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ORIGINAL ARTICLE

The feasibility of a Swiss complex interprofessional intervention to improve the management of procedural pain in neonates in the Finnish context: A qualitative study

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Abstract

Aim: To evaluate the feasibility of the Swiss complex interprofessional intervention, NEODOL© (NEOnato DOLore), for improving the management of procedural pain in neonates in the Finnish context.

Background: Interprofessional collaboration is important for all professionals involved in the care of neonates and for neonates' parents, to understand the appropriate use of non-pharmacological and/or pharmacological methods for each pain situation and how to assess pain in real-life situations. Appropriate methods of pain relief for neonates should be preferred as they protect the development of the neonate's brain.

Design: A descriptive qualitative design.

Method: Data were collected through semi-structured focus group discussions following the Medical Research Council's framework for evaluation of complex interventions, in this case NEODOL© which aims to improve the procedural pain management of neonates. A purposive sample ($n = 13$) included eleven professionals representing various professions within Finnish Neonatal Intensive Care Units and two parents of infants who have received care in a Neonatal Intensive Care Unit. Data were analysed using inductive content analysis, and the results were reported in accordance with the COREQ guidelines.

Results: Professionals' and parents' evaluations suggest that NEODOL© is feasible, because it is consistent and addresses a current need. They assessed its overall content to be relevant and accessible, and its components to be internally coherent. However, they emphasise the need for further evaluation and refinement of the intervention to achieve the desired outcomes and cost-effectiveness.

Conclusions: While NEODOL© is considered feasible, it requires further evaluation and refinement in the local context of each hospital before implementation.

KEYWORDS

evidence-based practice, feasibility study, interprofessional education, interprofessional practice, multiprofessional care, neonatal intensive care, pain management

INTRODUCTION

To date, there has been little research into the feasibility of replicating an existing complex pain management intervention in a new context, particularly from the perspective of interprofessional collaboration (IPC). More attention should be given to interventions that promote IPC in the context of pain management to improve the management of procedural pain in neonates.

For preterm and sick neonates, effective assessment and management of pain is particularly critical as repeated painful procedures have been shown to have a detrimental effect on the development of the brain and nervous system [1, 2]. Pain management is part of quality care in neonatal nursing. It has been acknowledged that parents should be involved in providing care and alleviating stress and pain for their neonates but, despite various efforts and interventions to support this, it only occurs to a limited degree in Neonatal Intensive Care Units (NICUs) [3, 4].

Preterm and sick neonates are treated by multiple professionals in NICU. Interprofessional collaboration involves different professional groups and neonates' parents working together while using their distinct core competencies, aiming to identify individualised solutions appropriate to the neonate and their family [5–7]. Developing pain management strategies in collaboration with both parents and healthcare professionals is crucial to ensure comprehensive care that meets the unique needs of neonates.

BACKGROUND

Numerous professionals from various fields and disciplines are involved in the care of neonates. Preterm and sick neonates frequently experience pain as part of their medical care in NICUs [8, 9]. It is possible that the large number of professionals involved, each with different expertise, pain relief techniques, and protocols, contributes to poor pain management. Treatment of neonates should aim to protect the brain and its development, and high-quality pain management is central to this. Several studies show that repeated painful procedures have negative effects on the development of neonates' brains and nervous systems, which can manifest as various neurological and cognitive problems later in life. Proper pain management is essential to safeguarding the brain development of this vulnerable patient group and contributes to normal neurocognitive development in infants [1, 2].

Evidence-based implementation strategies are primarily aimed at health professionals, such as training nurses or other health professionals in pain management, thus neglecting parents [4, 6]. Parental involvement is recommended because they are key stakeholders in this context. Both parents and professionals could benefit from training on assessing and treating pain in various pain-causing situations that arise in NICUs. They should both be involved in evaluating any intervention intended to improve the management of procedural pain in neonates [10]. The content of any training that requires significant resources should be evaluated beforehand. Values and attitudes play a crucial role in guiding actions, and altering established working methods can be challenging. Resistance to change often arises when long-standing practices are being modified. However, when individuals are able to influence their own actions, this typically diminishes resistance to change [11].

Thus, this study aimed to describe the feasibility of NEODOL (NEOnato DOLore)© for improving the management of procedural pain in neonates in the Finnish context.

Pain assessment is currently inadequate, and parents are not given sufficient guidance on pain relief methods [12], despite care units describing themselves as family-centred [4]. Non-pharmacological pain relief methods, such as kangaroo care, are suitable for use in some painful situations [13]. Engel et al. [14] raise the question "Where does the patient fit?" Without parental involvement, care is only an interprofessional activity between professionals, interdisciplinary [15,16], and does not meet individual needs [10,14]. Both under- and over-treating pain, and using inappropriate methods, can have adverse effects, so it is crucial to strike the right balance [1,2]. The starting point for pain management is assessment, which is conducted both before and after pain relief [17,18]. Non-pharmacological methods should be the primary approach for managing short-term procedural pain, ideally facilitated through active parental involvement [12,13].

METHODS

Study design

A descriptive qualitative design was selected for this study using a qualitative description approach based on the philosophical tenets of naturalistic inquiry [19, 20]. The

study was intended to describe how professionals and parents evaluated the feasibility of the Swiss NEODOL© intervention using semi-structured focus group discussions and inductive content analysis.

The study follows the new Medical Research Council framework (MRC) [21]. It focuses on examining *whether* and *how* the intervention might be feasible in a new context (Figure 1) by assessing step 2 (feasibility). Step 3 (evaluation) and step 4 (implementation) are not considered in this study.

Step 1 in the research process (Figure 1), which involves identifying the intervention, was conducted at an earlier date by examining the assessment and experiences of stakeholders relevant to the neonatal pain management context. These results have been reported elsewhere and indicated the need for an educational intervention [10, 16]. The NEODOL© intervention was identified by searching the literature, and the decision to choose this intervention was made after an evaluability assessment using the Template for Intervention Description and Replication (TIDieR) checklist [22]. The checklist helped the researchers to evaluate whether the NEODOL© intervention warranted closer scrutiny, or whether the research team should develop an entirely new intervention.

The MRC framework emphasises that identifying an intervention could involve leveraging those that have been developed elsewhere and have the potential to be adapted to new contexts. This adaptation process might involve tailoring the intervention to a new population, setting, or targeting different outcomes. We used a theory-based approach according to MRC guidelines. A well-developed programme theory can aid in identifying which aspects of the original intervention need adaptation for different applications, and the essential mechanisms that should be retained even if the delivery method is slightly modified [21].

Step 2 in the research process (Figure 1) involves feasibility, and this is reported in the current study. This step is about assessing the feasibility of an intervention and evaluation design in order to make decisions about progressing to the next stage of evaluation. Due to the nature of interprofessional collaboration, we decided that the most appropriate method for addressing our research questions was to use focus groups involving both neonates' parents and professionals representing different professions. The

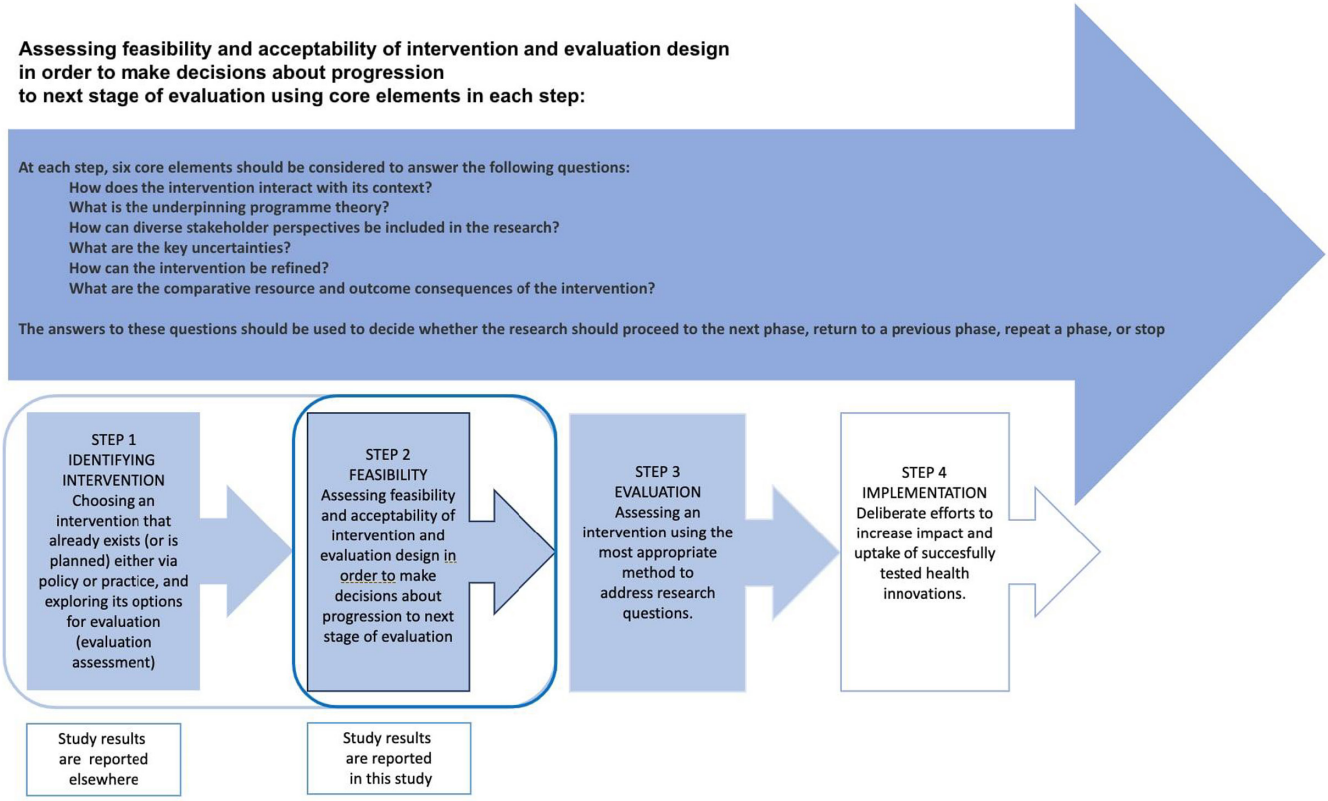

FIGURE 1 Flow chart of the study, adapted and modified to this study from the MRC's framework [21] for evaluation of complex interventions.

checklist of consolidated criteria for reporting qualitative research (COREQ) was used to report the research findings (Appendix S1; [23]).

Study context

Nurse managers in NICUs provided information about the characteristics of their units in order to define the study context. Staffing generally included childcare workers, nurses, midwives, and doctors (neonatologists) alongside external professionals such as therapists, radiographers, and bio analysts. Facilities mainly consisted of relatively small patient rooms with limited opportunities for parental presence. The participating NICUs were level III units in which both premature and critically ill neonates are treated. One of the participating units has baby-friendly certification and an active desire to improve their practices. The other unit has limited parental involvement due to the lack of space for them under current arrangements. Both units have laboratory sample collection times, which are often in the morning to ensure results are available for the doctor's rounds.

Intervention

The NEODOL© intervention developed by Balice-Bourgois et al. [24] is designed for three groups: healthcare professionals, parents and neonates. The first two parts of the intervention consist of a training programme of health professionals which aims to enhance interprofessional collaboration, pain assessment and knowledge about both pharmacological and non-pharmacological methods, including parental information and involvement during procedural pain. The third part, dedicated to neonates, is a bundle of care, oriented towards immediate interventions that should be applied during each painful procedure (Table 1).

The content of the interprofessional training is based on the Interprofessional Pain Curriculum Outline from the International Association for the Study of Pain (IASP) and tailored to the context of pain management for NICU patients [24]. Professionals received a pocket-sized brochure providing an overview of the elements of the complex intervention and recommendations for procedural pain management. In addition, an information booklet for parents was created based on studies by Franck et al. [25, 26], Franck [27], Harrison et al. [28], and Coughlin et al. [29]. For the current study, the content of the intervention was translated from Italian and French into English by native speakers, and then into Finnish. The content of the intervention, when carried out by native individuals, was aimed to be kept as similar as possible to the original content [30].

Recruitment and participant characteristics

We used purposive sampling to recruit participants. Professionals were eligible for this study if they were nurses, midwives, nurse managers, bio analysts, physiotherapists or speech therapists, or neonatologists involved in care in a NICU, and parents were eligible if they had a child aged under 2 who had been admitted to a NICU in Finland. The professionals were recruited from level III NICUs and rehabilitation wards in two Finnish University Hospitals, and from two laboratory services which work with those hospitals. Healthcare professionals from outside the NICU were limited to those involved in blood sampling, speech therapy, or physiotherapy, and they were recruited through a contact person. Parents were recruited following their involvement in discussions about a previous study on a related topic, and through day clinics at the hospitals. An information leaflet about the study was sent to parents by the researcher, and to healthcare professionals by the contact person. Professionals and parents who were interested in participating were asked to contact the researcher for further information by phone or e-mail. Participants then sent a consent form to the researcher, available from beginning of September to the end of November 2023. Two professionals (one nurse and one neonatologist) dropped out after having signed the consent form. No parents dropped out at this point.

Two neonatologists, one midwife, two nurses, one nurse manager, three bio analysts, and two parents participated in the study. All participants were women. Participants' average age was 40 years, and the professionals had gained work experience over periods of between 5 and 35 years.

Data collection

The data were collected using semi-structured focus group discussions. The method is designed to obtain data from a purposively selected group of individuals rather than from a statistically representative sample of the wider population [31]. Focus group discussions offered an appropriate way to bring those who are affected by interprofessional collaboration on pain management for neonates together to discuss the topic as a group. The focus group representing University Hospital A consisted of one nurse manager, one nurse, one bio analyst, one neonatologist, and one parent. The focus group representing University Hospital B consisted of one midwife, one nurse, two bio analysts, one neonatologist, and one parent. The focus group discussions were conducted by one of the authors (MM-A), a female researcher who had no prior relationship with the participants. Focus group discussions took place on a digital platform (Zoom), at a time chosen by

TABLE 1 Components of the NEODOL© intervention according to Balice-Bourgois et al. [24].

Stakeholders	Aims	Description
Health professionals	Training of health professionals and interprofessional collaboration	• Structured interprofessional education program • «Pain champion» in the unit • Creation of a recommendation booklet developed specifically for the care unit • Creation of posters and reminders
Parents	Information for parents and involvement during painful procedures	• Information booklet for parents that informs them about their child's procedural pain during hospitalisation in the neonatal unit and how they can collaborate during painful procedures
Neonates	Implementation of a plan for the management of painful procedures (bundle procedure)	• Bundle procedures that integrate all the elements to be taken into account to perform a painful procedure: • Planning the procedure • Collaboration and involvement of the family • Environmental measures • Pain assessment • Choice of analgesia • Documentation in the patient's record

TABLE 2 Focus group discussion themes.

In line with MRC 2021, consideration will be given to:
Context/environment
• compatibility with the environment and existing policies
• willingness to act in accordance with the intervention
• compatibility of the intervention's activities
Background theory
• is it appropriate for us, is it appropriate in the context of pain management
• complex/easy to understand
Possible stakeholders
• who is affected by the intervention, who is it aimed at
• aspects, impact on work, working methods and practices
Challenges and strengths
• uncertainties and inconsistencies
• usability
• time taken to learn the approach
• difficult/unfriendly to use
Modifying the intervention
• improvement (activities, materials)
• physical activity (what is available, what is not, whether updating is needed)
• materials (what is available, what is not, whether updating is needed)
Resources and potential benefits
• what and what resources are required (learning new things)
• what influences the child's care pathway
• short-term benefits
• long-term benefits

agreement between the participants and the researcher. Prior to the discussions, the researcher sent participants the NEODOL© content and discussion themes so that they could familiarise themselves with them in advance. Participants were also given the opportunity to discuss the study at any stage before the focus group discussion. Saturation, meaning the point at which new codes may emerge but not new subcategories, guided the sample size [32].

The discussion guide was developed according to MRC's framework for complex interventions [21] and the TIDieR checklist [22], and structured into themes and clarifying questions. Focus groups discussed the following themes: (1) context/environment, (2) background theory, (3) possible stakeholders, (4) challenges and strengths, (5) modifying the intervention, and (6) resources and potential benefits (Table 2). The discussions were audio-recorded. Open-ended questions addressed the discussion themes, seeking to delve deeper and highlight relevant areas within the participants' responses. The researcher asked clarifying questions if needed, such as: what is available, what is not, is updating needed, do you have anything else to add, or does someone else have any other thoughts on this? All participants were invited to express their opinions and thoughts about each other's experiences. To discuss the intervention, the researcher guided the conversation based on the discussion themes and, at the same time, the intervention content was shown on a shared screen.

Data collection took place over a 3-month period. The discussion themes and questions were pre-tested with one professional and one parent prior to the focus group discussions taking place. The resulting content was not included in the research data. No changes were made to the discussion themes and questions based on this pre-test. The focus group discussions were transcribed verbatim, and the transcribed text was checked by comparing it with

the recorded discussions. The average duration of focus group discussions was 1 h and 21 min.

Ethical considerations

The research followed good scientific principles according to the World Medical Association (2018), [33]. The study received approval from all participating organisations. In line with the General Data Protection Regulation (EU 2016/679), [34], participants gave their informed consent to participate after being informed about the research topic and assured that participation was confidential and voluntary. Further, participants were told that they could withdraw from the study at any point without any negative consequences. At the beginning of the discussion, before the recording began, each participant was repeatedly told what the study was about and given the opportunity to ask questions.

Analysis

The data were analysed using inductive content analysis because there are no previous studies dealing with the phenomenon and, due to the nature of interprofessional collaboration, the viewpoints were fragmented [32]. The discussion themes served only as aids and were not used to analyse the data. Firstly, one researcher (MM-A) carefully reviewed the transcripts several times to become familiar with the data. Secondly, sentences and units that related to one of the research questions were picked out into a Word file. Thirdly, original phrases and sentences, and reduced expressions of them, were identified, coded, and grouped into categories which were given expressive names. The analysis constantly moved back and forth between the research questions, data, codes, subcategories, and main categories. The research team (MM-A, AA and TP) critically evaluated the analysis and sought to reach a consensus on the refinement of the sub-, generic and main categories.

FINDINGS

The feasibility of Swiss NEODOL© to improve the management of procedural pain in neonates within the Finnish context was evaluated by professionals and parents. Two main categories emerged from parents' and professionals' evaluations: (1) the current topic and consistent structure of the intervention, which was expressed in terms of being relevant and accessible in its entire and the individual components being compatible with each other, and (2) the need for further local evaluation and refinement of the intervention, which was highlighted through discussion points which considered how to achieve advantages and how to achieve cost-effective results (Figure 2).

Relevant and accessible in its entirety

This generic category included subcategories that enhance team spirit and common goals, ideal model and readiness to work interprofessionally.

From the parental point of view, the intervention brought together the key stakeholders and provided an opportunity for collaboration in assessing and alleviating pain.

> If there had been a booklet for everyone [parents], and everyone [professionals] had undergone the same training, then at least one could trust that everyone should have that knowledge.
>
> (FG2:1)

Parents unanimously agreed that a central focus of the intervention was to standardise the actions of professionals and direct their attitudes towards enabling parents to participate increasingly in alleviating their child's pain. This required that professionals understood and were proficient in offering non-pharmacological pain relief methods. Common goals could only be achieved through collaboration, and parents felt that all professionals should possess this skill so that they could guide parents accordingly.

At the same time, professionals emphasised the importance of the intervention in light of earlier research findings which had identified shortcomings in both parental involvement in general and pain management specifically. Professionals acknowledged the need to enable parental involvement and standardise practices. Although clear methods had not yet been identified, a well-designed and comprehensive intervention had the potential to address these issues. Understandings of interprofessional collaboration varied among participating professionals: some still preferred to maintain separate functions and roles, while others were open to collaborative learning and sharing knowledge and skills in line with an interprofessional approach.

> Preparations for painful procedures involve sugar, a pacifier, a facilitated tucking, and other methods. Then the doctor enters the situation, where there is either a parent or caregiver, and the scenario is rehearsed in the

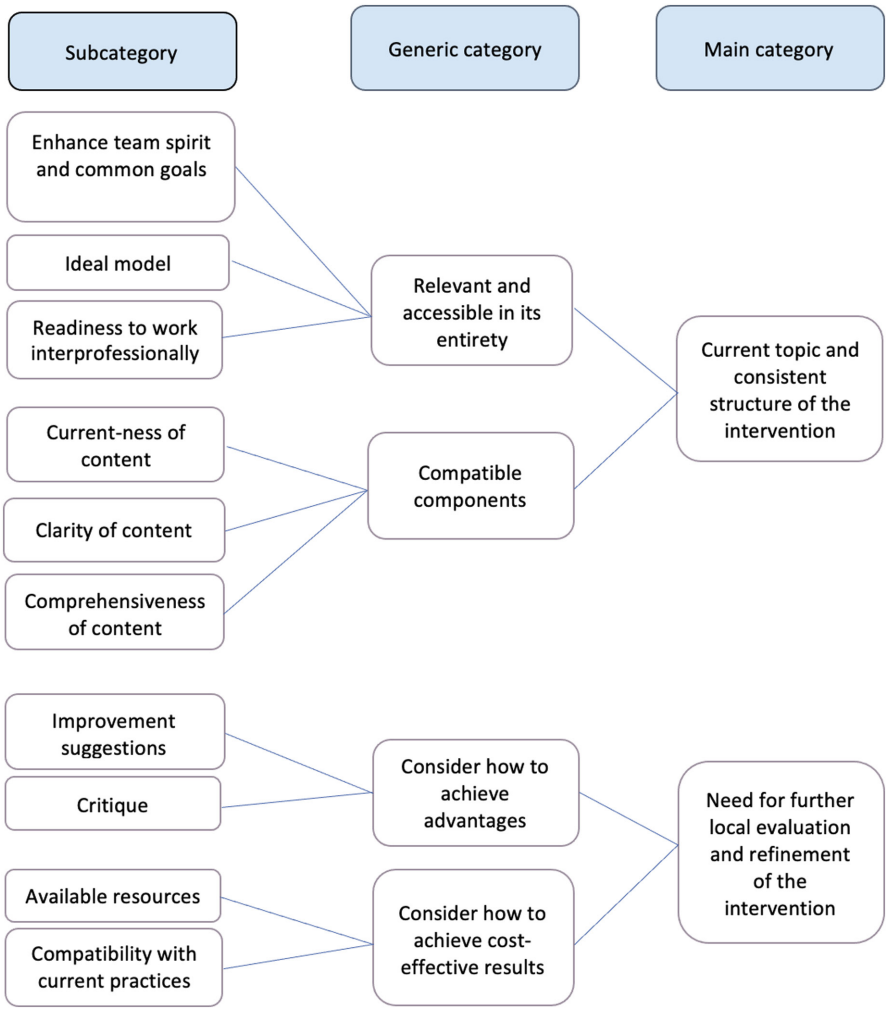

FIGURE 2 Emerging main categories: Current topic and consistent structure of the intervention and need for further local evaluation and refinement of the intervention.

> incubator—this is usually very well-prepared from the doctor's perspective. Then the doctor performs the procedure, and the caregiver, whether with the parent or alone, takes care of non-pharmacological pain management.
>
> (FG1:3)

The concept of all professionals participating in neonatal pain management was unfamiliar to some, yet they expressed a willingness to adhere to a unified model. Professionals' views differed in line with their unique expertise and roles, but nurses could serve as unifying forces in situations involving procedural pain.

Compatible components

This generic category included subcategories current-ness of content, clarity of content, and comprehensiveness of content.

According to parents, the intervention guided professionals and parents towards collaboration. Its overall content was perceived as having a unifying effect, emphasising listening to parents, guiding and involving them, and showing appreciation. The informative content of the intervention, especially the background theory, helped parents to understand why people behave the way they do. For this reason, the content of the intervention was perceived to be valuable and to form a logical whole.

> There are clearly significant differences between different individuals in how the presence of the parent is taken into account.
>
> (FG2:1)

Having had the opportunity to familiarise themselves with material aimed at professionals, the parents wondered whether the professionals had considered parental involvement and non-pharmacological pain relief methods during their professional studies.

> If we decide that something like this should be introduced in Finland, might someone then think that this is not a medical matter, and they don't need to take note of it?
>
> (FG1:1)

Professionals evaluated the content of the intervention from various perspectives. The scientific basis of the intervention was appreciated and considered sound. The PowerPoint presentation, background material, and parent booklet were generally considered to be effective, offering ways of guiding their actions using a process chart. The background theory [24] brought the components together and created an understanding of the complex whole.

> Certainly, this [background theory] illustrates how diverse it [pain management through interprofessional collaboration] is and how many aspects are associated with it.
>
> (FG2: 4,5)

While the topic of pain management in neonates was very familiar to some, this was not the case for everyone. The topic was also considered to be timely as it coincided with the development of family- and patient-centred approach in Finnish healthcare.

Consider how to achieve advantages

This generic category included subcategories improvement suggestions and critique.

Parents highlighted the importance of competence in anticipating pain and non-pharmacological pain relief. They suggested that, contrary to the intervention, a pain scale could be introduced in maternity clinics to support parents' interpretation of their child's signals during the early stages of interaction. They also emphasised that the booklet provided to parents could include more detailed visual instructions.

> [In the booklet,] there could be concrete images for parents to use, and it would certainly be helpful even after the intensive care period or any hospital stay in general.
>
> (FG2:1)

When asked to consider electronic options such as a QR code, as suggested by the professionals, parents felt that a physical paper booklet was the better option at the onset of intensive care.

> I can honestly say that if someone shows me a link or QR code like this, I will stick it up somewhere ---.
>
> (FG1:1)

Some professionals criticised individual components of the intervention. For example, some believed that the style of the parent booklet was inappropriate style, with a tone that could be perceived as negative, even frightening. Attention should be paid to the wording of the content, as well as images and materials. All content should be available in Finnish language, and the timing for giving the booklet to parents should be considered carefully.

> As the very first step, I wouldn't give a parent a booklet detailing all the painful aspects expected here, so that the professional can, you know, take a moment to consider when it would be appropriate to give the booklet.
>
> (FG1:3)

The training aimed at professionals also received criticism: the history of pain management was not considered necessary, and non-pharmacological pain relief methods were not deemed to be needed by all professionals, for example, doctors other than neonatologists visiting a NICU. Recording sweetening as a medication was perceived as something that is not done now and will not be done in the future either.

However, almost all criticism was accompanied by a suggested solution or improvement. In situations related to taking blood samples, most professionals were satisfied with current practice but were willing to develop their work further towards a family-centred and interprofessional approach. This did not imply that the intervention contained anything unnecessary: rather, it reflected that the current practice of taking blood samples early in the morning, when parents were not present, suited the professionals. The intervention was perceived to offer inadequate content on pre-analytical measures, such as warming the puncture site before taking a blood side, and it was suggested that such detail should be added to it. As pain assessment scores guided decision-making, the scoring system proposed in the operating model should be adjusted to align with the current pain scale. The most central theme requiring change, however, was the medication-related aspect of pain management, as this varied from hospital to hospital. The absence of existing clear, uniform guidelines meant that the guidelines presented in this intervention could not be enforced, and training could not establish a common structure regarding medication. It was limited to mentioning that, in some situations, a neonate may need pharmacological pain relief.

Consider how to achieve cost-effective results

This main category included subcategories resources and compatibility with current practices.

Professionals evaluated the intervention in terms of what it would require and what it would produce. Bio analysts considered the training to be only partially applicable to their own work but thought it would add value to the work of those who collect samples in the neonatal intensive care unit or generally from small paediatric patients. They also felt that, although collaboration is already adequate, they could benefit from greater expertise in pain assessment and appropriate non-pharmacological pain relief methods. Professionals collectively felt that the training should not be mandatory for everyone, but that supervisors could, for example, require nurses starting work in the NICU to complete it. They also noted that the training seemed to be aimed primarily at nurses. Professionals' views on the practical delivery of training were mixed, with some suggesting that certain themes should be taught in workshop-like sessions and involve shared exercises, while others believed that the training should be entirely online. However, they were unanimous in stating that the training should be divided into parts and that it should be possible to complete it during working hours. Overall, the intervention was assessed to be likely to lead to more consistent practices, satisfied parents, improved quality of care, and therefore shorter treatment periods.

> ...the treatment times [at the NICU] would be shorter, and parents would be satisfied. On the other hand, the psychological burden and morbidity of parents, including depression and anxiety during the early childhood period, would also be alleviated.
>
> (FG2:3)

Ultimately, the training could have a positive impact on the length of treatment periods and, consequently, its costs. The potential to reduce treatment periods would also have a favourable effect on nursing resources. Shorter hospital stays may reduce the number of patients at times, reducing staff workloads.

From the professionals' perspective, the intervention was somewhat self-evident and related to familiar issues that each organisation handled in its own ways. Some professionals assessed the intervention as a useful way of combining practices, but opinions were divided. These differences of opinion could be attributed to the different contexts of each hospital, in terms of staff, resources, and environment, and to the different family-centred models that they used. From the professional point of view, a prerequisite for implementing this intervention would be to carry out further evaluation and refinement in the local context.

> If we proceed with this, then it's really important to approach it locally. Each unit should have the opportunity to review the material from its own perspective to avoid redundancy in the training material. Even worse - would be conflicting information [for example, regarding medication]. I wouldn't take a package like this as is from elsewhere; it should be customised.
>
> (FG1:3)

They also insisted that the intervention must be available entirely in Finnish as English language proficiency varied and some of the visual materials were currently only available in English. This was particularly important if the training took place entirely online and through independent study, without the guidance and explanation available through face-to-face instruction.

DISCUSSION

Developing educational interventions is a complex process which is often met with challenges that hinder progress. This study offers novel insight into the feasibility of NEODOL© in the Finnish context and serves as an example of research aimed at development. The findings underscore the various considerations that are crucial when planning an educational intervention.

The NEODOL© intervention as a whole was evaluated as feasible due to its topic being current and its consistent structure. The background theory of the intervention was deemed to be understandable as it effectively highlighted the complexity of the issue. Further, the components of the intervention were perceived to work well together and form a coherent whole. However, the intervention also provoked criticism: for example, its content on blood sampling was insufficient, and it did not address how medications should be prescribed. Based on the results of this study, NEODOL© is feasible, but cannot simply be adopted in its existing form. Instead, it needs to be evaluated and refined using the TIDier checklist and adapted to fit each hospital's specific needs.

Parents emphasised the importance of introducing pain relief methods and pain assessment early in maternity clinics, highlighting the need for further development of family-centred practices [4, 12]. Parents played an important role in the discussions as they focused more on

how the intervention would work in practice and how it would manifest for them. Professionals acknowledged their understanding of the intervention but noted discrepancies between theoretical knowledge and practical implementation. The Health Care Act (30.12.2010/1326) [35] mandates evidence-based practice, and this influences organisational resource allocation. This study underscores the importance of adapting implementation to the relevant context and culture.

Focus group discussions revealed varying perspectives, with parents' views aligning with each other more consistently than professionals' views. The discrepancies that this study identified between healthcare professionals' self-assessed competence and parental evaluations underscore the need for further investigation into this topic. The study emphasises the importance of assessing resource-intensive training content in advance and highlights parents' strong desire to acquire expertise in pain assessment and management [3, 36]. Professionals stated that many aspects of the intervention are crystal clear to them. However, the inconsistency of real-life practice suggests that the relevant approaches are not well-implemented despite being obvious and, in some areas such as non-pharmacological pain relief, good, up-to-date guidelines being available. This was highlighted during the focus group discussion when a parent asked to what extent professionals participate in training on interprofessional collaboration and consideration of parents in pain relief during their professional studies.

Professionals unanimously agreed that the NEODOL© intervention should be customised to align with local guidelines, as different University Hospitals have different resources, including staff capacity, and distinct medication and dosage regimes. They argue that further local evaluation and refinement would be justified for reasons of patient safety as well as resources and workloads. As Mäki-Asiala et al. [16] have highlighted, context matters in terms of who an action affects and what goals can be set. An important observation from this study is that cultural adaptation was carried out at a high level at an early stage, but the actual context varies in each operational unit and is shaped by values and attitudes—organisational culture—as well as resource availability.

Allegaert and van den Anker [37] aptly titled their article "Neonatal pain management: still in search of the Holy Grail." This title remains relevant several years later. Simply implementing interventions that have been designed to improve neonatal pain management is not sufficient to change the situation: such interventions must also respond to actual need. This implies that the content should be modified as described in this study, and its effectiveness should be evaluated. However, modifying the content of an intervention to align with needs, and then implementing it in practice, requires time, expertise, and financial resources. This may explain why nursing practices do not necessarily change. As noted above, local evaluation and refinement are needed before an intervention is implemented, but it should also be assessed and refined after implementation. For example, the question of how best training can be delivered—online or through in-person workshops—could be explored on the basis of experience. This approach aligns with the MRC's new framework for evaluating and developing complex interventions [21].

In this study, our evaluation of the intervention brought up an important theme concerning the need for guidelines on pharmacological pain relief for neonates. This suggests that neonatal pain management requires more comprehensive and interprofessional attention, and this study identifies several opportunities for further relevant research within the MRC's framework (Figure 1).

Study limitations and strengths

This qualitative study was designed to achieve confirmability, credibility, dependability, and transferability [19]. Although the sample size was quite small, purposive sampling with a focus on pain management and the use of semi-structured group discussions narrowed the study's focus, supporting data saturation. Data saturation occurred during the second focus group discussion, as it generated new codes but not new subcategories [32]. Although Nyumba et al. [31] recommend three focus groups in homogeneous settings, in this study, two focus groups are considered sufficient according to Hennink et al. [38]. This is because we aim to identify core issues in the data, which requires a smaller sample size to reach saturation. In contrast, a study where researchers aim to understand the issues in-depth requires a larger sample size [38]. The focus groups were deliberately composed of heterogeneous participants selected based on their backgrounds. This approach facilitated broader and more genuine discussions where, for example, a parent could ask clarifying questions to professionals or vice versa. This interaction enhanced the richness of the data [39].

According to Bengtsson [40], it is important to map out external resources—such as financial resources, time, and potential informants—already when planning the study. This is because data collection and analysis can be costly and time-consuming, and the choice of

methods often adapts to these limitations. Based on this, some perspectives may be incomplete or entirely missing from this study. Secondly, the internal resources of the research team, such as knowledge and ability, must be identified [40]. Initially, epistemology guided methodological choices [41] in this study, and all the authors' extensive knowledge of the neonatal pain management context helped in formulating the research question, selecting a coherent methodology, and conducting the analysis. The context was particularly familiar to the first author, who is a nurse and a parent of preterm infants. We aimed to keep an open mind and be interested in the participants' opinions and evaluations as they expressed them. However, it is possible that despite self-reflection, our preconceptions have influenced the interpretation of the informants' narratives and, thus, the results. To avoid this potential bias, we facilitated discussion throughout the process, especially during the inductive analysis process. The authors' methodological expertise complemented each other, and their experiences and insights deepened the analysis. We think that, in this study, all the authors' extensive knowledge of the context of neonatal pain management strengthened the inductive analysis process, and the chosen framework facilitated the presentation and examination of the results.

To ensure dependability, the first author conducted both focus group discussions within 2 months and structured them using the same guide. To enhance confirmability, we have presented rich quotations which underpin the findings. The study involved participants from different professional fields, which strengthened the transferability of the results. In addition, we have tried to present the research results as accurately as possible so that readers can decide on the transferability of the results to their own context. Unfortunately, the rehabilitation perspective was missing. This is because, in one hospital, therapists did not feel personally connected to the topic and, in the other, therapists were so new in their roles that they worried their own experiences and perspectives would be too limited to contribute to the study.

CONCLUSIONS

The NEODOL© training intervention is feasible for use in the Finnish context. Both professionals and parents felt that it would be appropriate because its content is sound, it would promote parental involvement and support collaboration among professionals. Therefore, we conclude that the intervention could improve the management of procedural pain in neonates, although its contents should be modified and continually evaluated in the context of each hospital.

RELEVANCE TO CLINICAL PRACTICE

This study produces reliable information about interdisciplinary and interprofessional collaboration which can be utilised in the training and ongoing education of various professional groups. The intervention can, after adaptation to local needs as identified in this study, be employed to improve the management of procedural pain in neonates.

AUTHOR CONTRIBUTIONS

Critical contributions to the study design: MM-A, CB-B, AA, and TP; *Substantial contribution to project coordination, data acquisition, and analysis*: MM-A; *Drafting the manuscript*: MM-A; AA and TP; *Final categories, codes and interpretations, critical revision of the manuscript for important intellectual content, contribution to edit the manuscript, publication of final approval of the version, and full access to the data*: All authors; *Takes full responsibility for the integrity of the data and the accuracy of the data analysis*: First author. The contributions each author has made to the manuscript are in accordance with the ICMJE authorship guidelines.

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CONFLICT OF INTEREST STATEMENT

The authors declare that there is no conflict of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

ETHICS STATEMENT

The first author has a cooperation agreement with the original developer of NEODOL© which pre-dates this research. This study does not require approval from the

Ethics Committee because it only asks for opinions and evaluations about an intervention.

STUDY APPROVAL

The study received approval from the University Hospital of Oulu (159/2023), The Business Enterprise Joint Authority of the Northern Finland Laboratory Centre (347/13.01.01/2023), Kuopio University Hospital (807/13.00/2023), and The Business Enterprise Joint Authority of the Eastern Finland Laboratory Centre (15/11/2023).

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SUPPORTING INFORMATION

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