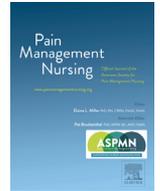




ELSEVIER

Contents lists available at ScienceDirect

Pain Management Nursing

journal homepage: www.painmanagementnursing.org

Original Research

Interprofessional Collaboration in the Context of Pain Management in Neonatal Intensive Care: A Cross-Sectional Survey

Mariaana Mäki-Asiala, R.N., M.H.Sc.*, Pirjo Kaakinen, R.N., Ph.D., Tarja Pölkki, R.N., Ph.D.

University of Oulu, Faculty of Medicine, Research Unit of Nursing Science and Health Management, Oulu, Finland

ARTICLE INFO

Article history:

Received 21 December 2021

Received in revised form 10 August 2022

Accepted 13 August 2022

Available online xxx

ABSTRACT

Purpose: Describe interprofessional collaboration (IPC) in the context of pain management in neonatal intensive care based on healthcare team members' perceptions of partnership, cooperation and coordination.

Design: A descriptive cross-sectional study design was used.

Background: IPC improves the quality of pain management for neonates. IPC is teamwork involving both professionals and the neonates' parents. Parents play an important role in the holistic care of their infant, which includes pain management.

Methods: Data was collected with Assessment of Interprofessional Collaboration Scale (AITCS-II) from the healthcare teams featuring representatives ($n = 132$) of multiple professional groups who were working in neonatal intensive care units ($n = 4$) in Finland. Descriptive statistical methods and the Mann-Whitney or Kruskal-Wallis nonparametric tests were used to analyze the data.

Results: The results were examined in three subscales of IPC (partnership, cooperation and coordination) on three different levels: "need to focus on developing collaborative practice", "moving towards collaboration" and "good collaboration". Participants perceived all the subscales as well as the overall level of IPC for pain management in neonatal intensive care to be at level "moving towards collaboration".

Conclusion: Participants appreciated each other as professionals and were willing to cooperate, but they had different perceptions of parental involvement in IPC. Attention should be paid to IPC in specific contexts such as pain management.

© 2022 The Authors. Published by Elsevier Inc. on behalf of American Society for Pain Management Nursing.

This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/4.0/>)

Introduction

According to World Health Organization (WHO) interprofessional collaboration (IPC) within neonatal intensive care teams can be assessed in terms of partnership, cooperation, and coordination (WHO, 2010). Collaboration in teamwork is based on respect for and trust in oneself and others. Factors that contribute to successful collaboration are partnership, cooperative endeavor, willing participation, shared planning and decision-making, a team approach, contribution of expertise, shared responsibility, non-hierarchical relationships, and shared knowledge and expertise (Engel et al., 2019; Nancarrow et al., 2013; Orchard et al., 2005). These factors can be used to assess teamwork in situational contexts such as that

of neonatal pain management. The findings of such studies can be used to improve team-based care. (Nancarrow et al., 2013; WHO, 2010). Although cooperation between nurses and mothers, nurses and parents, and doctors and parents have all been studied separately (Ajja et al., 2019; Axelin et al., 2018; Brødsgaard et al., 2019), there is a lack of published studies examining all of these professional groups and parents simultaneously and discussing IPC in relation to management of neonatal pain in neonatal intensive care. Research on interprofessional collaborative practices in the context of pain management based on health care team members' perceptions could be used to guide the review and reform of clinical practices, in order to better support interprofessional working and thus improve quality of care.

Neonatal pain and its management have been studied extensively (Anand, 2017; Anand et al., 2017; Lago et al., 2017; Perry et al., 2018; Pillai Riddell et al., 2015), but many questions and gaps remain both in assessment and treatment of pain

* Address correspondence to Mariaana Mäki-Asiala, R.N., M.H.Sc., University of Oulu, Faculty of Medicine, Research Unit of Health Sciences and Technology, Aapistie 5A, 90014 Oulu, Finland.

E-mail address: mariaana.maki-asiala@oulu.fi (M. Mäki-Asiala).

<https://doi.org/10.1016/j.pmn.2022.08.006>

1524-9042/© 2022 The Authors. Published by Elsevier Inc. on behalf of American Society for Pain Management Nursing. This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/4.0/>)

(Eccleston et al., 2021; Walter-Nicolet et al., 2017). Any unpleasant sensory stimulation to a neonate may be interpreted as pain, and neonates are exposed to pain on average 11 times per day during intensive care (Roofthoof et al., 2014; Walker, 2019). The underdeveloped sensory system of neonates is unable to localize the pain but respond to it comprehensively. For the same reason, they respond to any noxious stimuli frequently manifested, as pain. (Anand, 2017; Walker, 2019.) Pain experienced as a neonate is likely to affect many neurologic functions later in life and must therefore be minimized to properly care for this vulnerable group of children (Maxwell et al., 2019; Walker, 2019). Preventive measures, such as peaceful environment and non-pharmacologic pain-relieving methods, can support the overall well-being of the neonates and reduce their pain (Pillai Riddell et al., 2015; Walter-Nicolet et al., 2017).

Assessment of pain is the starting point in its treatment (Anand et al., 2017; Pölkki et al., 2018), and pain management is an essential part of high-quality neonatal care (Anand et al., 2017; Walter-Nicolet et al., 2017). However, assessment and treatment of infant's pain during hospital care have repeatedly been shown to be deficient (Anand et al., 2017; Walter-Nicolet et al., 2017). Anand et al. (2017) concluded routine assessments of continuous pain in neonates should be developed and included in the clinical practice of neonatal intensive care units.

In addition, Walter-Nicolet et al. (2017) highlighted that the well-being and brain development of neonates should be supported by pain assessment, prevention and treatment of painful procedures, and the use of appropriate dosed medications. Various indicators have been developed for pain assessment, but they are rarely used. (Anand et al., 2017; Pölkki et al., 2018.) According to a Finnish study (Pölkki et al., 2018), the nurses ($n = 294$) considered pain assessment important, but more than half of them felt able to assess pain in a reliable way without using pain assessment scales.

An interprofessional collaboration is a participatory collaborative partnership between a team of health providers and the parents of infants, with shared decision making and an emphasis on cooperation and professional expertise (Balige-Bourgeois et al., 2020; Orchard et al., 2005). In recent years, intensive care for neonates has focused on family-centered care to better address the needs of infants and their parents (Aija et al., 2019; Axelin et al., 2018). Parents should have the opportunity to be with their child whenever they want and be actively involved in caring for their infant; however, practices vary widely (Pillai Riddell et al., 2015). In the context of neonates' pain management, family-centered care is a part of IPC (Balige-Bourgeois et al., 2020), not a separate clinical practice.

The care of infants in neonatal intensive care requires the expertise of professionals in several different fields, and therefore their perceptions on the IPC as a targeted activity in neonatal pain management is important. There is a challenge in the IPC approach when not all team members agree with the plan. In this case, the solution could be to harmonize approaches with national guidelines which advise on the correct pain relief for different painful procedures (Anand et al., 2017; Pölkki et al., 2018). Nurses and midwives are usually with infants throughout their shifts, while other professionals will only do a short procedure for the infants. When each professional sees only a part of the whole pathway from infant's birth to the end of hospitalization, there is a risk of fragmentation of pain management. In terms of homogeneity of care, it would be good if the team caring for the infant were as permanent as possible. Permanent teams make it easier to build trust and share knowledge.

Based on earlier studies IPC has been associated with effective management of neonatal pain (Axelin et al., 2015; Balige-Bourgeois et al., 2020; Brødsgaard et al., 2019; Eccleston et al., 2021;

McNair et al., 2020). By supporting family-centered care in neonatal pain management, parents can be actively involved in alleviating their infant's pain. They can participate in painful procedures, i.e., blood sampling, by assessing pain and managing it with non-pharmacologic pain-relieving methods. When parents are seen as a resource, it improves individual care and reduces the burden on healthcare professionals. Parents participation is therefore important for both high-quality nursing and resource saving. (Balige-Bourgeois et al., 2020; Pölkki et al., 2018; Walker, 2019.)

Methods

Study Design and Setting

This descriptive cross-sectional study was carried out among health care teams featuring representatives of multiple professional groups who were working in neonatal intensive care units at four Finnish University hospitals.

Purpose

The purpose of this study was to describe interprofessional collaboration in the context of pain management in neonatal intensive care based on health care team members' perceptions of partnership, cooperation, and coordination. The research questions were as follows:

How do professional groups working in neonatal intensive care assess their interprofessional collaboration in the context of neonatal pain management?

Which background factors are associated with the interprofessional collaboration in pain management during neonatal intensive care?

Participants

The participants were members of the health care team involved in caring for neonates in intensive care units including physicians, physiotherapists, speech therapists, medical laboratory/laboratory personnel, nurses, midwives, nurse leaders/managers, and radiographers. Their level of education ranged from vocational degree to the highest academic degree. In total, 439 members of different health care teams were invited to participate and 132 (30%) responded. Participants worked at four university hospitals in Finland (Helsinki, Turku, Oulu, and Kuopio).

Data Collection and Ethical Considerations

The data were collected during October 2019. Each participating hospital had a contact person who sent the email addresses of prospective participants to the researcher. The surveys were conducted via Webropol 3.0 hosted by University of (blinded for review). The survey links were distributed to participants via e-mail addresses provided to the researcher by the contact person from each hospital.

Permission to conduct the study was obtained from the participating hospitals. The research was conducted in accordance with the General Data Protection Regulation (Access to European Union Law, EU regulation 2016/679), and the Helsinki Declaration (World Medical Association, 2018) (World Medical, 2018). The authors emailed a cover letter and an individual Webropol-link to the questionnaire to each prospective participant in the study. The cover letter explained the study's purpose, confidentiality, voluntary nature, and stated that participants could discontinue their participation at any time during the study.

Instrument

The diagnostic instrument used to evaluate the level of IPC among the various members of the health care team was the Assessment of Interprofessional Team Collaboration Scale (AITCS-II). The AITCS-II is a valid and reliable questionnaire developed in Canada to measure collaboration among health care teams (Orchard et al., 2012; Orchard et al., 2018).

The internal consistency of the original AITCS-II (Orchard et al., 2018) as measured by Cronbach's alpha coefficient is 0.89. The internal consistency of the original scale was strengthened by its developers through explorative and confirmatory factor analysis. The internal validity of the themes of AITCS-II is reported to be >1 with variance of 60.7%. The three themes contribute 29.8%, 16.5%, and 14.4% of the total variance, respectively (Orchard et al., 2018).

The questionnaire also has 23 items comprising three subscales of interprofessional collaboration: partnership (8 items), cooperation (8 items), and coordination (7 items). All items are rated using a 5-point Likert-scale ranging from one (never) to five (always). Mean scores for each subscale can be categorized into three areas of team collaboration: "need to focus on developing collaborative practice" (1.0-2.9); "moving towards collaboration" (3.0-3.9); "good collaboration" (4.0 or more) (Orchard et al., 2018).

Validity and Reliability

The Canadian version of AITCS-II was translated into Finnish according to scientific guidelines (Beaton et al., 2000) by the first author of the study. In the translation process, two native Finnish speaking researchers independently translated the AITCS-II into Finnish. Researchers discussed the essence of statements in their translations and found them to be concordant; while there were minor differences in word choice between the translations, the content of the statements was congruent. Next, the scale was modified to address treatment of neonatal pain, in accordance with guidelines provided by the original developer of the AITCS-II instrument. The statements were modified so that the operating environment concerned the targeted pain management of infants by professionals and parents as a team. The content validity of the questionnaire was evaluated by an expert panel consisting of three nurses, one midwife, one physiotherapist, and one doctor. A few items were clarified based on the panel's input, and the statements were judged to be content-relevant. Finally, a back-translation to the original language was performed after minor word alterations based on the expert panel recommendations. The final version was approved by the original developer of AITCS-II.

The pilot version of the scale was pre-tested for face validity by discussing it with three people who have previously worked in neonatal intensive care units. These respondents rated the statements and answered some additional open-ended questions. Examples of the additional questions were "Do you consider the questionnaire relevant to neonatal intensive care?", "were there any questions hard to understand?", and "Do you have any further comment on the statements?". One participant commented on the difficulty of answering statements in which they were supposed to consider how they currently felt their team members thought and felt about certain issues. This concern was addressed by writing a carefully prepared cover letter explaining each participant should express only his/her own opinions even when answering questions related to other team members.

The internal consistency of the adapted Finnish version of AITCS-II (AITCS-FIN) was evaluated by item analysis and Cronbach's alpha. The alpha values for the subscales ranged from 0.75-0.87 and its internal consistency was 0.87, both of which are quite similar to the corresponding values for AITCS-II. Alpha scores over 0.7

can be considered acceptable (Polit & Beck 2017). After all the above steps about evaluating content and face validity as well as the internal consistency, AITCS-FIN was considered as a valid and reliable instrument to measure IPC in Finnish culture.

Sociodemographic and Professional Data

The sociodemographic and professional data were used as background information and included participants' gender (voluntary to identify), professional title, form of employment (part-time, full-time, temporary, or permanent), education, work experience since most graduation, and the work experience in the current position.

Data Analysis

The data were analyzed using IBM SPSS-25.0.1 for Windows. The background information was analyzed using descriptive statistics. The options on the 5-point Likert-scale were reduced to three categories because of small numbers of frequencies in some of them. Options 1 (never) and 2 (rarely) were combined and changed to category 3; option 3 was changed to category 2. Options 4 (most) and 5 (always) were combined and changed to category 1. Sum variables (mean and standard deviation [SD]) were computed for total interprofessional collaboration and the partnership, cooperation, and coordination subscales. In accordance with an earlier study (Orchard et al., 2018), mean scores of 1.0 to 2.9 were taken to indicate a "need to focus on developing collaborative practice", scores of 3.0 to 3.9 were interpreted as "moving towards collaboration", and scores of 4.0 or more indicated "good collaboration". The Mann-Whitney *U* test or Kruskal-Wallis *H*-test were used to evaluate differences in background variables. The statistical significance threshold was set to $p < .05$.

Results

Sample

Of the 439 questionnaires distributed to eligible participants, 132 were returned to the researcher. Of the Finland's five university hospitals, one did not wish to participate in the study due to an overload of work. Two questionnaires on background information were incomplete. Gender reporting was voluntary, so questionnaires were included in the analysis.

Background Information

Most participants were female (93%) and 74% were nurses. Their length of work experience ranged from 0 to 36 years (Mean = 13.6 years, SD = 9.8) and their length of service in their current position ranged from 0.1 to 40 years (Mean = 11.5 years, SD = 10.0). Over half of the participants (59%) had a bachelor's degree and 11% had master's degree (Table 1).

Interprofessional collaboration in neonatal pain management

Based on the participants' responses to AITCS-II, the level of interprofessional collaboration relating to pain management in neonatal intensive care in the participating Finnish hospitals can be classified as "moving towards collaboration" (Mean AITCS-II score = 3.86, SD = 0.55) (Table 2). Similarly, the mean scores for the partnership (Mean score = 3.82, SD = 0.68), cooperation (Mean = 3.95, SD = 0.54), and coordination (Mean = 3.80, SD = 0.62) subscales indicated the participants' units were "moving towards collaboration" (Table 3).

Table 1
Background factors associated with perception of interprofessional collaboration.
Subscales of interprofessional collaboration

Background factors	n	AITCS-II ^a Mean (SD)	p	Partnership Mean (SD)	p	Cooperation Mean (SD)	p	Coordination Mean (SD)	p
Gender			.080 ^b		.247 ^b		.028 ^b		.098
Female	123	3.85 (0.54)		3.81 (0.68)		3.95 (0.52)		3.79 (0.62)	
Male	7	4.22 (0.49)		4.13 (0.65)		4.34 (0.37)		4.20 (0.56)	
Form of employment			.820 ^b		.982 ^b		.780 ^b		.735 ^b
Full-time	96	3.86 (0.53)		3.77 (0.76)		3.97 (0.56)		3.83 (0.63)	
Part-time	36	3.86 (0.59)		3.83 (0.65)		3.95 (0.53)		3.79 (0.62)	
Level of education			.028 ^c		.010 ^c		.080 ^c		.123 ^c
Vocational school	33	3.82 (0.53)		3.74 (0.69)		3.94 (0.42)		3.79 (0.67)	
Bachelor's degree	79	3.80 (0.56)		3.77 (0.68)		3.89 (0.58)		3.75 (0.62)	
Master's degree	14	4.11 (0.47)		4.21 (0.56)		4.10 (0.43)		4.03 (0.54)	
Doctorate	7	4.29 (0.42)		4.27 (0.49)		4.39 (0.44)		4.20 (0.45)	
Professional title			<.001 ^c		.005 ^c		.023 ^c		.026 ^c
Physician	12	4.25 (0.51)		4.36 (0.45)		4.32 (0.46)		4.17 (0.46)	
Nurse	98	3.81 (0.51)		3.74 (0.63)		3.90 (0.53)		3.77 (0.58)	
Midwife	12	4.10 (0.33)		4.07 (0.51)		4.11 (0.37)		4.11 (0.35)	
Other occupational professionals	10	4.25 (0.45)		4.34 (0.44)		4.29 (0.44)		4.13 (0.46)	
Work experience									
After latest examination			.949 ^c		.952 ^c		.929 ^c		.879 ^c
0-5 y	32	3.88 (0.55)		3.84 (0.72)		3.94 (0.56)		3.85 (0.66)	
>5-10	37	3.87 (0.55)		3.82 (0.69)		3.99 (0.45)		3.81 (0.67)	
>10-20	52	3.91 (0.57)		3.87 (0.68)		4.00 (0.64)		3.86 (0.65)	
>20	21	3.81 (0.56)		3.78 (0.64)		3.90 (0.64)		3.75 (0.61)	
In the current job			.134 ^c		.493 ^c		.247 ^c		.064 ^c
0-5 y	34	3.87 (0.68)		3.88 (0.73)		3.89 (0.59)		3.84 (0.60)	
>5-10	24	3.76 (0.47)		3.65 (0.65)		3.97 (0.29)		3.67 (0.63)	
>10-20									
>20									

^a AITCS-II scores: Mean 1.0-2.9 = Need to develop collaboration; Mean 3.0-3.9 = Moving toward collaboration; Mean \geq 4.0 Good collaboration.

^b Mann-Whitney *U* test.

^c Kruskal-Wallis H-test. AITCS-II = Assessment of Interprofessional Team Collaboration Scale; SD = standard deviation.

Table 2
Interprofessional collaboration mean score in pain management in neonatal intensive care ($n = 132$)

Level of interprofessional collaboration	AITCS-II Mean ^a	SD	α
Partnership	3.82	0.68	0.83
Cooperation	3.95	0.54	0.87
Coordination	3.80	0.62	0.75
TOTAL COLLABORATION	3.86	0.55	0.87

^a AITCS-II scores: Mean 1.0-2.9 = Need to develop collaboration; Mean 3.0-3.9 = Moving toward collaboration; Mean $>$ 4.0 = Good collaboration. AITCS-II = Assessment of Interprofessional Team Collaboration Scale; SD = standard deviation.

Partnership

The partnership subscale relates to attitudes. The responses to the subscale items showed most (83%) participants maintained consistent and mutual communication about neonatal care, and 16% did it occasionally. Participants (76%) regularly discussed the treatment of newborn infants, and 74% of participants coordinated health and social services based on the infants' need for care and treatment. Participants (72%) reported their teams set goals for infants' care plans, and 67% of the parents participated in care plan development. Participants (62%) worked with parents to modify their infant's personal care plan, and (66%) also took parents' wishes into account when implementing pain treatment. Participants (59%) said when caring for infants, they encouraged other team members and the infant's parents to use their knowledge and skills to plan pain management (Table 3).

Cooperation

The cooperation subscale relates to value base. Responses to the subscale items showed most participants (89%) understood the

laws and regulations governing their professional work and shared knowledge and skills within their teams (82%). Most participants (78%) also respected and trusted their teammates and were building a sense of mutual trust (75%) among team members. Participants (72%) felt they shared power. The changes in their teams' working practices were done based on feedback (73%). Participants also (74%) tried to find consensus when the views of their professional team members differed (Table 4). It is noteworthy that nurses were significantly different in their responses to cooperation compared with the other professionals involved. They were the largest group of participants, but still quite unanimous that cooperation could be improved (Table 1).

Coordination

The coordination subscale relates to willingness and ability to share knowledge and skills. Responses to the subscale items showed most (83%) participants agreed the goals of neonatal care were shared by the team members. Additionally, 80% agreed team members encouraged each other and the infants' parents to communicate openly and supported them in doing so. Participants (73%) supported parents' participation in group meetings and reported their own views on interprofessional collaboration in practice. Participants (69%) were committed to conflict resolution, and 23% engaged in conflict resolution occasionally. Participants (80%) generally accepted the leadership of a team might change depending on the exact care needed by an infant, but only 41% reported they were able to take part in selecting team leader, which in this case could be a professional or a parent (Table 5). Also in this subscale, nurses were significantly different in their responses compared with the other professionals who participated (Table 1).

Table 3
Partnership in Interprofessional Collaboration

When working in interprofessional team and treating infant's pain, all team members...Item	f (%) Most/Always	f (%) Occasionally	f (%) Rarely/Never	n
1. maintain consistent, mutual communication about neonatal care.	109 (82.6)	21 (15.9)	2 (1.5)	132
2. meet regularly to discuss the treatment of the infant.	100 (75.8)	19 (14.4)	13 (9.8)	132
3. seek to co-ordinate health and social services based on the need of care and treatment of the infant.	97 (73.5)	26 (19.7)	9 (6.8)	132
4. participate in setting goals for treatment plans for each infant.	95 (72.0)	26 (19.7)	11 (8.3)	132
5. involve the parents of the infant in the planning of treatment and setting of goals.	89 (67.4)	29 (22.0)	14 (10.6)	132
6. listen to the wishes of the parents of the infant in the implementation of pain treatment.	87 (65.9)	32 (24.2)	13 (9.8)	132
7. work with the infant's parents to modify an individual treatment plan for the infant.	82 (62.1)	29 (22.0)	21 (15.9)	132
8. encourage each other and the infant's parents to use their knowledge and skills when planning pain management.	78 (59.1)	37 (28.0)	17 (12.))	132

Table 4
Cooperation in Interprofessional Collaboration

When working in interprofessional team and treating infant's pain, all team members...Item	f (%) Most/Always	f (%) Occasionally	f (%) Rarely/Never	n
9. understand the laws and regulations that each professional group within team is affected by.	117 (88.6)	11 (8.3)	4 (3.0)	132
10. are open and honest to each other.	108 (81.8)	24 (18.2)	-	132
11. understand that professionals in the team have shared knowledge and skills.	108 (81.8)	20 (15.2)	4 (3.0)	132
12. respect and trust each other.	103 (78.0)	29 (22.0)	-	132
13. build a sense of mutual trust among team members.	99 (7.0)	30 (22.7)	3 (2.3)	132
14. seek to reach a mutually agreed decision when the views of team members differ from each other.	97 (73.5)	33 (25.0)	2 (1.5)	132
15. adjust their team performance based on feedback and evaluation they have made with each other.	96 (72.7)	32 (24.2)	4 (3.0)	132
16. share power with each other.	95 (72.0)	32 (24.2)	5 (3.8)	132

Background factors associated with interprofessional collaboration in pain management during neonatal intensive care

Factors associated with the perception of IPC were level of education (Kruskal-Wallis test, $p = .028$) and professional title ($p < .001$) (Table 1).

Participants with doctoral (5.3%) and master (10.6%) degrees considered the overall level of IPC within their teams to be good, as did physicians (9.1%), midwives (9.1%), and other occupational professionals (7.6%). Conversely, nurses (74.0%) perceived overall IPC to be "moving towards collaboration."

Level of education (Kruskal-Wallis test, $p = .010$) and professional title ($p = .005$) were significantly associated with partnership. Gender ($p = .028$) and professional title ($p = .023$) were significantly associated with cooperation. Men (5.3%) reported cooperation to be better than women (93.2%). Professional title ($p = .026$) was significantly associated with coordination, when physicians, midwives, and other occupational professionals assessed cooperation to be good while nurses perceived it to be at the "moving towards collaboration" level.

Discussion

This study purposed to describe interprofessional collaboration in the context of pain management in neonatal intensive care based on health care team members' perceptions of partnership,

cooperation, and coordination at four Finnish university hospitals. The participants felt their teamwork relating to pain management was at the "moving towards collaboration" level. Participants with high education and men as well as physicians, midwives, and other occupational professionals perceived the level of interprofessional collaboration to be higher than nurses did. Form of employment or work experience did not affect the perceived level of collaboration.

While the overall levels of IPC as perceived by different participant groups were quite similar, there were some noteworthy differences. Midwives, who work in the same practical settings as nurses when managing neonatal pain in intensive care, perceived the overall level of collaboration within teams to be good, whereas nurses perceived it to be at the "moving towards collaboration" level. Such differences are important because nurses were the largest respondent group. Both nurses and midwives work with all of the other professional groups involved in managing neonatal pain on a daily basis. Based on this result it can be concluded the perception of neonatal pain management varied considerably.

Although the treatment for neonatal pain management has been widely studied, the IPC related to healthcare teams and pain management assessment and treatment within the neonatal care units has not; however, the results presented here are supported by previous findings about involving parents by establishing a

Table 5
Coordination in Interprofessional Collaboration

When working in interprofessional team and treating infant's pain, all team members...Item	F (%) Most/Always	F (%) Occasionally	F (%) Rarely/Never	n
17. equally divide agreed goals among team members.	109 (82.6)	16 (12.1)	7 (5.3)	132
18. encourage and support each other and the parents of the infant to open communication.	105 (79.5)	23 (17.4)	4 (3.0)	132
19. accept that the leader/person in charge changes according to the need of treatment of the infant.	105 (79.5)	23 (17.4)	4 (3.0)	132
20. has its own views of what interprofessional collaboration is in practice.	96 (72.7)	26 (19.7)	10 (7.6)	132
21. openly support involvement of the parents of a infant in team meetings.	96 (72.7)	24 (18.2)	12 (9.1)	132
22. commit to an agreed process to resolve conflicts.	91 (68.9)	31 (23.5)	10 (7.6)	132
23. select the team leader/person in charge.	54 (40.9)	40 (30.3)	38 (28.8)	132

true listening culture and addressing their hopes and expectations (Aija et al., 2019; Axelin et al., 2015; Axelin et al., 2018).

Partnership was the subscale with the most pronounced variability of perceptions. This subscale relates to attitudes, including cooperation, willingness to jointly design and act, and the sharing of competence between all participating professional groups as well as the infant's parents. The relatively high variability on this subscale highlights that perceptions of partnership vary between participants. It is important to note, because successful collaboration within interprofessional team relies on individual attitudes being respected and accepted (Orchard et al., 2005; Pillai Riddell et al., 2015; Perry et al., 2018; Walker, 2019).

Participant responses to the cooperation subscale items had limited variability. Items on this subscale relate to the value base—specifically trustworthiness, willingness to change opinions, and solve problems within the team. Cooperation is important, but without partnership and coordination it is deficient (Orchard et al., 2005; Nancarrow et al., 2013).

Responses to the coordination subscale items were quite similar. The subscale relates to willingness and ability to share power, knowledge, and skills; however, one item relating to hierarchical relationships (choosing a team leader) stood out. All the professionals, as well as the infant's parents, need to be able to assess the pain. Professionals should also be able to take advantage of the presence of parents and make decisions with them. Over time, the parents learn to know their infant's signals and develop in the assessment of pain. In these situations, the parent can also suggest an appropriate course of action and pain relief. When professionals have a desire to work with infant's parents, the team leader may vary depending on the situation (; McNair et al., 2020). This supports family-centered care in interprofessional collaboration and enables parents of neonates to participate in their infant's care.

Although there is a lack of research data on IPC in neonatal pain management, Eccleston et al., 2021 emphasized the importance of collaborative practices in pain management. One significant issue they named was the experience of equity and equality among all team members. Standardization of clinical practices can reasonably be expected to enable uniform treatment of patients (Pölkki et al., 2018; Walter-Nicolet et al., 2017), but requires participants to cooperate willingly. Because the best pain treatment involves avoiding or preparing for painful procedures (Pillai Riddell et al., 2015; Walter-Nicolet et al., 2017), IPC should always strongly involve parents in partnership, cooperation, and coordination. This enables the setting of appropriate goals and gives parents the opportunity to participate and influence. Family-centered nursing should not just be about parents spending time with their infant in the ward. The results showed involvement of parents was deficient even based on the responses of groups, who felt the level of collaboration within

their teams was good (physicians and midwives). All items in every subscale relating to listening to parents, sharing information, and paying attention to parents had comparatively low scores. Previous studies have shown it is important to involve parents throughout the process of collaboration, because it increases quality of care (Balice-Bourgeois et al., 2020; Perry et al., 2018). Evaluating and treating pain is not merely a task for nurses; it must be done through IPC with the same quality as all other care activities. It is, therefore, important to carefully consider practice.

In accordance with previous reports, our findings indicate many factors can influence pain management. A study on neonatal pain relief in North America found pharmacologic treatments for neonates are well established and non-pharmacologic pain-relieving methods can, therefore, be beneficial for relieving neonatal pain from a long-term and developmental perspective (Perry et al., 2018). Poor pain relief is not due to a lack of evidence-based knowledge; rather, it seems to come from the perceptions of various professions about pain management and the way in which health care organizations operate (Eccleston et al., 2021; McNair et al., 2020). Pain assessment is important to do in the right way, and with a suitable measure for the patient group (Olsson et al., 2021; Pölkki et al., 2018). Cooperation between nurses and mothers, nurses and parents, and doctors and parents has been studied previously (Axelin et al., 2015; Balice-Bourgeois et al., 2020; Brødsgaard et al., 2019; McNair et al., 2020), but few previous studies have examined all professional groups simultaneously in the context of pain management (Balice-Bourgeois et al., 2020). Thus, interprofessional collaboration as a clinical practice may not be understood as well as it is generally believed because comprehensive definitions in practice may be lacking (Engel et al., 2019). This may be due to the culture of the work community, limited resources (Walter-Nicolet et al., 2017; Perry et al., 2018), or the lack of unified practices in pain assessment and management (Lago et al., 2017).

It is worth considering which professional groups are most familiar with neonatal patients, pain assessment scales, and non-pharmacologic pain management measures for neonates. According to the World Health Organization (2010), successful collaboration requires consideration of the patient's specific characteristics and needs, as well as, interprofessional sharing of knowledge and skills. This suggests the differences in perception observed in this study may be due to a lack of knowledge among certain professionals, indicating a need for training and harmonization of approaches. The findings presented here are consistent with the results of international studies on IPC (Balice-Bourgeois et al., 2020; Prentice et al., 2016) and parental involvement (Aija et al., 2019; McNair et al., 2020; Pillai Riddell et al., 2015). However, more research is needed on the implementation of IPC and ways to promote it in the context of neonatal pain management.

Limitations

This study has some limitations which may influence the interpretation of its results and the generalizability of the findings. First, some professional groups were not represented among the participants, which is why the results obtained should be treated with caution (Milton, 2017; Polit & Beck, 2017). At the outset of the study, the authors did not have email addresses for medical laboratory/laboratory staff at one hospital, so some professionals in this category were excluded from the study. Second, at the beginning of the study, the nursing managers estimated the number of different professionals connected in their units. We asked all professionals, who are in some way involved in caring for neonates in intensive care units, to participate in the study. Finally, a reminder was sent once a week to those who had not responded. The reminder stated the study was interprofessional, and concerned all occupational groups involved in intensive care of neonates. The questionnaire was short and only some background information was required. Nonrespondents may have had different perceptions on the topic, or they felt it totally unfamiliar. However, four of five Finnish university hospitals were willing to participate and response rate of 30% was achieved. The response rate was low, although typical for surveys (Polit & Beck, 2017), which is why the results should be considered with caution to all NICUs at Finnish university hospitals. In addition, our results are in line with earlier literature (Balice-Bourgeois et al., 2020; Lago et al., 2017; McNair et al., 2020) dealing with neonatal pain management and parental participation.

Conclusions

Professionals involved in neonatal care perceived interprofessional collaboration as a mutual goal. The involvement of parents in all areas of interprofessional collaboration, including partnership, cooperation, and coordination was estimated to be “moving towards collaboration”, although the experience of equality among the team members was not fully realized. Some background factors were associated with perceptions of partnership, cooperation, and coordination, which is important to consider when reviewing and reforming of clinical practices.

Implications for Nursing Education, Practice and Research

Health care teams featuring representatives of multiple professional groups perceived the level of interprofessional collaboration in pain management in neonatal intensive care to be “moving towards collaboration”. Further research is needed about parents’ view of interprofessional collaboration. In successful interprofessional collaboration whole teams need to be able to assess the pain. It would be useful to focus on educational interventions and their follow-up for opening the discussion about what interprofessional collaboration means in the context of neonatal pain management and how it can be promoted in practice.

Acknowledgments

We would like to thank all the study participants and Professor Carole Orchard for permitting to use the AITCS-II in this study.

References

Access to European union law. Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation). <http://data.europa.eu/eli/reg/2016/679/2016-05-04>.

- Aija, A., Toome, L., Axelin, A., Raiskila, S., & Lehtonen, L. (2019). Parents’ presence and participation in medical rounds in 11 European neonatal units. *Early Human Development*, 130, 10–16. <https://doi.org/10.1016/j.earlhumdev.2019.01.003>.
- Anand, K. J. S. (2017). Defining pain in newborns : need for a uniform taxonomy? *Acta Paediatrica*, 106(9), 1438–1444. <https://doi.org/10.1111/apa.13936>.
- Anand, K. J. S., Eriksson, M., Boyle, E. M., Avila-Alvarez, A., Andersen, R. D., Sarafidis, K., Polkki, T., Matos, C., Lago, P., Papadouri, T., Attard-Montalto, S., Ilmoja, M. L., Simons, S., Tamielene, R., van Overmeire, B., Berger, A., Dobrzanska, A., Schroth, M., Bergqvist, L., Courtois, E., Rousseau, J., ... Carbaial, R.EU-ROPAIN survey working group of the NeoOpioid Consortium. (2017). Assessment of Continuous continuous pain in newborns admitted to nicus in 18 European countries. *Acta Paediatrica*, 106(8), 1248–1259.
- Axelin, A., Anderzén-Carlsson, A., Eriksson, M., Pölkki, T., Korhonen, A., & Franck, L. S. (2015). Neonatal intensive care nurses’ perceptions of parental participation in infant pain management. *Journal of Perinatal & Neonatal Nursing*, 29(4), 363–374. <https://doi.org/10.1097/JPN.0000000000000136>.
- Axelin, A., Outinen, J., Lainema, K., Lehtonen, L., & Franck, L. S. (2018). Neonatologists can impede or support parents’ participation in decision-making during medical rounds in neonatal intensive care units. *Acta Paediatrica*, 107(12), 2100–2108. <https://doi.org/10.1111/apa.14386>.
- Balice-Bourgeois, C., Zumstein-Shaha, M., Simonetti, G. D., & Newman, C. J. (2020). Interprofessional collaboration and involvement of parents in the management of painful procedures in newborns. *Frontiers in Pediatrics*, 8, 394. <https://doi.org/10.3389/fped.2020.00394>.
- Beaton, D. E., Bombardier, C., Guillemin, F., & Ferraz, M. B. (2000). Guidelines for the Process of Cross-Cultural Adaptation of Self-Report Measures. *SPINE*, 25(24), 3186–3191. <https://doi.org/10.1097/00007632-200012150-00014>.
- Brødsgaard, A., Pedersen, J. T., Larsen, P., & Weis, J. (2019). Parents’ and nurses’ experiences of partnership in neonatal intensive care units: A qualitative review and meta-synthesis. *Journal of Clinical Nursing*, 28(17–18), 3117–3139. <https://doi.org/10.1111/jocn.14920>.
- Eccleston, C., Fisher, E., Howard, R. F., Slater, R., Forgeron, P., Palermo, T. M., ... Wood, C. (2021). Delivering transformative action in paediatric pain: a Lancet Child & Adolescent Health Commission. *Lancet Child Adolescent Health*, 5(1), 47–87. [https://doi.org/10.1016/S2352-4642\(20\)30277-7](https://doi.org/10.1016/S2352-4642(20)30277-7).
- Engel, J., Prentice, D., & Hicks, R. (2019). Where does the patient fit? An analysis of word use within the context of interprofessional collaborative care. *Global Qualitative Nursing Research*, 7(6), 1–7. <https://doi.org/10.1177/2333393619889353>.
- Lago, P., Garetti, E., Bellieni, C. V., Merazzi, D., Savant Levet, P., Ancora, G., & Pirelli, A. (2017). Pain Study Group of the Italian Society of Neonatology Systematic review of nonpharmacological analgesic interventions for common needle-related procedure in newborn infants and development of evidence-based clinical guidelines. *Acta Paediatrica*, 106(6), 864–870. <https://doi.org/10.1111/apa.14606>.
- Maxwell, L. G., Fraga, M. V., & Malavolta, C. P. (2019). Assessment of pain in the newborn: An update. *Clinics in Perinatology*, 46(4), 693–707. <https://doi.org/10.1016/j.clp.2019.08.005>.
- McNair, C., Chinia, N., Shah, V., McAllister, M., Franck, L. S., Stevens, B., Burry, L., & Taddio, A. (2020). Metasynthesis of factors that influence parents’ participation in pain management for their infants in the NICU. *Journal of Obstetric, Gynecologic & Neonatal Nursing*, 49(3), 263–271. <https://doi.org/10.1016/j.jogn.2020.02.007>.
- Milton, C. L. (2017). The ethics of big data and nursing science. *Nursing Science Quarterly*, 30(4), 300–302. <https://doi.org/10.1177/0894318417724474>.
- Nancarrow, S. A., Booth, A., Ariss, S., Smith, T., Enderby, P., & Roots, A. (2013). Ten principles of good interdisciplinary team work. *Human Resources of Health*, 11, 19. <https://doi.org/10.1186/1478-4491-11-19>.
- Olsson, E., Ahl, H., Bengtsson, K., Vejjaram, D. N., Norman, E., Bruschetti, M., & Eriksson, M. (2021). The use and reporting of neonatal pain scales: A systematic review of randomized trials. *Pain*, 162(2), 353–360. <https://doi.org/10.1097/j.pain.0000000000002046>.
- Orchard, C. A., Curran, V., & Kabene, S. (2005). Creating a culture for interdisciplinary collaborative professional practice. *Medical Education Online*, 10(1), 4387. <https://doi.org/10.3402/meo.v10i.4387>.
- Orchard, C. A., King, G. A., Khalili, H., & Bezzina, M. B. (2012). Assessment of Interprofessional Team Collaboration Scale (AITCS): Development and testing of the Instrument. *Journal of Continuing Education in Health Professions*, 32(1), 58–67. <https://doi.org/10.1002/chp.21123>.
- Orchard, C. A., King, G. A., Khalili, H., & Bezzina, M. B. (2018). Assessment of Interprofessional Team Collaboration Scale (AITCS): Further testing and instrument revision. *Journal of Continuing Education in Health Professions*, 38(1), 11–18. <https://doi.org/10.1097/CEH.0000000000000193>.
- Perry, M., Tan, Z., Weiding, T., Xu, W., & Cong, X. S. (2018). Neonatal pain: Perceptions and current practice. *Critical Care Nursing Clinics of North America*, 30(4), 549–561.
- Pillai Riddell, R. R., Racine, M. N., Gennis, H. G., Turcotte, K., Uman, L. S., Horton, R. E., Kohut, S. A., Hillgrove Stuart, J., Stevens, B., & Lisi, D. M. (2015). Non-pharmacological management of infant and young child procedural pain. *Cochrane Database of Systematic Reviews*, 2015(12), Article CD006275. <https://doi.org/10.1002/14651858.CD006275.pub3>.
- Polit, D. F., & Beck, C. T. (2017). *Nursing research: Generating and accessing evidence for nursing practice* (10th). Philadelphia: Wolters Kluwer Health/Lippincott Williams & Wilkins.

- Pölkki, T., Korhonen, A., & Laukkala, H. (2018). Nurses' perceptions of pain assessment and management practices in neonates: a cross-sectional survey. *Scandinavian Journal of Caring Sciences*, 32(2), 725–733. <https://doi.org/10.1111/scs.12503>.
- Prentice, D., Jung, B., Taplya, K., Stobbe, K., & Hildebrand, L. (2016). Staff perceptions of collaboration on a new interprofessional unit using the Assessment of Interprofessional Team Collaboration Scale (AITCS). *Interprofessional Care*, 30(6), 823–825. <https://doi.org/10.1080/13561820.2016.1218447>.
- Roofthoof, D. W., Simons, S. H., Anand, K. J. S., Tibboel, D., & van Dijk, M. (2014). Eight years later, are we still hurting newborn infants? *Neonatology*, 105(3), 218–226. <https://doi.org/10.1159/000357207>.
- Walker, S. M. (2019). Long-term effects of neonatal pain. *Seminars in Fetal and Neonatal Medicine*, 24(4), Article 101005. <https://doi.org/10.1016/j.siny.2019.04.005>.
- Walter-Nicolet, E., Calvel, L., Gazzo, G., Poisbeau, P., & Kuhn, P. (2017). Neonatal pain, still searching for the optimal approach. *Current Pharmaceutical Design*, 38(23), 5861–5878. <https://doi.org/10.2174/1381612823666171017164957>.
- WHO. (World Health Organization). *Framework for action on interprofessional education and collaborative practice*. 2010. https://apps.who.int/iris/bitstream/handle/10665/70185/WHO_HRH_10.3_eng.pdf?sequence=1.
- World Medical Association. *Declaration of Helsinki - Ethical principles for medical research involving human subjects*. 2018. <https://www.wma.net/policies-post/wma-declaration-of-helsinki-ethical-principles-for-medical-research-involving-human-subjects/>.