.0003
- F group (Pre vs. T0 vs. T1 vs. T3 vs. T5 vs. T10): p = 0.0002

Only at one minute after the procedure was the average heart rate lower in P neonates compared to F infants. Three minutes after puncture more neonates had bradycardia or tachycardia, compared to the friction group. These findings show that the variation of heart rate is an inconsistent and insensitive way to evaluate pain in term newborn infants. Nor is the heart rate variation specific in relation to pain assessment, as occurs with other physiologic variables. It is important to note that in most infants the increase or decrease in heart rate during the puncture was not significant enough to alert the clinician to any need for analgesia or interruption of procedure.

In this study most neonates decreased their heart rate after the puncture instead of showing the usual response, i.e. tachycardia after a painful stimulus. No specific association between a distressing or painful stimulus on the back of the hand and bradycardia could be found. Possibly, technical artifacts interfered with the correct evaluation of heart rate.

Nevertheless, it appears important to repeat the study with heart rate evaluation performed simultaneously by pulse oxymetry and electrocardiography, in order to understand better the heart rate response to painful stimulus in healthy term newborn infants. With the methodology here applied, heart rate assessment was not useful in detecting the neonatal pain. Since heart rate monitoring is routine in almost all neonatal intensive care units, care must be taken in associating its variations with the presence of pain. At best, together with other behavioral and multidimensional pain scales, and interpreted within the environmental context of the patient, the heart rate can only give a secondary support to the clinician who is evaluating the presence of pain in the neonate.

Table 5 - Number (percentage) of patients with HR < 80 bpm and/or HR > 160 bpm or O_2 sat. < 90% at each study time

Cut-off point	Group		X^2 or Fisher
Time	Puncture(n=33)	Friction(n=37)	P-value
HR<80 and/or >160 bpm			
Pre	0	0	1.00
T0	14 (42%)	11 (30%)	0.55
T1	19 (57%)	8 (22%)	0.12
T3	7 (21%)	1 (3%)	0.045
T5	1 (3%)	1 (3%)	1.00
T10	0	0	1.00
O_2 sat < 90%			
Pre	0	0	1.00
T0	8 (24%)	7 (19%)	0.59
T1	12 (36%)	3 (8%)	0.007
T3	6 (18%)	1 (3%)	0.046
T5	1 (3%)	1 (3%)	1.00
T10	0	0	1.00

The oxygen saturation presented a more persistent decrease after the painful procedure, compared to the heart rate, and the decay was more pronounced in the neonates that received the puncture, compared to those that received the friction. Therefore O_2 saturation values seem to be a valid tool for evaluating the newborn infants' pain. However, just as for any physiologic pain parameter, it has a low specificity, and it can be altered by other non-painful stimuli.

Although statistical differences were noted between P and F groups at 1 and 3 minutes after the procedure, the average O_2 saturation values were above 90% during the whole study period, and only a third of P neonates had hypoxia after the procedure. These findings mean that the clinical importance of P and F statistical differences is questionable, and that O_2 saturation also has low sensitivity as a pain assessment tool. That is, it would be difficult to use O_2 saturation values as the only indicator of pain in neonates. Although the monitoring of this physiologic parameter is generally available in neonatal intensive care units, it should be considered as an accessory tool for pain assessment.

In the present study the various pain parameters were analyzed separately, and their assessment of pain presence often did not agree in the same patient. This finding indicates that the use of multiple information can help to establish the presence of neonatal pain, and confirms the utility of composite scales for pain

assessment in newborn infants.

In conclusion, this study helps to validate the Neonatal Facial Activity Coding System and the Neonatal Infant Pain Scale as valid and suitable instruments for neonatal pain evaluation. Heart rate and O_2 saturation have low sensitivity and specificity for evaluating neonatal pain, and can be used only as auxiliary methods. New studies should be performed in order to validate the NFCS and the NIPS in critically ill term and preterm patients. The availability of adequate pain assessment tools is critical for reducing the undertreatment of neonatal pain.

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RESUMO

Contexto: A subjetividade da dor gera uma grande dificuldade para a elaboração de um método único de avaliação e de fácil aplicação na clínica diária. Os métodos para a avaliação da dor no período neonatal devem ser válidos, seguros, confiáveis, úteis e exeqüíveis. **Objetivo:** verificar a validade do Sistema de Codificação da Atividade Facial Neonatal (NFCS), Escala de Dor para o RN (NIPS), freqüência cardíaca (FC) e saturação de oxigênio ($SatO_2$) para a avaliação da dor no recém-nascido (RN). **Tipo de estudo:** prospectivo, duplo-cego e randomizado. **Local:** maternidade de nível secundário. **Participantes:** 70 RN a termo saudáveis, com punção venosa para bilirrubina, divididos em dois grupos: P (n=33) recebeu um estímulo doloroso (punção) e F (n=37) um desagradável (fricção na mão). **Intervenção:** observação do NFCS, da NIPS, da FC e da $SatO_2$, antes (PRÉ), durante (T0) e 1(T1), 3(T3), 5(T5) e 10(T10) minutos após P ou F. **Mensuração:** testes não paramétricos (significância: $p<0.05$). **Resultados:** a mediana do NFCS e da NIPS foi maior no Grupo P em T0, T1 e T3. Mais RN do Grupo P apresentaram NFCS >2 e/ou NIPS >3 em T0, T1 e T3. A FC foi inferior no Grupo P em T1. A $SatO_2$ manteve-se, em média, acima de 90% nos dois grupos. **Conclusões:** o NFCS e a NIPS são válidos para a avaliação da dor aguda no RN a termo. A FC e a $SatO_2$ devem ser utilizadas como coadjuvantes.