

PAIN MANAGEMENT STRATEGIES IN NEONATAL INTENSIVE CARE: CLINICAL PRACTICE AND INFLUENCING FACTORS IN MOROCCAN CONTEXT

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Abstract

Introduction: Neonatal pain is an unpleasant sensation indicating the presence of a problem that affects the well-being of the newborn. Practicing effective methods can be complex and requires collaborative approaches that focus on the patient and his family. The aim of this study was to determine the strategies adopted by professionals for pain management and the factors that are influencing their integration into clinical practice in neonatology. **Materials & Methods:** A descriptive and correlational study was conducted, between July 2020 and June 2021, with a comprehensive sample of 60 health professionals, using a questionnaire and an observation grid, in the Neonatal Intensive Care Unit at the Hassan II University Hospital of Fez, Morocco. **Results:** Pain management strategies are insufficiently integrated into clinical practice. For environmental factors promoting well-being, behavioral observation 0.629** ($p < 0.01$) and respect for the sleep/wake cycle 0.599** ($p < 0.01$) were the two most significant positive variables. For personal factors, there was a statistically significant negative correlation between staff psychological experience and developmental strategies. Burnout - 0.668** ($p < 0.01$) and mental distress - 0.609** ($p < 0.01$) were the two most significant variables. Furthermore, the ANOVA showed a statistically significant negative correlation between environmental and personal factors and pain management strategies ($F=15.845$, $p < 0.05$). **Conclusion:** The management of painful procedures in the Neonatal Intensive Care Units in Morocco requires a consolidation of the efforts by both professionals and managers. Careful action should be taken on environmental and personal factors in order to develop strategies for better pain management in neonatology.

Keywords: clinical practice ICU; newborn; pain care; professional; strategy; Morocco.

Introduction

Hospitalized newborns are faced with multiple cares causing stress, discomfort and pain [1]. Neonatal stress is a physical, psychological and social event that causes multiple reactions and an instability between the body and its environment [2]. As a stressful experience, pain is an unpleasant phenomenon associated with an actual or potential in newborns can lead to increases in heart rate, blood

injury, with sensory, emotional, cognitive and social components [3]. However, the neonatal intensive care environment contains many stressors including painful procedures, excessive noise and bright lights. As a result, premature or sick term newborns may undergo more than 700 procedures during hospitalization, more than 200 handling episodes in a 24-hour period and 93 heel pricks in a two-week period [4]. In this regard, stress reactions temperature and hypoxemic episodes [5]. However,

experience intense stress episodes. The main sources are the physical environment, the sight of their sick child and the fear of possible after-effects the feeling of powerlessness and inability to fulfil their parental role [6].

Indeed, in the context of managing a care situation, health care staff are obliged to carry out interventions for therapeutic or diagnostic purposes. In most cases, painful care and procedures are not accompanied by adequate analgesia and pain relief measures [7]. However, given the dynamic development of pain memory, its management during painful care is a professional duty and a human right. This contributes to the protection of the child from long-term consequences, including negative reactions to subsequent painful events, and to the acceptance of care [8].

Several factors can be identified in pain management. The attitudes and beliefs of health professionals, the care environment and the parents' lack of knowledge and information can influence and limit its optimal management [9]. However, the practice of effective pain prevention and relief strategies can be complex and requires collaborative and collective approaches that go beyond the expertise of a single profession. A competent, collaborative, patient- and family-centered interprofessional team is necessary for quality pain and invasive care [10]. The premature or full-term baby is a human being in his or her own right with important needs and desires that must be respected to enable him or her to build his or her own personality and develop in the best possible conditions [11]. In front of this being deprived of speech, his body reflects his emotional situation of discomfort and suffering in case of pain. In the same, it is essential for the practitioner to decode these unpleasant manifestations [12]. The detection of pain in newborns is based on the observation of their behavior using adapted and validated scales for their age and circumstances. Although these scales are available in clinical settings, their use is not widespread [13]. Nevertheless, the care environment should be conducive to the well-being of the child and parents. Pain management is best achieved through prevention, restriction and avoidance of harmful stimuli and the use of analgesia. Preparing this space and administering anxiolytics in stressful situations can also be helpful [14]. However, painful or stressful procedures should be kept to a minimum. Repeated painful procedures can cause algic behavior to the hospitalized newborns [15]. It has been shown that the severity of the condition and the number of painful procedures have a significant influence on pain scores [16]. Following painful procedures, analgesic treatment has become an obligation for careers. The ability of the newborn to feel pain has become a scientific fact. Non-pharmacological means, which may be environmental or behavioral in nature, play a key

role in pain management. Thus, non-medicinal means may be favored, including swaddling, non-nutritive sucking, oral sucrose administration and positioning [17].

Indeed, assessment is an essential step in pain management. To be effective, it is necessary to anticipate the location, quality, duration, intensity and to use an appropriate assessment tool [18]. Health professionals are not aware of how to perceive, assess and manage pain in newborns. Indeed, a range of barriers to optimal care have been identified by studies¹⁹. These include the need of age-specific assessment tools, the limited ability to use available evidence on pain, the need to effectively integrate practitioners, parents and families in the provision of care, and structural issues [19]. In this respect, eliminating or reducing any painful or stressful procedures during the hospitalization of a newborn baby is a challenge for all practitioners. The aim of this study is to evaluate the strategies adopted by professionals for pain management and the factors influencing their integration into clinical practice in neonatology.

Materials and methods

Study design and Setting

In order to answer the research question and to control for study bias, a quantitative descriptive correlational research design was adapted. The study took place in the Neonatal Intensive Care Unit of the Mother and Child Hospital of Hassan II University Hospital in Fez, Morocco. This is a high-level service, with an inter-regional hierarchy within the pyramid of care, which handles all potentially painful care interventions. Respecting the inclusion and exclusion criteria, we chose the most involved professionals in pain management and assessment among all the staff working in the care unit (n=60) with 17 doctors, 27 nurses and 16 caregivers. The inclusion criteria was a previous experience in the management of hospitalized neonates in ICU. Professionals who did not agree to participate in the study were excluded.

Data collection

This study was based on two data collection instruments (local questionnaire surveys) allowing confidentiality of the data and better representativeness. After pre-test approval, the questionnaire was reliable with a Cronbach's alpha of 0.93 and an intraclass correlation coefficient of 0.9. One hundred twenty variables were selected, divided to 4 major items: the sociometric features, the general knowledge about pain, the care environment and the pain management strategies. Thus, an observation grid was chosen to explore the practical conduct of the participants. It carried out in

different situations and at different times: before, during and after care. The observed acts refer to blood sampling, hygiene and comfort care, taking peripheral and central venous lines, intubation, placing a nasogastric tube, tracheal suctioning, various mobilizations and subcutaneous injection. It allowed not only to test the validity of the information collected through the questionnaire but also to describe the participants' behavioral situations. For the data collection process, both instruments were tested and validated with other professionals in a similar unit. The study took place between July 2020 and June 2021. During this period, data collection through observation took place in scheduled sessions with the consent of the participants, from a total of 55. The aim was to clearly define other aspects of this study.

Statistical analyses

The data were processed using the Statistical Package for Social Sciences (SPSS) version 25 software. Descriptive statistics, Pearson correlation and variance analyses (ANOVA) were performed to measure the power of the relationship between the variables. All tests of significance were checked at two-sided p-value of 0.05. For each stage of management, the level of pain management strategies was assessed in percentages.

Ethical consideration

This work is part of a doctoral project in Neonatal Developmental Support Care. The study was approved by the University Hospital Ethics Committee of Hassan II University Hospital was obtained (n° 21/19; 18/08/2022); clear informed consent was obtained from all the participants. The later were informed of their right to decide on the extent of the information contained in the final report and to withdraw at any time; confidentiality was assured.

Results

Socio-demographic characteristics

It should be noted that only 55 professionals agreed to take part in this study, with a rate of 92 %; distributed as following: 25 (45.46%) were nurses, 16 (29.09%) were doctors and 14 (25.45%) were caregivers. The female gender was prominent with 46 (83.64%). The most dominant age group was between 20-30 years old (n= 47; 85, 45%), while the age group between 30 and 40 years didn't exceed (n= 8; 14.55%). Regarding professional seniority, 19 (34.55%) had less than 2 years, 18 (32.73%) had between 2 and 5 years' experience, 10 (18.18%) had between 5 and 10 years'

experience while only 8 (14.54%) worked more than 10 years in neonatology ICU.

General knowledge of pain

Regarding training in the management of pain in newborns, 49 participants (89.09%) stated that they had no knowledge in this area. Regarding the meaning of pain in the newborn, 26 (47.27%) consider it as an unpleasant sensory and emotional experience; it corresponded to a present or potential tissue damage for 11 (20.01%), an inherent quality of life present in all living organisms for 8 (14.54%). Ten participants (18.18%) were unaware of the exact meaning of pain in the newborn.

For the methods of helping the baby to return to calm, 26 participants (47.27%) opted for the use of dummy or other object to suck (the baby's fingers or those of the parents), 11 (20.01%) opted for the asymmetrical flexion positioning, 9 (16.36%) used to bring the hands close to the baby's mouth, 8 (14.54%) opted for grasping and only 4 (7.27%) for swaddling.

For non-pharmacological methods of pain management, 48 (87.27%) adopted the skin-to-skin contact method, 42 (76.36%) opted for breastfeeding/bottle feeding /nipple feeding, 40 (72.73%) used oral sugar solution, only 4 (7.27%) preferred using swaddling and touch massage and 2 (3.64%) opted for music therapy. None of the participants selected the decreasing over-stimulation with sound and reducing brightness. As for their knowledge on the harmful effects of pain, 40 participants (72.73%) assessed that pain had no negative effect on the newborn, 9 (16.36%) stated the sudden changes in vital parameters and 6 (10.90%) announced the occurrence of cerebral hemorrhage in the first five days of life. Only 4 participants (7.27%) stated that the pain was remembered in the medium term and that psycho-behavioral problems appeared in the longer term.

Regarding knowledge of the behavioral signs of pain, 48 of the professionals (87.27%) reported the presence of wrinkled foreheads and clenched eyelids, 40 (72.73%) reported the appearance of furrowed brows, 38 (69.09%) reported the accentuation of the nasolabial folds and the agitation of the arms and only 6 (10.90%) detected pain through tachycardia, sweating and withdrawal reaction.

Care environment

Regarding the environmental factors that promote the well-being of hospitalized newborns, 40 participants (72.73%) paid attention to their feeding, 19 (34.55%) reported the creation of moments of silence, 14 (25.45%) confirmed the practice of asymmetrical positioning, 11 (20.00%) emphasized the organization of the care unit. Only 7 (12.73%)

reported managing work-related stress, 6 (10.90%) reported skin-to-skin carrying and 2 (3.64%) evoked the respect of the wake/sleep cycle, with an absence of care grouping and observation of newborn behavior.

Concerning the impact of the pain and discomfort of the newborn on the psychological experience of the personnel, 40 participants (76.36%) stated that they suffered morally, 36(65.45%) declared professional exhaustion, 26(47.27%) reported the feeling of

powerlessness, 20(36.36%) testified to low self-esteem, 2(3.64%) showed denial and 3(5.45%) reported depression. In addition, the study recorded the impact of staff psychological experience on the development of support strategies. The results showed a statistically significant negative correlation between supporting strategies and certain elements of the psychological experience. These were burnout - 0.668** (p < 0.01) and moral suffering - 0.609** (p < 0.01) (**Table 1**).

Table 1. Strategies to support neuro-somatic development and psychological experiences of

Personnel: Correlations		Strategies to support neuro-somatic development	Bad Self-esteem	Feeling of helplessness	Denial	Moral suffering	Burn-out	Depression
Strategies to support neuro-somatic development	Pearson correlation	1	.042	.185*	.190*	-.609**	-.668**	.372*
	Sig. (bilateral)		.762	.176	.164	.000	.000	.005
	N	55	55	55	55	55	55	55

*. The correlation is significant at the 0.05 level (two-tailed)
 **. The correlation is significant at the 0.01 level (two-tailed).

Strategies for pain management

Concerning the strategies to support neuro-somatic development, 16 of the participants (29.09%) reported monitoring signs of adaptation and signs of subsystem stress, 15 (27.27%) reacted to autonomic subsystem imbalance (breathing, colorings, heart rate, digestion, visceral responses), 10 (18.18%) reported respecting the newborn's rhythm and supporting his or her skills. Only 9 (16.36%) used soothing methods (swaddling, non-nutritive sucking...) and 6 (10.90%) provided gentle contact with the newborn for the improvement of his/her attention/interaction system. Whereas, 35 (63.63%) reported the lack of use of a well-defined developmental support strategy.

Regarding the pain management strategies, 32 of the professionals (58.18%) insisted on the use of pharmacological means but only 7(12.73%) adopted non-pharmacological ones. Five of them reported the limitation of painful and invasive procedures and the organization of the timing and the duration of care based on the baby's behavior. Only 2 participants emphasized the daily assessment of pain using a validated tool and the definition of different professional roles (**Table 2**).

For the use of pain assessment protocols and scales in painful and invasive care, on all participants, 53 (96.36%) reported the absence of written protocols and well-defined scales in the department. 2 (3.64%) added the lack of special tests and the limitation to the monitoring the baby's general condition. Concerning the personnel responsible for pain management, 40 (76.36%) stated that it was part of the medical interventions, 9 (16.36%) advanced that it was the responsibility of the nursing staff, 6 (10.90%) declared the participation of all the staff involved in the care of the newborn. It's important to

note that all of participants were unaware of the parents' role in these painful procedures.

Table 2. Pain management strategies

Statement	Frequency	Percent
Daily assessment by validated tools	2	3.63%
Use of pharmacological protocol	32	58.18%
Use of non-pharmacological protocol	7	12.73%
Organizing the timing and duration of care based on the baby's behavior	5	9.09%
Limiting painful and invasive procedures	5	9.09%
Definition of professional roles	2	3.63%

Concerning the participation of parents in painful and invasive care, 5 (9.09%) were open to their presence before the act of care in order to prepare the baby psychologically and reduce his stress. 6 (10.90%) stated that their presence is necessary after the act of care in order to support the baby and reduce the intensity of the pain with especially the presence of the mother in order to relieve the baby through breastfeeding and skin-to-skin contact. Forty four participants (80.00%) refused the presence of the parents during the painful procedures because it could be a source of difficulty in achieving successful care.

With regard to the reassessment of pain, only 2 participants (3.64%) practiced it often, while 43 (78.18%) stated that it was not done after treatment. The **observation** of the participants, before and during the painful care procedure showed that 35 (63.64%) of the professionals showed an interest in the preparation of materials and the organization of

the environment. 37 (67.27%) respected the standards and rules of hygiene and 38 (69.09%) installed the baby properly. Other acts that were neglected by professionals, such as adapting the

light, respecting the sleep/wake cycle, reducing excessive noise, observing behavior and integrating parents into care (Table 3).

Table 3. Criteria observed before and during a painful act

Before			During		
Observed criteria	Realized	Notrealized	Observed criteria	Realized	Notrealized
Preparation of material and equipment	35 (63.64%)	20 (36.36%)	Respecting the sleep/wake state	0 (0.00%)	55 (100 %)
Light adaptation	2 (3.64%)	53 (96.36%)	Proper seating of the baby	38 (69.09%)	17 (30.91%)
Creation of day/night cycle	0 (0.00%)	55 (100 %)	Use of assessment protocol/scale	0 (0.00%)	55 (100 %)
Decrease in noise overstimulation	2 (3.64%)	53 (96.36%)	Carrying out care with respect for rhythm	16 (29.09%)	39 (70.91%)
Respect for hygiene	37 (67.27%)	18 (32.73%)	Managing work-related stress	12 (21.82%)	43 (78.18%)
Organization of the care unit	35 (63.64%)	20 (36.36%)	Interprofessional collaboration	8 (14.55%)	47 (85.45%)
Adequate positioning	6 (10.90%)	49 (89.10%)	Observing clinical manifestations of pain	4 (7.27%)	51 (92.73%)
Respect for feeding time	2 (3.64%)	53 (96.36%)	Behavioral observation	0 (0.00%)	55 (100 %)
Respect for sleep time	0 (0.00%)	21 (92%)	Parental involvement in care	0 (0.00%)	55 (100 %)
Respecting the time of exchange	1 (1.82%)	54 (98.18%)	Application of non-pharmacological methods	6 (10.90%)	49 (89.10%)

After the painful care procedure: All participants in the study expressed a disinterest in the immediate evaluation of the effectiveness of the means used for care (pharmacological and non-pharmacological), in the reassessment of pain, in the reduction of agitation and anxiety due to care, and in the reduction of parental suffering and stress. Furthermore, for their level of pain management, 25(46%) recorded a low level, 26(47%) had an average level and only 4(7%) scored a high level. Concerning the correlation between pain management strategies and

environmental factors, the results showed that the variables: behavioral observation 0.629** (p < 0.01) and respect for the sleep/wake cycle 0.599** (p < 0.01) were the two most significant positive variables. This can be interpreted by the evolution of these items in the same direction, the improvement of environmental factors favoring the well-being of the hospitalized newborn contributes positively to the evolution of pain management strategies during painful and/or invasive care (Table 4).

Table 4. Pain management strategies and environmental factors: Correlations

		Pain manage-ment strategi-es	Care organis-ation	Profess-ional stress manage-ment	Mome-nts of silence	Asym-etric posture	Behavio-ral observat-ion	Care groupi-ng	sleep/ wake cycles	Parent partici-pation	feeding	Skin to Skin
Pain management strategies	Pearson correlation	1	.120	.320*	.454**	.374**	.629**	.437**	.599**	.534**	.096	.523**
	Sig. (bilateral)		.384	.017	.001	.005	.000	.001	.000	.000	.487	.000
	N	55	55	55	55	55	55	55	55	55	55	55

*. The correlation is significant at the 0.05 level (two-tailed).
 **. The correlation is significant at the 0.01 level (two-tailed).

Regarding the factors influencing the improvement of the quality of care for better pain management, 53 participants (96.36%) testified to the non-availability of protocols and scales in the care unit, 49(89.10%) experienced work overload, 44(80,00%) confirmed the lack of continuous training,

43(78,18%) underlined the non-adaptation of the environment, 20(36,36%) declared difficulties related to professional conflicts and role definition, while 6(10,90%) affirmed the ignorance of the ethical aspects of care.

In terms of results, the study confirmed the presence of certain factors influencing the practice of pain management, both environmental and personal.

In order to determine the relationship between the different variables, two summary scales were created. The first concerned the strategies adopted by professionals for pain management, and the second the influencing factors. In this respect, analysis of variance (ANOVA) has shown that there is a statistically significant correlation between factors

(environmental and personal) and pain management strategies. Indeed, the statistics revealed a ($F=15.845$, $p < 0.05$), with a statistically significant negative correlation between the two variables. This can be explained by the strong negative influence of these factors on pain management conditions. In other words, the greater the intensity of the existence of these unfavorable factors, the lower is the effectiveness of pain management (**Figure 1**).

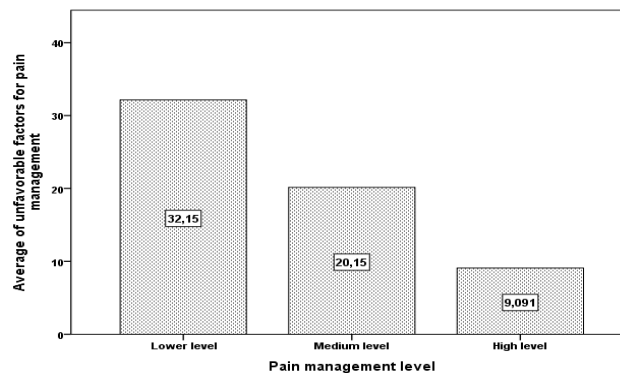


Figure 1. Pain management versus unfavorable factors

Discussion

For an effective assessment of the strategies and factors influencing pain management in hospitalized newborns, the variables studied were discussed by combining the results of the questionnaire and the observational survey.

Personal factors

According to their socio-professional features, this is a multidisciplinary population comprising nurses, doctors and nursing assistants with a predominance of women, young age and professional seniority of less than 5 years. In their study on factors influencing the implementation of developmental care among neonatal intensive care unit (NICU) nurses in China, Zhang et al. (2016) have confirmed that newborn pain management can be influenced by certain contributing factors, such as the age of the practitioner, his or her professional experience and educational background [20].

With regard to general knowledge about pain, only 6 (10.90%) had received professional training on pain and more than 26 (47.27%) did not know the meaning of the term. In a pilot study conducted among mothers, nurses and premature newborns to evaluate the feasibility and acceptability of an olfactory stimulation with breast milk for procedural pain, De Clifford-Faugère et al. (2019) discussed the importance of the knowledge about pain in the newborn [21]. They confirmed that poor pain management may be the result of a lack of knowledge on the part of practitioners and a poor application of the methods taught. They also

highlighted the importance of promoting access to continuing education in order to develop technical skills among professionals with the aim of integrating non-pharmacological methods into pain interventions [21].

For the adverse effects of pain, a significant number of 40 participants (72.73%) confirmed that pain have no negative effect on the newborn. However, Bellieni et al. (2012) concluded that painful and stressful stimuli increase the baby's heart rate, blood pressure and intracranial pressure [22]. At the same time, Salmani et al. (2018) added that the use of a patrician's hands and simulated hands to place a newborn in a facilitated position is effective in monitoring physiological cues [23].

Regarding behavioral signs of pain, participants expressed a lack of awareness of some of the signs of pain. Debillon et al. (2014) stated that the recognition of pain in the newborn represents a certain challenge for the clinician. It can only be effective if there is a cluster of symptoms [24]. Allain et al. (2017) advanced, in their article on the management of pain during prematurity, that newborns express themselves through their behavior, motor skills, facial expressions, sleep patterns and interactions with their environment [25]. For this reason, the nursing staff must be able to identify the signs of pain. This can be done through the use of tools adapted to their behavior [25]. In addition, 76% of participants stated that the pain and discomfort of the newborn certainly has an impact on the psychological experience of the staff. In this sense, Chahraoui et al. (2011) revealed that the inter-individual and emotional experience of the careers in the intensive care units addresses the issue

of feeling pressured at work which causes a certain exhaustion [26]. The most distressing sources include the confrontation with death, painful and invasive procedures, treatment limitations and the personal difficulty in maintaining an emotional distance from these stressful situations [26].

Environmental factors

In order to promote well-being in hospitalized newborns, certain strategies specific to the environment, such as creating moments of silence, respecting sleep, reducing light, skin-to-skin, grouping care and observing the newborn's behavior, are insufficient. Ratynski et al. (2002) suggested that the observation of the newborn's behavior is a source of information about their well-being, development and neurological integrity [27]. The authors advanced that this observational approach should be considered as the starting point for an analgesic or developmental intervention; they also stated the need for specialized training to the practitioners. Regarding the long-term effects of neonatal pain, Walker et al. (2019) revealed that the adaptation of the newborn to the care environment seems to be crucial [14] and depends on human interventions which take into account the reduction of harmful stimuli, the use of analgesic methods, respect for sleep as well as the sensory expectations of the newborn [14].

Pain management strategies

With regard to strategies to help neuro-somatic development, the study showed the absence of the use of a well-defined strategy in 63.63% as well as shortcomings in the application of calming methods (16.36%). Alinejad-Naeini et al. (2014) conducted a randomized, controlled crossover study to examine the impact of the facilitated tuck position on behavioral pain during suctioning in premature newborns [28]. They demonstrated that postural support of the newborn during and after care allows the strengthening of extension movements; also, wrapping the newborn in a nappy or in the hands of the parents or patricians promotes sleep onset, sleep duration, motor organization and self-regulation skills [28]. According to Obeidat et al., the newborn can implement self-regulatory behaviors, such as a grouping of hands, a curled up posture or grabbing gestures [29]. Allain et al. (2017) added that the baby cannot develop these skills without individualized supportive care [30].

Regarding the impact of staff psychological experience on developmental strategies, Ishak et al (2019) showed that the imbalance in the psychological experience of staff inhibits the practice of neuro-somatic developmental support strategies, which consequently impacts on pain management practices in the newborn [31].

Embriaco et al. (2007) have shown, in their study on burnout among doctors working in intensive care units, the negative effect of occupational stress on quality of care [32]. They determined a considerable number of identified stressors such as working relationships or inter-professional conflicts, working hours and other organizational and institutional factors [32].

With regard to pain management strategies, this study showed a lack of use of non-pharmacological methods. Trottier et al. (2022) individualized pain prevention and treatment strategies, combining physical, psychological, pharmacological and non-pharmacological approaches, must be available in all healthcare settings [33]. Sizun et al (2014) have confirmed the beneficial impact of non-medicinal means (including skin-to-skin) on thermal and respiratory regulation, on the newborn's sleep and on maternal well-being [34]. This developmental support combines several elements such as bending posture, wrapping, non-nutritive sucking, environmental adaptation and prolonged exposure to the parental voice [34]. Foster et al. (2016) stated that non-nutritive sucking provides comfort, pain relief; it improves muscle tone, cardio-respiratory stability and reduces hospital stay [35].

In our study, daily assessment of pain using a validated tool was practiced by only 2 professionals (3.63%), with no use of assessment protocols or scales. Cong et al. (2013) advanced that the assessment and measurement of pain involves a multidimensional, quantitative and numerical description of each factor related to the quality of pain [36].

In the context of the interaction between the developmental subsystems of the newborn and the care environment, Blanchard and Oberg (2015) suggested that the stress behaviors in newborns indicate a level of tiredness, exhaustion or disorganization [37].

Regarding the personnel responsible for pain management, Porter et al (1997) assumed that training programs should be provided to develop the skills of health professionals as well as to define the different professional roles and to validate pain assessment tools that can be easily applied in clinical settings [38].

As for parental involvement in painful and invasive care, 80% of the professionals in our study refused maintaining the parent-newborn relationship. Thus, the role of parents during painful and invasive procedures is indispensable. Ponthier et al (2020) demonstrated a reluctance to allow parents to be present during the most invasive procedures [39]. They concluded that the role of parents in the NICU was significantly influenced by center level and caregiver seniority. The authors recommended informing professionals about the benefits of these practices, and implementing specific training programs to improve the relationship between staff

and parents [39]. On the other hand, Carbajal et al. (2008) have added that the presence of parents is one of the factors that significantly limits the use of analgesia, reduces the levels of pain to which newborns are exposed and allows the support of sensory stimulation [7]. According to Feldman and Eidelman (2007), this contribution is made through a number of development strategies including skin-to-skin baby wearing, touch massage and bundling of care [40]. For Yu et al. (2017), parental involvement in care is an integral part of the clinical practice to reduce the psychological risks of separation and further facilitate short-term medical and neurobehavioral outcomes, especially in premature infants [41]. Faced with the demands of intensive care units, According to Thébaud et al. (2022), professionals must tailor their practices to the needs of parents in order to develop family-centered strategies [42].

In summary, there are multiples factors influencing pain management. Mehrnoush et al. (2017) highlighted the lack of training courses, the absence of an infant pain management policy as the most influencing factors in neonatal pain management [43]. However, Urso (2007) recommended several advances in the establishment of pain management protocols in neonatal care facilities including proper assessment, appropriate treatment, family involvement and adequate caregiver education [44]. Byrd et al. (2009) highlighted suggested nurse and physician resistance to practice change as a barrier related to pain assessment tools with a need to implement convenient strategies to face such resistance [45].

Strengths and limitations

The personal motivation of the authors in believing in the crucial role of professionals is highlighted in this work. This article represents a first initiative to study pain management strategies and the influencing factors. However, certain factors were not investigated in the present study, such as the epidemiological profile of hospitalized children, professional skills and the perception of care centered on the newborn and his or her family.

Conclusion

Preventing or reducing painful or invasive procedures during a newborn's hospitalization remains a challenge for every professional. In the Moroccan context, in the absence of an established pain management and assessment program in the intensive care unit concerned by this study, the present results clearly identify multiple deficiencies. We recommend the consolidation of the efforts of both professionals and managers to develop pain management skills, organization of the work

environment and the implementation of clear protocols and pain evaluation scales.

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