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REVIEW

Innovative Strategies for Pediatric Pain Management in Invasive Procedures: Role of Nursing and Non-Pharmacological Approaches

Estrategias Innovadoras para el Manejo del Dolor Pediátrico en Procedimientos Invasivos: Rol de Enfermería y Métodos No Farmacológicos

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ABSTRACT

Introduction: In recent years, several researches addressed the reduction of pain and anxiety in children undergoing invasive procedures, highlighting that pediatric pain management remains an infrequent practice, despite the availability of effective treatments. Studies such as those by Navarro (2013) and Cocerá Martínez (2016) highlighted the relevance of the role of Nursing in pain management and the need to implement non-pharmacological strategies, such as distraction methods, to relieve pain in pediatric patients.
Development: Pain was defined as a subjective experience that combines sensory and emotional components. In the pediatric setting, its assessment represents a challenge due to the difficulty of young children to verbally express their sensations. Tools such as the Wong and Baker facial scale and the verbal numerical scale have facilitated the assessment of pain. In addition, non-pharmacological methods, such as the use of music, electronic games or relaxation techniques, proved to be effective in reducing pain perception and anxiety in children during procedures such as venipuncture. Prior preparation, through clear explanation of the procedure, also contributed to decrease stress in patients and their families.
Conclusions: Adequate pain management in children requires a comprehensive approach combining pharmacologic and nonpharmacologic strategies. The active participation of the nursing professional, together with the implementation of innovative methods, is essential to improve the quality of pediatric care and promote a more humanized experience in health services.

Keywords: Pediatric pain; Nursing; Non-pharmacological methods; Pain assessment; Active distraction.

RESUMEN

Introducción: En los últimos años, diversas investigaciones abordaron la reducción del dolor y la ansiedad en niños sometidos a procedimientos invasivos, destacando que el manejo del dolor pediátrico continúa siendo una práctica poco frecuente, a pesar de la disponibilidad de tratamientos efectivos. Estudios como los de Navarro (2013) y Cocerá Martínez (2016) subrayaron la relevancia del rol de Enfermería en el manejo del dolor y la necesidad de implementar estrategias no farmacológicas, como métodos de distracción, para aliviar el dolor en pacientes pediátricos.
Desarrollo: El dolor se definió como una experiencia subjetiva que combina componentes sensoriales y emocionales. En el ámbito pediátrico, su valoración representa un reto debido a la dificultad de los niños pequeños para expresar verbalmente sus sensaciones. Herramientas como la escala facial de Wong y Baker y la escala numérica verbal facilitaron la evaluación del dolor. Además, métodos no farmacológicos, como el uso de música, juegos electrónicos o técnicas de relajación, demostraron ser efectivos para reducir la percepción del dolor y la ansiedad en los niños durante procedimientos como la venopunción. La preparación previa, mediante la explicación clara del procedimiento, también contribuyó a disminuir el estrés de los pacientes y sus familias.
Conclusiones: El manejo adecuado del dolor en niños requiere un enfoque integral que combine estrategias farmacológicas y no farmacológicas. La participación activa del profesional de Enfermería, junto con la implementación de métodos innovadores, resulta esencial para mejorar la calidad de la atención pediátrica y promover una experiencia más humanizada en los servicios de salud.

Palabras clave: Dolor pediátrico; Enfermería; Métodos no farmacológicos; Evaluación del dolor; Distracción activa.

INTRODUCTION

In recent years, various studies have been carried out on how to minimize pain and anxiety in children during painful, invasive procedures. Procedural pain management is an underused practice in children despite the availability of effective treatments. For Navarro (2013), hospitalization, vaccination, and venipuncture techniques are highly stressful events for pediatric patients hospitalized in a hospital unit.

In her degree thesis, Cocerá Martínez points out that pain management in children before, during, and after venipuncture is an essential task that the nursing professional in all healthcare settings must carry out. She then concludes that the non-pharmacological management of pain associated with invasive procedures is an independent task that nurses must include in their care and that, despite evidence of the effectiveness of multiple pain relief measures in these situations, their application in practice is scarce (Cocerá Martínez, 2016).

According to the analyzed bibliography, various distractions are considered efficient in reducing pain during vaccinations and venipunctures in children. These types of distractions include the use of a kaleidoscope, a tablet, and a cell phone (Sánchez, 2018).

Another relevant issue in determining how to eliminate pain is having the ability to measure it in order to know how important it is for the patient. Pain is a subjective rather than an objective sensation and depends on the person, which is why the nursing professional must carry out a thorough and comprehensive assessment of it (Rioja, 2018).

General objective

Analyze and promote effective strategies, both pharmacological and non-pharmacological, for the management of pain and anxiety in children during painful, invasive procedures, emphasizing the

importance of comprehensive pain assessment and the role of the nursing professional in the implementation of these measures in clinical practice.

DEVELOPMENT

Pain is defined as any unpleasant or painful sensory and emotional experience associated with tissue damage, and the subjective component plays a fundamental role in its assessment, description, and reporting.

For some years now, the idea of pain as the fifth vital sign has been promoted, and therefore, most recommendations revolve around the fact that it should be anticipated, evaluated, and treated in all clinical settings. However, given the inability of young infants to verbalize pain and the impossibility of having previous painful experiences that modulate the current one, the assessment and management of pain in this population group constitute a significant challenge (Hernández, 2018).

In recent years, the medical community and clinical research have become significantly interested in the assessment and study of pain in all types of patients. Therefore, regardless of the population, pain must be anticipated, evaluated, and managed appropriately in each possible scenario. Different definitions of pain have emerged to achieve a multidimensional approach to pain, which can be applied depending on the patient's context.

The International Association for the Study of Pain (IASP) defined pain as a subjective construct, "an unpleasant or disagreeable sensory and emotional experience or sensation caused by, or associated with, actual or potential tissue damage" modulated by previous life experiences. Thus, pain is also the description of a particular form of emotional stress resulting from the effects of the excessive stress generated by the painful experience, which requires a level of awareness adequate for it to be compared with an experience (Sánchez, 2004).

Classification of pain.

Pain can be classified according to its duration as acute or chronic. Acute pain, in turn, can be superficial -cutaneous or peripheral- or somatic -deep, central, and visceral-.

Acute superficial, cutaneous, or peripheral pain is produced by thermal, mechanical, electrical, or chemical stimuli localized in the skin. This type of pain can manifest itself as tingling, burning, stabbing, or cutting. Its location is clear, and there may be no relationship with the intensity and duration of the triggering stimulus. It may be accompanied by hyperalgesia or hyperesthesia (Cocerás, 2016).

Acute pain can also be identified as pain caused by injuries or accidents, pain associated with post-operative situations, or pain linked to diagnostic procedures and medical treatments. In this case, it involves invasive procedures that require the use of instruments that penetrate tissue or a bodily orifice, such as the administration of injections, suppositories, catheterization, peripheral venous puncture, or excruciating procedures such as bone marrow aspiration or burn treatments (Martínez, 2016).

Chronic pain is defined as pain that manifests itself in a persistent, episodic, or recurrent manner; its intensity or severity affects the functionality or living conditions of the patient suffering from it, and it is attributable to a disease process. Various authors have suggested that chronicity is a period longer than required to achieve a cure. Chronic pain has been considered to last for more than 3 to 6 months from the onset (Covarrubias, 2013).

Assessment of pain.

From the direct contact we have with patients, it is not possible to assess pain from different levels since nurses have tools such as health education and general communication to detect reactions such as anxiety, fear, irritability, and pain in family members and patients who come to us and require our attention when they arrive at the hospital, both when they go to the emergency room or at the time of admission.

The author Yamila Báez (2018) states that, in order to detect these feelings in our patients, it is vitally important to have an adequate anamnesis and a good assessment. This will sharpen the clinical eye of the nurse and facilitate their work during their study of the service.

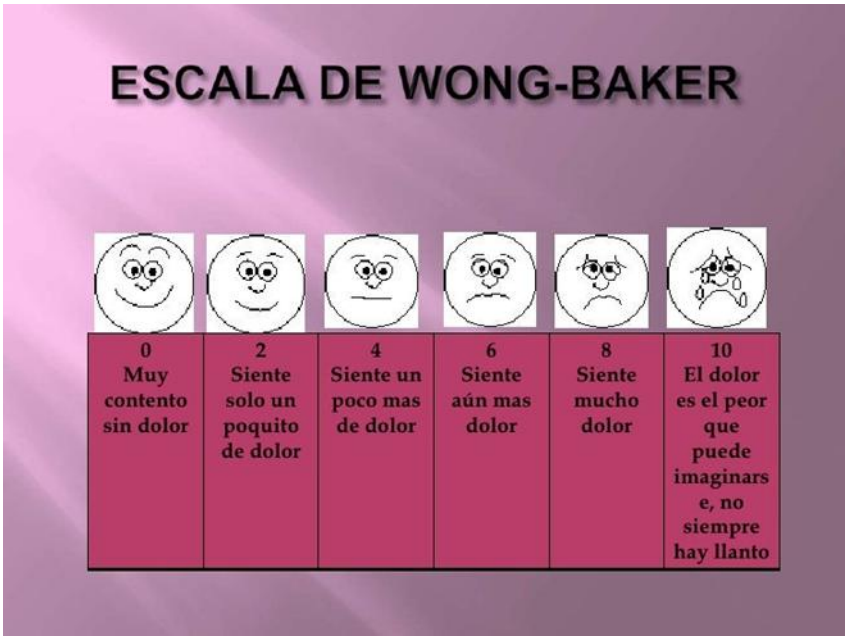
In order to carry out an adequate assessment of the situation the child is going through, it is important to consider aspects such as age. For example, newborns and infants react to painful sensations by crying, moving their bodies vigorously, and showing different facial expressions; the same does not happen with school-age children, as they can express discomfort or pain in different ways because they can locate the pain in the affected area and show the fear that specific procedures cause them. During this stage, painful experiences cause them stress and irritability.

We consider that pain in children is often underestimated and misinterpreted, so it is important to know how to differentiate and detect different signals that they give us according to their age. For this, we have different tools that would be useful when assessing pain.

Facial expression scale.

It is also known as the Wong and Baker facial scale. It is used mainly in pediatric patients and shows a series of faces with expressions ranging from happiness to crying, each of which is assigned a number from 0 (no pain) to 6 (maximum pain). The patient has to indicate which face best represents the intensity of their pain at the time of the examination.

Figure 1.



Source: Author's own creation.

Verbal numerical scale.

The patient rates their pain from 0 to 10, with 0 being no pain and 10 being the worst pain imaginable.

Non-pharmacological methods.

Several general measures for pain control focus on prevention, especially avoiding chronic painful stimuli and minimizing painful procedures. Correctly managing some measures will enable the child to reduce their perception of pain, raising their threshold as much as possible.

Some suggested measures are to use distraction methods such as music, a tablet, a cell phone, or showing images to capture the child's attention by keeping their mind occupied and replacing thoughts

of pain with positive ones. Breathing techniques can also be used to divert the child's attention. Something important, especially with older children, is to use empathy, putting ourselves in the child's shoes, trying to understand and empathize with them, listening to their fears and concerns, and paying attention to their expression of pain. With this, through dialogue, the child's cooperation can be achieved to perform the technique more quickly without the child having to be mobilized or restrained, causing them more anxiety and fear. It is vital to explain the procedure to the child and their caregiver, what is expected of them, and how long it will take (Báez, 2018).

Distractors.

In the last 10 to 15 years, the results of several epidemiological studies have consistently emphasized that a significant proportion (49% to 64%) of hospitalized children receive inadequate pain management despite the increase in available treatments and knowledge. Experimental studies affirm that inadequate relief of pain, distress, and anxiety during painful procedures in childhood can decrease individual tolerance to pain, increase painful responses throughout life, and contribute to the development of chronic pain. There are multiple strategies to improve the treatment of pain and anxiety that involve the use of non-pharmacological treatments (Miguez, 2013).

Distraction is a non-pharmacological pain control technique commonly used by healthcare professionals and parents to reduce the pain and anxiety caused by different procedures. In short, it is a cognitive coping strategy that passively redirects the subject's attention or actively involves the subject in a task (Rioja, 2018).

Passive forms of distraction mainly consist of listening to music or watching television. Active forms of distraction include interactive toys or electronic games. This is why new technologies can be beneficial in providing quality care and managing children's pain and anxiety as efficiently as possible. New technologies also make it possible to develop content to prepare the patient before the invasive procedure. The preparation aims to allay fears and erroneous preconceptions about the procedure. This is achieved by providing accurate and appropriate information about the technique used, what it is for, and what is expected of the child during the procedure. The patient is given a sense of control over the situation through preparation.

On the other hand, interactive games are multisensory toys that involve a player's active cognitive, motor, and visual skills. For them to be played successfully, great attention is required, and it is common for children to concentrate so much on these games that their surroundings become non-existent. For this reason, electronic games are seen as an active distraction technique with the potential to block multiple senses to reduce pain and anxiety. Researchers have evaluated the effect of distraction on patients undergoing preoperative care and venipuncture, and most consider interactive games to be effective in reducing anxiety and stress in pediatric patients undergoing invasive procedures (Rioja, 2018).

Venipuncture technique

This technique consists of reaching the interior of a peripheral vein by passing a catheter through the tissues. The aim is to access the interior of a specific vein and leave a catheter inside it to keep a route to the venous circulation open, either for diagnostic or therapeutic purposes.

Venipuncture technique, procedure.

- Wash your hands and put on gloves.
- Explain the relevant information to the patient or family member.
- Evaluate and choose the vein for the IV puncture, in order of preference from distal to proximal. In the upper limb:
    - Back of the hand.
    - Forearm (cephalic forearm vein and basilic forearm vein); antecubital fossae (median elbow vein, cephalic vein and basilic vein).
    - Arm (cephalic vein and basilic vein).

On lower limbs (if the above are not suitable):
  - Veins on the back of the foot.
  - Inner saphenous vein.
- Place the patient in the supine position with the limb extended and barely separated from the body.
- Place the compressor in position.
- Try to get the patient to relax, insisting that they do not move the limb. Ask them to open and close their hand several times to improve venous return. You can place the limb in decline for several seconds, rub the path of the vein from distal to proximal, apply heat to the limb, or tap the vein gently with your finger to promote venous dilation.
- Prepare the puncture area with an antiseptic.
- Palpate the path of the vein 2 to 3 cm below the puncture point with the second and third fingers of the non-dominant hand and use them to hold the skin steady to facilitate access.
- Insert the catheter with a smooth and steady movement, 3 to 5 mm, in the direction of blood flow, at an angle of between 15 and 30º to the skin, always with the bevel facing upwards, until blood appears in the rear chamber.
- Once the vein has been entered, place the catheter parallel to the skin, insert it about 5 mm further along the metal guide, and then finish sliding the catheter over the guide.
- Once the access is in place, remove the compressor with the non-dominant hand.
- Remove the metal guide, pressing with the fingers of the non-dominant hand above the place where the tip of the catheter has been lodged to prevent blood from leaking.
- Connect to the medication infusion system, parenteral hydration, heparinized cap, or 3-way stopcock. Check that fluid enters the vein and observe the insertion point to avoid extravasation or pain. Once this has been verified, set the indicated speed as indicated.
- Secure the catheter to the skin with hypoallergenic tape, trying to leave enough visibility of the line's route. Write down the date and time on the side of the catheter.
- Discard the needle in the container without encapsulating the used items.
- Prepare the patient.
- Inform them of the limitation of movement to which they must submit the limb in which the catheter will remain to prevent its accidental removal.
- Explain that the catheter is made of a flexible material that adapts to the lumen of the vein. It is also important not to flex the limb (if it is lodged in the crease) where the catheter is located to avoid obstructing the flow or even causing it to stop completely, favoring the formation of thrombi and obstruction.
- Wash hands.
- Record in nursing sheet.

CONCLUSIONS

Adequately managing pain and anxiety in children during invasive procedures is a significant challenge in clinical practice, which demands the integration of pharmacological and non-pharmacological approaches. Despite the scientific evidence supporting the effectiveness of various strategies, their practical application remains limited. It is crucial that nurses, who play a fundamental role in pediatric care, prioritize pain assessment and management as an essential component of comprehensive care.

Non-pharmacological techniques, such as active and passive distractions, have proven particularly useful in mitigating children's perception of pain. Implementing tools such as electronic devices, music,

interactive games, and relaxation techniques helps redirect the attention of young patients, significantly reducing their discomfort and stress. This approach improves the child's experience during the procedure and reinforces families' trust in the healthcare system.

Comprehensive pain assessment is another critical aspect. Since pain is a subjective experience and its expression varies according to age, using specific tools, such as the Wong-Baker FACES Pain Rating Scale or the verbal numerical scale, is essential. These allow the nursing professional to objectively evaluate the pain's intensity and adapt to the capacities of the pediatric patient. In addition, it is important to recognize that young children, unable to verbalize their pain adequately, require detailed observation of their facial expressions, movements, and behavior.

Although effective, pharmacological methods are not always sufficient or appropriate in all cases. Therefore, a combination of approaches is key to guaranteeing multidimensional pain management. Preparation prior to the procedure, which includes a detailed explanation of the process to the child and their carer, also plays an essential role in reducing the associated anxiety and promoting greater cooperation from the patient.

Finally, it is essential to promote the continuous education of nursing professionals on the latest strategies and tools available for pediatric pain management. Likewise, the systematic implementation of these practices in all healthcare settings should be advocated, recognizing their positive impact on both patients' well-being and the quality of care provided.

In conclusion, the management of pain in children during invasive procedures must be addressed as a priority. The integration of innovative strategies, together with a rigorous assessment and an empathetic approach, will significantly improve the pediatric experience in health services, laying the foundations for more humanized and practical care.

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CONFLICT OF INTEREST

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