Research

Use of Non Pharmacological Therapies for Pain Management in Children: A Survey of Pediatric Healthcare Provides

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Abstract

Background. Pediatric pain management is a complex challenge, particularly in settings such as intensive care units and in postoperative care, where the use of analgesic drugs can result in significant side effects. The use of non-pharmacological therapies (NPTs) has been shown to be effective in reducing both pain and anxiety. Since they are safe and free of side effects, they are therefore suitable for reducing the adverse effects of pharmacotherapy and improving the compliance of pediatric patients.

Methods. A descriptive survey was carried out by means of an ad hoc questionnaire with multiple-choice questions and was open to 202 voluntary healthcare personnel of pediatric departments of a Tuscany pediatric health agency with non-probability convenience sampling. The questionnaire assessed knowledge, skills and attitudes toward NPTs, with a statistical analysis of qualitative and quantitative variables.

Results. Forty-six percent of participants considered NPTs effective for pain control, but a significant proportion (54%) remained skeptical. Pediatric nurses demonstrated greater expertise in the use of NPTs, with 91% showing sufficient knowledge compared to 63% in other professions (Odds Ratio = 6.1; CI: 2.8–13; $p < 0.0001$).

Conclusions. The study highlights the need for specific and ongoing educational programs on provision NPTs for healthcare personnel. Integration of NPTs into care plans could reduce dependence on analgesics, helping both to significantly reduce pain and to ensure a more holistic approach.

Keywords: Pain, Pain Management, Cognitive Behavioral Therapy, Nursing.

Background

For the first time since 1979, the International Association for the Study of Pain (IASP) has introduced a new definition of pain, describing it as "an unpleasant sensory and emotional experience associated with, or resembling that associated with, actual or potential tissue damage"[1,2]. The IASP aims to enhance pain assessment methods, particularly for children, where anxiety and fear can worsen chronic pain. [3]. In fact, anxiety can amplify the perception of pain and worsen clinical outcomes; thus, anxiety management interventions, such as cognitive-behavioral therapy, are proposed as complementary treatments[4]. Several studies explore the challenges in pain management for hospitalized children, particularly into intensive pediatric care and postoperative settings[5], where a multidisciplinary and personalized approach is necessary, including both pharmacological and non-pharmacological therapies (NPTs), to alleviate pain and prevent long-term complications[6]. Pain is considered one of the most frequently reported adverse events, especially in pediatric intensive care units[7,8]. However, pain management in pediatric settings remains complex, even though pain relief has been recognized as a human right since 2004[9]. The different responses and perceptions of pain across various pediatric ages make it difficult to establish a single therapeutic approach[10]. Some authors highlight the difficulties in assessing pain and propose a wider use of non-pharmacological therapies as part of an integrated therapeutic plan[11]. Analgesic drugs, such as opioids, are commonly used to manage pain in children[12,13], especially in pediatric intensive care units (PICU) and post-operative settings. However, these drugs can cause significant side effects such as hypotension, respiratory failure, delirium and withdrawal syndromes, and long-term neuropsychological problems[14,15]. Interventions implemented for non-pharmacological pain management include physical and psychological methods that can be applied simultaneously or independently[16,17]. NPTs include acupuncture, non-nutritive sucking, breastfeeding, sucrose/glucose solution, breathing, distraction, sensory techniques, cognitive-behavioral techniques, therapeutic massage, music therapy, physical contact, and many others[18]. Although there is evidence NPTs, the strategies are not universally used and their application is not widespread. Several studies indicate that healthcare personnel have limited knowledge of these strategies and their correct application due to lack of specific training, heavy workload, and inadequate nurse-to-patient ratios[19,20], thus constituting a significant barrier to their application. To improve the dissemination and effectiveness of non-pharmacological therapies, it is essential to develop specific and continuous educational programs for healthcare personnel. Integrating these therapies into nursing and medical training programs can significantly improve pediatric pain management[21]. It is therefore essential to promote the use of these strategies, not only to reduce the side effects associated with pharmacotherapy but also to ensure a holistic and child- and family-centered approach to pain management. This study aims to evaluate the knowledge, skills, and attitudes of healthcare providers regarding the use of non-pharmacological therapies in pediatrics.

Materials and methods

Study design

An open survey was conducted using a questionnaire consisting of multiple-choice and open-ended questions, developed ad hoc based on a questionnaire found in literature[22]. Before the final draft, the survey instrument was reviewed by a group of pediatric specialist nurses. They were asked to assess the relevance of the questions, clarity, and coverage of knowledge areas. The questionnaire consists of 31 items, including 1 open-ended question. The collected data were entered into a database and processed with Microsoft Excel by the research team. Statistical significance was set to *P* value less than .05.

Sample characteristics and setting

The sampling method used was a convenience sampling based on the voluntary participation of healthcare and social-healthcare personnel from the departments of the Meyer University Hospital IRCCS, totaling 202 participants. The simple size has not been calculated, therefore, all professionals who agree to participate in the study have been included. The study was written following the guidelines of the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statements[23].

Inclusion and Exclusion Criteria

All healthcare professionals employed at Meyer University Hospital IRCCS, including nurses, pediatric nurses, doctors, specialist trainees, radiology technicians, speech

therapists, psychologists, and healthcare assistants. Students, administrative staff, and non-healthcare technicians were excluded.

Data Collection Tool

Data collection was conducted anonymously from March to September 2024. The workers participating in this study received the questionnaire via email through the Google Forms website platform. Before its final draft, the survey tool, was submitted to a group of specialist nurses in the critical care area. They were asked to evaluate the relevance of the questions, the clarity, and the coverage of the areas of knowledge.

The questionnaire is structured into three sections. The first section collects socio-demographic data (such as professional qualification, age, years of service, and educational background) through 7 questions. The second section contains questions about knowledge, skills, and attitudes regarding the use of NPTs. The third section specifically addresses the use of NPTs and pain management in pediatrics.

For the section on knowledge, skills, and attitudes towards NPTs, participants rated each statement on a 5-point Likert scale: "insufficient," "poor," "sufficient," "good," and "advanced." In the analysis, responses "insufficient" and "poor" were combined as "insufficient," while "sufficient," "good," and "advanced" were grouped as "sufficient." Attitudes towards NPTs were classified as "not inclined" (for "not inclined" and "slightly inclined") and "inclined" (for "sufficient," "good," and "inclined"). In the section on the use of NPTs, participants responded with a binary option (yes or no) regarding their knowledge. For pain management, participants expressed their agreement on a 5-point Likert scale (from "completely disagree" to "completely agree"). The responses "completely agree" and "agree" were combined, as well as "completely disagree" and "disagree," and evaluated as correct or incorrect, while "neutral" was considered impartial.

Ethical considerations

The study received authorization from the Health Directorate of AOU Meyer IRCCS in Florence. It was conducted in accordance with the principles of the Declaration of Helsinki and its subsequent amendments, respecting the privacy of the participants. Participants received an online form containing information about the study, including its description and purpose, with explicit indication of the voluntary nature of their anonymous participation. Completing the survey was considered consent. Only the authors of the study had access to the data. Data were managed and stored in compliance with current data protection regulations. All the ethical concerns of the study were stated in the first part of the questionnaire in agreement with the principles of the Italian data protection authority (DPA).

Data analysis

The frequency of variables and central tendency indices were calculated. Independent variables were cross-tabulated with dependent variables and analyzed using the Chi-square test for qualitative variables and Student's t-test for quantitative variables. ANOVA was performed for variance analysis, and the Kruskal-Wallis test was used for non-parametric samples. Absolute frequencies and percentages were also calculated for the examined variables. Additionally, the open-ended question was reported descriptively.

Results

A total of 202 participants were included in the study. The 48% (n=96) of responses came from nursing staff, of which 13% (n=26) were pediatric nurses. The 15% (n=30) were doctors, 9% (n=18) were specialist trainee doctors, 6% (n=12) were healthcare assistants, 4% (n=8) were radiology technicians, 3% (n=6) were physiotherapists, 1% (n=2) were psychologists, and another 1% (n=2) were speech therapists. The majority of the sample is female, (80%, n=161). The average age of participants is 40.7 years (SD 10.7). The 25% (n=51) of the sample are younger than 31 years old, with the 75% (n=151) under 51 years old. The average years of experience is 14.5 years (SD 9.9), while 12.5 (SD 9.8) years is the average experience in pediatric settings. The second part of the questionnaire evaluates knowledge, skills, and attitudes regarding the use of NPTs and knowledge about pain management.

Participant Characteristics

NPTs Knowledge

The 4% (n=8) of the participants reported having insufficient knowledge, 16% (n=32) poor, 29% (n=59) sufficient, 34% (n=69) good, and 17% (n=34) advanced. Pediatric nurses showed solid knowledge, with 19% (n=5) rating their knowledge as advanced and 44% (n=11) as good. In contrast, specialist trainee doctors showed the most uncertainty, with 61% (n=11) rating their

knowledge as poor and 39% (n=7) as sufficient. Sufficient knowledge is significantly associated with longer service in pediatric care, with an average of 15 years for the group with sufficient knowledge compared to 11 years for those with insufficient knowledge (Kruskal-Wallis Test, H = 8.4, p<0.003). In comparing knowledge across healthcare professions, nurses demonstrated sufficient knowledge in 91% (n=184) of cases, in stark contrast to 63% (n=127) of other professions (Odds Ratio = 6.1; CI: 2.8-13; Chi-square = 8.85; p < 0.0001).

NPTs Competencies

Among all healthcare professionals, 5% (n=10) rated their competencies as insufficient, 19% (n=38) as poor, 36% (n=73) as sufficient, 32% (n=65) as good, and 8% (n=16) as advanced. Nursing professionals are three times more likely to have sufficient competencies compared to other groups (Odds Ratio = 3.7; CI: 1.9–7.2; Chi-square = 9.9; p<0.0007). The average years of service for those with sufficient competencies is 16 years (DS 10), compared to 10 years (DS 8) for those with insufficient competencies, highlighting a significant correlation between experience and competencies (Kruskal-Wallis Test, H = 11.37, p<0.0007). Pediatric nurses and psychologists emerged as the groups with the highest advanced competencies, at 15% (n=30) and 33% (n=67) respectively.

NPTs Attitudes

The 3.5% (n=7) of healthcare professionals reported a non-inclined attitude, 9.5% (n=19) slightly inclined, 34% (n=69) sufficient, 28% (n=57) good, and 25% (n=50) very inclined. The 50% (n=3) of physiotherapists, 100% (n=2) of speech therapists, and 50% (n=2) of psychologists declared themselves very inclined.

Comparison Between Healthcare Professions and Work Settings

In the comparison between nursing (including pediatric nurse) and other professions, nurses were significantly more inclined to use NPTs (Odds Ratio = 0.4; CI: 0.2–0.9; Chi-square = 0.03; p<0.02). Participants with inclined attitudes had an average age of 41 years and an average of 15 years of service, without statistically significant differences compared to those with non-inclined attitudes (Kruskal-Wallis Test, H = 1.3, p<0.25). In the clinical settings the inclined attitudes was 86% and non inclined attitudes was 14% meanwhile in the non-clinical setting the attitudes inclined was 100%. The work setting highlighted relevant differences in knowledge (p<0.02), competencies (p<0.006), and attitudes (p<0.0035). No statistically significant differences were observed between clinical and non-clinical settings in terms of sufficient competencies with the 77% (n=148) and 70% (n=7) in the clinical and non-clinical setting respectively (Odds Ratio = 0.71; CI: 0.18–2.88; Chi-square = 0.63). The non-clinical setting include health professions management staff.

The most statistical difference among healthcare professionals in skills, knowledge, and attitudes by work environment (clinical and non-clinical settings) and educational qualification are summarized in Table 1.

Table 1. Statistical differences among healthcare professionals

Variables	Educational qualification	Work environment
Knowledge	p=0,077	p=0,02
Skills	p=0,002	p=0,006
Attitudes	p=0,05	p=0,005

The most significant variables investigating professional attitudes, awareness, and practices towards NPTs, reflecting the most crucial points of pediatric pain management, are summarized in Table 2 and Table 3.

Table 2. Knowledge on pain.

Variables	Incorrect (%)	Impartial (%)	Correct (%)
Is it part of the rights of a hospitalized patient to have a significant reduction in pain of any origin?	1,5	4,5	94
Should a patient with chronic pain be treated with on-demand analgesic therapy?	57	20	23
Should a patient who reports being in pain always be believed?	12	24	64
Lack of expression of pain does not mean lack of pain.	2	9	89
Do distraction techniques, such as music or relaxation, reduce the perception of pain?	2	11	87
Pharmacological therapy can be combined with TNF.?	1	4	96
Should pain be regularly measured using evaluation scales?	1	3	96
Should we wait for the pain to reappear before administering an additional dose of analgesic?	71	16	13

Table 3. Knowledge of Non-Pharmacological Techniques

Variables	Yes (%)	No (%)
Have you ever applied non-pharmacological techniques (NPTs)?	79	21
Do you think NPTs (Non-Pharmacological Techniques) are a valid tool for pain control?	46	54
Have you ever seen a non-pharmacological technique (NPT) being applied?	89	11
Do you believe that the choice of non-pharmacological techniques (NPTs) depends on the child's age?	68	32

Discussion

This study aims to assess the knowledge, skills, and attitudes of healthcare professionals regarding the use of NPTs in pediatrics. Poor pain management is one of the most adverse events in pediatrics due to healthcare professionals' lack of understanding of the phenomenon. Recent studies highlight the importance of NPTs in treating pediatric pain, demonstrating their benefits in reducing both perceived pain and anxiety in children. A recent review demonstrated the effectiveness of distraction and cognitive-behavioral therapy in reducing pain and anxiety in children during medical procedures[18].

Distraction methods, such as play or music, can significantly reduce perceived pain and stress levels, improving the experience of young patients during painful procedures[24,26]. Additionally, a study found that techniques such as non-nutritive sucking and skin-to-skin contact can reduce pain in newborns undergoing procedures like blood draws and injections[26,27]. These techniques have been recognized as useful tools for calming infants without the use of drugs, reducing the risk of long-term side effects, and improving the quality of pediatric care[4].

The analysis of the obtained data highlights the variety of knowledge, skills, and attitudes among the healthcare professionals involved in pain management. In particular, nurses, especially pediatric nurses, show greater competence in the use of NPTs compared to other professions. These results confirm the difficulties already highlighted in the literature in terms of training and competence uniformity in the use of NPTs. The correlation between pediatric experience and knowledge of NPTs is another interesting result: professionals with more experience in the pediatric context tend to show higher levels of knowledge and competence[28,29]. Recent studies highlight how anxiety can exacerbate the perception of pain in children[30,31], negatively impacting clinical outcomes. This underscores the importance of a multidisciplinary management approach that includes NPTs such as cognitive-behavioral therapy and distraction techniques (e.g., music and relaxation). These

interventions have proven effective in reducing procedural anxiety and pain in children and adolescents, as demonstrated by a review reporting a significant reduction in perceived pain during invasive procedures[18].

Our study shows that, although 46% of participants consider NPTs to be a valid tool for pain control, 54% are still not convinced of their effectiveness. This result highlights a significant challenge for the dissemination of NPTs and reflects the barriers to their implementation. Recent studies indicate that a lack of specific training represents a significant barrier to the effective use of NPTs for managing pain in children[32]. Several studies underline that, although there are effective techniques such as skin-to-skin contact, distraction, and the use of sweet solutions, many nurses do not apply them regularly due to limited knowledge or lack of confidence in their effectiveness[33]. Several NPTs were used during the pandemic but the lack of training hinders consistent application of these methods in pediatric units[7]. To promote a more comprehensive pediatric pain management approach focused on the child's physical and psychological well-being, it is essential to encourage the use of NPTs. Carter and Simons (2014) suggest that including these techniques in nursing and medical training programs can significantly improve the competencies and attitudes of healthcare personnel. A national survey on complementary care, identified similar barriers and facilitators for NPT adoption. The study noted that healthcare professionals' attitudes and confidence in complementary therapies are shaped by organizational support and training availability[34]. Several studies highlighting the underutilization of NPTs due to training deficits, skepticism, and limited institutional support[6,19]. The lack of structured training on NPTs and misconceptions about their effectiveness underscore the need for evidence-based advocacy and integrated education[11]. To promote NPTs in pediatric care, we recommend targeted training programs and policy updates. Training should include the integration of NPT modules into healthcare education and the provision of regular workshops. Interdisciplinary training sessions can also foster collaboration across healthcare teams.

NPTs should be embedded into standard pediatric pain management protocols to ensure they become a core part of care. Institutions should support these changes by allocating resources for staff training and implementing NPTs in daily clinical practices.

Limitations

This study has some limitations. The convenience sampling method may have introduced bias, limiting the generalizability of findings. The inability to calculate the response rate prevents assessing representativeness. Self-reported data may include response bias, and the cross-sectional design does not capture changes over time. Future research should consider longitudinal approaches to address these issues.

Conclusions

In light of our results, it seems that nursing staff have greater knowledge and competence in the use of NPTs compared to other healthcare professionals. Furthermore, the average age and years of service seem to play an important role in the propensity to use NPTs, with greater experience associated with more advanced competencies. According to our findings, it is a priority to develop specific and continuous educational programs on NPTs for healthcare professionals working with pediatric patients, to reduce dependence on pharmacological analgesics and ensure a more holistic approach.

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