Distraction methods for pain relief of cancer children submitted to painful procedures: systematic review*

Métodos de distração para o alívio da dor em crianças com câncer submetidas a procedimentos dolorosos: revisão sistemática

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ABSTRACT

BACKGROUND AND OBJECTIVES: Pain is one of the most persistent cancer symptoms. Non-pharmacological therapies are potential sources for cancer children care and should be considered alternatives for handling cancer signs and symptoms. This study aimed at identifying effective distraction interventions for pain relief and control of cancer children submitted to invasive procedures.

CONTENTS: This is a systematic review carried out in electronic databases LILACS, CINAHL, CENTRAL Cochrane Library and Pubmed, using the combination of controlled and uncontrolled keywords: child, pain, cancer and distraction. Ten studies were identified addressing distraction as intervention for venous, muscle and subcutaneous punctures, and procedures related to bone marrow aspiration and lumbar puncture.

CONCLUSION: Among identified interventions, there are virtual reality, practices such as blowing soap bubbles, use of warm pillows, party blower, electronic toys, among other self-selected interventions (music, games, books). Most interventions are easy to implement considering their low cost and are useful for health professionals looking at enhancing pediatric patients’ assistance with regard to pain management.

Keywords: Child, Children care, Pain, Pediatrics, Tumors.

INTRODUCTION

Pain is one primary cancer symptom¹, being experienced by all cancer children, with more than 70% of them having severe pain. So, there is the need to recognize this pain, even if subjectively understood, thus avoiding its inadequate treatment².

Common during diagnosis and management, pain may result from painful procedures, disease progression or nerve compression, among other factors³. It is important to note
that invasive procedures, common in different moments of the therapy imposed to cancer patients, induce the most distressing and difficult pain experiences for children and their parents, justifying further focus on handling pain related to such procedures8.

Currently, adequate pain management is becoming increasingly relevant, since it is considered indicator both of quality of life (QL) and of the assistance itself9, being that such management should take into consideration physical, psychosocial and spiritual aspects of patients and their families8. So, one should understand the need for psychological support and the use of non-pharmacological methods, as well as teaching strategies aiming at handling pain, thus decreasing behavioral impacts generated during invasive procedures.

Non-pharmacological pain control therapies are potential sources for cancer children assistance and should be seen as alternatives to handle cancer signs and symptoms. In addition, it is critical to prioritize the investigation of their most different application manners and of their results to manage other signs and symptoms different from pain, such as nausea, vomiting and anxiety8. Knowledge coming from available evidences is an important tool for the identification of different types of non-pharmacological therapies to prevent or decrease invasive procedure-related pain4.

This study aimed at identifying in the scientific literature effective distraction interventions for pain relief and control in cancer children submitted to invasive procedures, summarizing identified results, so that health professionals may use such information for the benefit of better assistance to pediatric patients in terms of pain management. We hope that the summary of existing knowledge on this subject may contribute to enhance the skills needed by health professionals when dealing with such patients.

**CONTENTS**

This is a systematic literature review, aiming at gathering all scientific evidences meeting pre-established eligibility criteria, to answer a specific research question. So, essential features of this review are: clear objective with pre-established selection criteria; explicit methodological reproducibility; systematic search to identify all studies which could meet eligibility criteria; evaluation of primary studies results, as well as a summary of their characteristics and results9.

The guiding question of the research – “Which effective distraction interventions are used for pain relief and control in cancer children submitted to invasive procedures?” – was developed using the PICO strategy from the acronym: Patient, Intervention, Comparison and Outcomes. PICO strategy has shown to be efficient for effective evidences recovery, because it focuses on the objective of the research and prevents unnecessary searches10.

Search went on until June 2014 in the following databases: LILACS, CINAHL, Cochrane Central Register of Controlled Trials (CENTRAL) and Pubmed. The following descriptors were used for the search: child, pain and distraction. Boolean operator “AND” was used for cross-checking among descriptors, establishing a single cross-check as search strategy, namely: child AND pain AND cancer AND distraction.

Inclusion criteria were clinical trials in Portuguese, English and Spanish addressing distraction interventions for pain relief and control in cancer children submitted to invasive procedures. Publication period limits were not adopted. We have identified 79 articles of which titles and abstracts were read, which allowed *a priori* selection of 15 studies. Since not all studies had in the abstract their methodological design or did not precisely indicate participants’ age and could be or not studies involving cancer children, type of outcome and intervention being used, it was necessary to initially examine in full all pre-selected studies. So, from identified studies, five have not met inclusion criteria, being left 10 articles as observed in figure 1. It is important to note that repeated studies in one or more databases were considered only once.

Articles data extraction and evaluation were independently made in pairs and divergences were discussed to reach a consensus.

Selected articles were reviewed by means of their full reading and filling of data collection tool developed by the authors. Then, articles were classified according to essay methodological quality, considering Jadad Scale11 (Table 1).

Ten articles were identified which addressed distraction as intervention to remove children’s focus from the invasive

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**Figure 1. Selection criteria for studies. Brasilia-DF, Brazil, 2014**

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procedure to which they were being submitted. With regard to language, all articles were published in English. Publication years varied between 1988 and 2009 and age groups of studied sample has varied from 2 years to 19 years of age (Table 1). All selected articles used some way of non-pharmacological intervention based on distraction, such as behavioral cognitive intervention for venous, muscle and subcutaneous punctures, and procedures related to bone marrow aspiration and lumbar puncture (Table 1). According to the articles, interventions were in general useful for pain relief or have shown decreased levels of anxiety, distress, affliction or fear present during invasive procedures (Table 2).

To evaluate the methodological quality of selected studies, Jadad Scale was applied, which evaluates criteria related to randomization, blinding and reasons for losing or excluding subjects from the study. According to these criteria, no study was considered of high-quality, as seen in table 1, which contains scores followed by justification. No evaluated study was characterized as double-blind, which has implied lower scores.

Table 1. Distribution of articles according to year, internal validity according to JADAD scale, sample age group, invasive procedure, applied intervention, evaluation scales and objectives. Brasilia-DF, Brazil, 2014

<table>
<thead>
<tr>
<th>Authors</th>
<th>JADAD</th>
<th>Sample size</th>
<th>Age group</th>
<th>Invasive procedure</th>
<th>Distraction intervention</th>
<th>Evaluation scales</th>
<th>Objective</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hedén, Von Essen, &amp; Ljungman</td>
<td>3</td>
<td>n=28</td>
<td>2 to 7 years</td>
<td>Subcutaneous puncture for TI-CVC access</td>
<td>Blowing soap bubbles</td>
<td>VAS</td>
<td>To evaluate whether children had less fear, distress and pain at routine puncture when submitted to some interventions: blowing soap bubbles our warm pad, as compared to usual established care.</td>
</tr>
<tr>
<td>Windich-Biermeier, Sjoberg, Dale, et al.</td>
<td>2</td>
<td>n=50</td>
<td>5 to 18 years</td>
<td>Subcutaneous puncture for TI-CVC access and venous puncture</td>
<td>Self-selected interventions, among them: blowing soap bubbles, challenging book, virtual reality glasses or portable games</td>
<td>CAS Fear Scale, OSBD</td>
<td>To evaluate the effect of self-selected distractions on pain, fear and distress in cancer children and adolescents submitted to procedures such as venous access, via subcutaneous puncture, to TI-CVC or venous punctures.</td>
</tr>
<tr>
<td>Wolitzky, Fivush, Zimand, et al.</td>
<td>2</td>
<td>n=20</td>
<td>7 to 14 years</td>
<td>Subcutaneous puncture for TI-CVC access</td>
<td>Virtual reality</td>
<td>VAS, How-I-Feel Questionnaire, Heart rate</td>
<td>To evaluate the effectiveness of virtual reality as behavioral intervention to decrease distress during TI-CVC access procedure.</td>
</tr>
<tr>
<td>Gershon, Zimand, Pickering, et al.</td>
<td>2</td>
<td>n=59</td>
<td>7 to 19 years</td>
<td>Subcutaneous puncture for TI-CVC access</td>
<td>Virtual reality</td>
<td>VAS, Heart rate</td>
<td>To observe the feasibility of a new technology to decrease anxiety and pain associated to invasive procedures in cancer children.</td>
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<tr>
<td>Dahlgquist, Pendley, Landthrip, et al.16</td>
<td>2</td>
<td>n=29</td>
<td>2 to 5 years</td>
<td>Subcutaneous puncture for TI-CVC access and muscle injections</td>
<td>Electronic toy</td>
<td>OSBD</td>
<td>To evaluate a distraction intervention developed to decrease distress of pre-school children submitted to repeated chemotherapy injections.</td>
</tr>
<tr>
<td>Broome, Rehwaldt &amp; Fogg17</td>
<td>3</td>
<td>n=19</td>
<td>4 to 18 years</td>
<td>Lumbar puncture</td>
<td>Relaxation, distraction and imagination</td>
<td>Oucher Scale</td>
<td>To examine how specific individual differences and contextual variables influence children/adolescents response to painful procedures during cancer treatment and how do such variables influence the effectiveness of relaxation, distraction and imagination.</td>
</tr>
<tr>
<td>Manne, Bakeman, Jacobsen, et al.18</td>
<td>1</td>
<td>n=35</td>
<td>36 to 107 months</td>
<td>Venous puncture</td>
<td>Intervention has incorporated both distraction (party blower used by children) and parents’ training during procedure.</td>
<td>Own scale</td>
<td>To analyze a behavioral intervention developed to decrease stress in children submitted to venous puncture for cancer treatment.</td>
</tr>
<tr>
<td>Manne, Redd, Jacobsen, et al.19</td>
<td>1</td>
<td>n=23</td>
<td>3 to 9 years</td>
<td>Venous puncture</td>
<td>Use of party blower by means of parent training and positive reinforcement to control children’s affliction/distress during invasive cancer treatment.</td>
<td>VAS</td>
<td>To investigate a behavioral intervention incorporating parents training, attention distraction and positive reinforcement to control children’s affliction/distress during invasive cancer treatment.</td>
</tr>
<tr>
<td>Smith, Ackerson &amp; Blotcky20</td>
<td>2</td>
<td>n=28</td>
<td>6 to 18 years</td>
<td>Bone marrow aspiration and/or lumbar puncture</td>
<td>Verbal distraction and sensory information</td>
<td>OSBD Self-reported fear and pain measures</td>
<td>Physiological anxiety measure</td>
</tr>
<tr>
<td>Kuttner, Bowman &amp; Teasdale21</td>
<td>2</td>
<td>n=48</td>
<td>3 to 6 years and 7 to 10 years</td>
<td>Bone marrow aspiration</td>
<td>Hypnosis, “imaginative event”, behavioral distraction</td>
<td>PBRS-R Observational scale for pain and anxiety</td>
<td>Self-report scale developed and validated for the study</td>
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</table>

CAS = color analog scale; TI-CVC = totally implanted central venous catheter; VAS = visual analog scale; OSBD = Observation Scale of Behavioral Distress; CHEOPS = Children’s Hospital of Eastern Ontario Pain Scale; PBRS-R = Procedure Behavior Rating Scale Revised.
Among distraction techniques found in the literature there is the use of electronic toys, relaxation, imagination, soap bubbles, warm pillow, self-selected distractions, party blower and virtual reality, being the two latter methods the most commonly used among selected articles.

With regard to virtual reality, studies have pointed that such intervention may be effective for children submitted to painful and distressing procedures. It is important to consider in which procedures such intervention may be used and un-
der which conditions, since problems have been raised about low painful stimulation related to evaluated invasive procedure, that is, totally implanted venous catheter puncture, and the use of topic local anesthetics before the procedure \(^{15}\). One should also consider that some studies have reported that topic local anesthetics would be used at puncture site, which could interfere with results \(^{12,13,15}\).

Still about virtual reality, it is inferred from the literature the need for further studies about the application of this technology taking into consideration its cost-effectiveness ratio \(^{15}\). Further studies should compare virtual reality efficacy to other distraction methods \(^{15}\), considering the high cost of some equipment used for virtual reality as compared to other distraction or amusement techniques, such as soap bubbles our warm pillow, which are simple, low-cost interventions not requiring professionals workload increase, being this often considered a barrier for the adoption of unconventional treatment means \(^{12}\).

Plural analysis of children’s behavior face to invasive procedures, including painful stimulation, is performed by means of different evaluation scales. Such scales are applied before, during and after the use of non-pharmacological interventions. Importance should be given to visual analog scale (VAS) and physiological evaluation taking into consideration parameters such as heart rate (Table 1). Physiological evaluation measures are valued in articles as method of analysis since they have brought significant results to studies \(^{14,15,20}\) being even considered tools to be included in the evaluation of future studies of those who have not used them yet \(^{19}\).

Involving the family during care is critical. Studies have shown that parents are able to play an active role in supporting and training their children during the procedure \(^{11}\), fact that is confirmed by other studies which have also counted on parents’ role during intervention and/or during evaluation \(^{12,14-19,21}\).

The study working with party blower \(^{18,19}\), has also effectively incorporated parents in the intervention process, even evaluating their distress during procedure \(^{18}\). Parents-children relationship favors coping with and accepting the distraction intervention, during knowingly painful procedures. Manne et al. \(^{18}\) suggest that the link between parents and children is extremely relevant for the effectiveness of the intervention when it depends on the training offered by parents to children. It was observed among selected studies that different distraction forms may be considered effective strategies for pain relief and control, in addition to decreasing distress, affliction, fear and anxiety; however the literature shows the need for expansion and analysis with regard to study samples. A large part of the studies state that sample was small \(^{12,18,20}\) indicating in their analyses the need for experiments with larger samples \(^{13,15,18,20}\).

The wide variety of age groups (younger age = 2 years and older age = 19 years) causes major divergences, since it simultaneously encompasses different development stages and cognitive capacities, being even important to consider the use and evaluation of adequate devices for younger children \(^{14,15}\). On the other hand, Manne et al. \(^{18}\) state that, according to their study data, older children tend to cooperate and present more positive results to distraction interventions as compared to younger children, for not rejecting distraction that much. It should be noted that studies have indicated as fragility the fact that they have not followed criteria with regard to evaluators’ blinding \(^{14,15,19}\). Aiming at preventing or decreasing possible biases of analyses and interpretation of results, we suggest the development of further studies with blind evaluators \(^{14}\).

**CONCLUSION**

The study allowed for the identification of evidences available in the scientific literature with regard to pain relief and control in cancer children using distraction practices. Among them there are virtual reality, practices such as blowing soap bubbles, use of warm pillow, party blower, electronic toys, among other self-selected interventions (music, games, books). Most interventions are easy to implement, considering their low cost, and are useful for health professionals looking at enhancing pediatric patients’ assistance with regard to pain management.

Major study limitations were: decreased number of participants both in experimental and control groups, which does not allow for more robust conclusions. Distraction techniques were varied and were not deeply described, considering the broad guiding question, which makes difficult to elect the most effective distraction intervention and for which invasive procedure. In addition, studies should have worked with more specific age groups, since development competences of each child are quite different and interaction and response to stress are age-dependent.

**REFERENCES**


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