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The impact of parent’s attitude towards acute procedure pain and influence on pain sensation and anxiety in children

Master Thesis

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1. SUMMARY

Author name and surname: Elisa García Charro

Research Title: The impact of parent’s attitude towards acute procedure pain and influence on pain sensation and anxiety in children.

Research aim: To investigate parental attitude and influence on children anxiety and pain during acute painful procedures (e.g. venipuncture, immunization).

Objective: To conduct a systematic review to analyze of previous literature and articles that investigated distress promoting behaviors and parent’s attitude influence on children.

Methods: This systematic review was designed in accordance with the Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA). A literature search was conducted in different online databases, collecting the studies that report behavior of children aged from birth to 18 years of age and their caregiver’s attitude during acute procedures. Searched studies were selected according an inclusion and exclusion criteria, and data was extracted and synthesized. Risks of bias and evidence quality were screened using QUADAS instrument and GRADE system respectively.

Results: The search ended up with 12 articles, from which only 4 cross-sectional studies were finally included in the systematic review. In general, data were insufficiently reported and unclear. Only 2 of 4 studies were assessed as low risk of bias. Quality of evidence was low for all the studies considering the fact that they were designed as observational studies.

Conclusions: All data supports the theory that parent’s attitude influence children’s distress and pain during routine acute procedures. The use of optimal quantity and quality distraction techniques showed to be very beneficial for the children coping-behaviors.
2. CONFLICT OF INTEREST

The realization of the presented systematic review didn’t receive any sponsors, suppliers of materials neither funds. There is no conflict of interest.

3. ETHICAL COMMITTEE APPROVAL

For the realization of this systematic review it wasn’t necessary the Ethics Committee Approval, as no information about patients was required neither used during the process.
4. ABBREVIATIONS LIST

PRISMA - Preferred Reporting Items for Systematic Review and Meta-Analysis

QUADAS - Quality Assessment of Diagnostic Accuracy Studies

GRADE - Grading of Recommendations, Assessment, Development and Evaluation

PICO - Population, Intervention, Control, Outcome

SoF - Summary of findings

IV - Intravenous

USA - United States of America

UK - United Kingdom
5. INTRODUCTION

Immunization and venipuncture are common and routine procedures during childhood. However, in most of the cases children suffer from anxiety and pain during these medical practices leading to life-long stress and bad experience associated with medical settings. For long time, pediatric pain was not considered as a serious issue. Swafford and Allan in a textbook of Pediatrics from 1968, explained that “the child will say he does not feel well or that he is uncomfortable or that he wants his parents but often will not relate this unhappiness to pain”[1]. The knowledge about pediatric pain, importance of pain assessment and management increased over the past 20 years. More researchers focus on the impact of acute painful procedure, such as venipuncture or immunization. However, procedural pain management is still identifying as a major area in need of improvement. It was reported to be a considerable cause of children and parents distress.

Management of pain is crucial in early age, particularly in the neonatal period. Its inadequacy is linked to numerous psychological and physiological consequences, as the development of needle phobia, leading to the avoidance of health care when being an adult or post-traumatic stress syndrome [2]. Infants who underwent multiple painful procedures are more pain sensitive (hyperalgesia) and more likely to report somatic symptoms when they become adolescents compared to infants who didn’t. In addition, inadequate procedural pain management during childhood may decrease effectiveness of analgesia in subsequent procedures [3].

Speaking about acute pediatric procedural pain, it is necessary to asses which are the conditions and variables that increase this problem. Age, gender, demographics and comorbidities are diverse factors that might explain children's response to procedures, but are the parent's behavior and their distracting capability what seems to influence these responses the most [4].

Children undergoing a painful procedure have a negative physiological and psychological impact on parents, who respond with an increase in the heart rate, blood pressure and self-report of anxiety [5]. Several studies revealed that this anxiety and the
way caregivers express and manage it during medical procedures have a proportional influence on children's anxiety and pain [6].

Pain interferences are influenced by the characteristics of the person suffering the pain and by the individual characteristics of the observer, in this case, the parents and caregivers. Different researchers compared the behavior of clinically anxious and not anxious mothers, and results suggested that mothers with higher anxiety become less emotionally sensitive, and might communicate their distress to their children [7].

With the hypothesis that lowering parent’s anxiety would lower child procedural anxiety and pain, distraction mechanisms became an important maneuver to manage infants pain, by diverting attention from a negative and uncomfortable stimulus to a pleasant one [8]. In addition, coaching parent's attitude and behavior towards acute interventions decrease distress in their children and ease procedures [9].

Unfortunately, there're still some limitations in controlled and randomized researches regarding this issue. Most of the studies consist of the careful inspection of parents and children distress relation during punctual medical procedures.

The objective of this review is to perform an analysis of previous literature and articles that investigated distress promoting behaviors, to evaluate how parents attitude influence children’s anxiety and pain during routine acute procedures as immunization or venipuncture.
6. AIM AND OBJECTIVES

Research aim: To investigate parental attitude and influence on children anxiety and pain during acute painful procedures (e.g. venipuncture, immunization).

Objectives:

- To conduct a systematic review.
- To analyze previous literature and articles that investigated distress promoting behaviors and parent’s attitude influence on children.
- To analyze if parental behavior and attitude has influence on stress and anxiety of pediatric patients during painful procedures.
7. LITERATURE REVIEW

7.1 Pediatric Pain

Pain is an unpleasant sensation and emotional experience that is considered as a global health problem. The experience of pain, its description and ways of feeling are individual. In this situation, children show to be the most vulnerable population. Whether it is associated with a chronic illness, an injury, acute procedure or an unknown cause, pain affects their physical and emotional well-being, interfering with recovery from illness, depressing children’s mood and decreasing sleep, performance in school, family and social interactions [10].

Despite the recent increase in scientific evidence in the last decades, pediatric pain continues to be an area in need of improvement, as children still experience unnecessary pain during hospitalization and medical procedures.

7.2 Pain physiology and perception

Pain has two complementary aspects: one is a localized sensation in a specific body part; the other is the unpleasant quality of different severity usually associated with behaviors. There’re four major processes involved into the processing of pain stimuli and information: transduction, transmission, modulation and perception [11].

- Transduction refers to the process by which tissue-damaging stimuli activate nerve endings. Children have the same number of pain nerve endings per square millimeter of skin as adults [12].
- Transmission is the function by which the message is transmitted from the periphery to the central nervous system by the axon of the primary afferent nociceptor. This neuron has its cell body in the dorsal root ganglion and through a long central process it sends the pain stimuli to the spinal cord. Once there, in the dorsal horn of the gray matter, the primary afferent nociceptors release transmitter substances which activate the second-order pain-transmission cells. This second-order cells cross over to the opposite side of the spinal cord and project to the brain stem and thalamus. The spinothalamic tract is the pathway

- Modulation is a neural process which acts to reduce activity in the transmission system. This spontaneous analgesia was recently discovered in patients with severe injuries who reported no significant pain and it’s explained by the block of certain brain regions responses to painful stimulation [11].

- Perception is the subjective awareness produced by sensory signals, when information is integrated into a meaningful whole.

The first three neural processes can be studied using methods that involve direct observation. However, perception is the subjective awareness of pain, and it can’t be directly measured. Perception of pain does not necessarily correlate with the severity of an injury or procedure; emotional well-being plays an important role in the degree of this feeling and, as a consequence, on its management. It was proved that, despite the condition of the health, pain has a greater impact and it’s more likely to become chronic in people who tend to catastrophize or somaticize [13]. Anxiety levels show to predict pain severity and its behavior, while anxiety reduction techniques and anxiolytic drugs have been reported to be successful in reducing pain associated with medical procedures.

In 1968, Melzack and Casey proposed that the hippocampus and associated cortices mediate and affect characteristics of pain [14]. Posterior studies demonstrated that pain-related to anxiety is associated with activation changes in the entorhinal cortex of the hippocampal formation [15].

### 7.3 Acute procedural pain

During childhood, kids have to overcome routine procedures, such as immunization and venipuncture, necessary for their health care. However, these acute procedures are usually painful and cause a marked distress in children and their caregivers. As explained before, pain perception is highly modulated by anxiety levels, even more in children, whose distress is highly influenced by external factors such as the parent’s behavior. Parents with high state anxiety usually communicate this emotional state in a way that increases their child’s anxiety. In turn, anxiety heightens children’s
psychological awareness and sensitivity to painful stimuli based on brain regions activation [15].

Acute procedural pain and its management are still not completely understood by some physicians.

7.4 Impact on future and parent’s role

If pain is not correctly addressed and treated it may impact on children’s quality of life by interfering with their mood, sleep, school attendance and other activities. Repeated exposure to pain may cause altered pain sensitivity, anxiety, stress disorders and/or hyperactivity [12]. The numerous psychological and physiological consequences of unmanaged acute procedural pediatric pain, as the development of needle phobia, can lead to the avoidance of health care when children grow into adults.

To prevent these situations, it is essential that healthcare practitioners and children’s caregivers are able to recognize acute procedural pain to apply the appropriate strategies that will reduce children’s distress and pain-related anxiety.

Parent’s role and the impact of their behavior on children distress is still in the study process. However, the new evidences [16] that prove the relationship between parent’s anxiety and children pain, remarks the importance of parent’s self-consciousness of the effect of their behavior on their children during acute medical procedures.
8. METHODS

The presented review was conducted during the last year of Medicine studies in Lithuanian University of Health Sciences (LSMU). The protocol for the review was designed in accordance with the Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) [17] [18], which is an evidence-based set of items and serves as a protocol on the reporting of systematics reviews and meta-analyses. Articles included in this review were assessed using QUADAS instrument and GRADE system [19].

8.1 Research question

The research question was formed according to the PICO (population, intervention, control, outcome) format. The aim of the following systematic review was to analyze if parent’s behavior increase their children’s distress and pain during acute procedures.

8.2 Search strategy

The search strategy combined keywords and subject headings for concepts: acute pain, distress, behavior, attitude, influence, parents/caregivers, Emergency/Emergency department/ED procedures and visits, primary care procedures and visits. Most common procedures in Emergency department (ED) and primary care settings were included into the search (e.g. venipuncture, immunization). Database search was limited to English language free of charge records published between 2010-2017. Systematic reviews, meta-analyses, literature reviews, letters to editor or opinion pieces were excluded from this review. All inclusion and exclusion criteria for article search are detailed in Table 1.
Table 1. Inclusion and exclusion criteria of the study.

<table>
<thead>
<tr>
<th>Inclusion</th>
<th>Exclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Qualitative or quantitative studies</td>
<td>Systemic reviews, meta-analyses, literature reviews or opinion pieces</td>
</tr>
<tr>
<td>Articles published in English</td>
<td>Articles published in other language than English</td>
</tr>
<tr>
<td>Full-text articles</td>
<td>Partial-text articles</td>
</tr>
<tr>
<td>Free articles</td>
<td>No free articles</td>
</tr>
<tr>
<td>Publication date not older than 10 years</td>
<td>Publication date older than 10 years</td>
</tr>
<tr>
<td>Infants/youth age birth-18 years</td>
<td>Youth older than 18 years old</td>
</tr>
<tr>
<td>Acute pain</td>
<td>Chronic pain. Other chronic conditions/diseases than pain</td>
</tr>
<tr>
<td>Acute procedures, common and routine procedures (e.g. immunization, venipuncture)</td>
<td>Not common and/or routine procedures (e.g. tracheostomy, endoscopies, urinary catheter insertion)</td>
</tr>
</tbody>
</table>

For the search, online databases were selected as following: MEDLINE, Google Scholar, Taylor & Francis Online, Oxford Academy Journals, Wiley Online Library and Cochrane Library [20]. In addition, reference list from each article search was checked looking for new articles.

8.3 Study selection

Previous search results were evaluated and selected or excluded following the PRISMA 2009 Flow Diagram. In the first-level screening, duplicates were removed. On the second-level screening, title and/or abstract of the articles were assessed for eligibility according the inclusion and exclusion criteria determined before the search.

Afterwards, adequacy of the full-text studies were evaluated paying attention to all characteristics that may determine their incorporation or omission from the review. The PRISMA diagram was developed to demonstrate the article movement throughout the review process.
8.4 Data extraction

Once the search studies were evaluated, all the included articles were carefully read and data was collected individually by recording information about study design, publication year, demographic of participants, sample size and population age range. Clinical settings, type of pain and procedure type were also extracted.

Because the primary objective of this review is to arrive to a conclusion about the impact of parent’s behavior on children, the main findings of all included studies were collected as well, related to infants and parent’s experience before and during the procedure, their coping strategies and how all these reactions were measured.

8.5 Data synthesis

For this synthesis process, data from all the articles were handled and synthesized, bringing together all the findings and conclusions from each report, with the aim of answer the question of this systematic review [21].

The selected articles are all cross-sectional observational studies that share the same purpose. They might have some differences in the methodology, tools and questionnaires used during of the trials, as it will be explained through the risk of bias and evidence quality assessment. However, all of the studies measured children’s distress and pain during the medical procedure, and parent’s different behaviors, such as anxiety. In fact, while some articles are more specific about the main factor (anxiety) that could increase infant’s distress and pain sensation, other studies evaluate all type of parent’s behavior, e.g., anxiety, the lack of empathy towards the child or the use distraction maneuvers. In addition, findings of the included reports showed to arrive to a similar conclusion.

8.6 Risk of bias evaluation

In this study risk of bias evaluation was performed using a checklist approach based on the QUADAS instrument (Cochrane) [22].
This rating tool analyze each study on 8 domains as following: study design, the sample size and its representation of the population, the instruments used during the trial and their reliability, blinding, findings analysis, withdrawals and possible uninterpretable results. All domains are phrased in a way they can be judged as “yes”, “no” or “unclear”. A judgement of “yes” indicates an optimal methodological characteristic. The more optimal methodological characteristics, the less potential bias are present on the study.

Based on the assessment of each domain, every report is ranked globally as high or low risk of bias. This will give a general idea of how trustful a conclusion is depending on the study’s performance.

8.7 Quality of evidence

Confidence into article’s recommendations must be assessed in each systemic review or meta-analysis in order to prevent errors and improve communication of judgements [23]. To rate this recommendation’s strength and quality of evidences it has been used the GRADE system.

The GRADE system rates the quality of evidence of each individual trial as HIGH, MODERATE, LOW and VERY LOW. First of all, the process starts by grading the study design as HIGH in case of Random Controlled Trials (RCTs) and LOW in case of non-RCTs, for example observational studies. Afterwards, the baseline may change (increase or decrease) according 8 specific assessment criteria [24].

Reasons to decrease the quality of evidence are determinate by the following 5 criteria:

- Risk of bias: Assessed previously by QUADAS instrument.
- Inconsistency, which measures the presence or absence of clinical heterogeneity (associated to the participants, interventions and outcomes) and/or methodological heterogeneity (referred to the differences in the conduction of the trial).
• Indirectness, a criteria that evaluates how applicable is the evidence and how well is addressed the question of interest.

• Imprecision, when the number of participants, events and outcomes are not enough to estimate a significant effect.

• Publication bias, in case of a selective publication of a study’s data depending on the results obtained, beneficial or harmful.

In case there is a serious or very serious concern about the quality in one of the criterion, the evidence may be downgraded by one or two levels, respectively. On the other hand, the quality of evidence may increase by one or two levels; however this is an infrequent situation.

Once each study is judged and evidence is graded, all results are summarized and reported in a SoF table (Summary of Findings).
9. RESULTS

9.1 Research question

The research question formed according the PICO (population, intervention, control, outcome) format it’s summarized in Table 2.

Table 2. PICO criteria of a research question.

<table>
<thead>
<tr>
<th>PICO</th>
<th>P (population of interest)</th>
<th>I (intervention)</th>
<th>C (control or comparison intervention)</th>
<th>O (outcome)</th>
</tr>
</thead>
<tbody>
<tr>
<td>P (population of interest)</td>
<td>Pediatric patients and their caregivers</td>
<td>Acute procedures</td>
<td>No control/comparison in the study</td>
<td>Distress and/or pain</td>
</tr>
</tbody>
</table>

9.2 Study selection

A total number of 12 articles, not older than 10 years, were collected after the search in previously described online databases. Reference list of each article was checked as well, but no new reports were included in the first studies list. There were no duplicates that needed to be removed.

Primary, title and abstract from each article was screened according relevance for the addressed problem. During this step of selection, 4 articles were excluded for not meeting eligibility criteria, e.g. articles analysing chronic pain in children instead of acute pain, children suffering from abdominal pain due to Inflammatory Bowel Diseases and reports with a type of design not accepted for this systematic review.

From the 8 studies left, and after full-text articles were assessed, we excluded 4 additional studies. We finally included 4 studies. All articles selected fit the inclusion criteria and provide the data necessary for their future evaluation and synthesis. The study selection is illustrated in the Figure 1 for the PRISMA flowchart.
9.3 Study Characteristics

A summary of all the information regarding the study design, country of origin, sample size, age range of participants and type of medical procedure is presented from each included article in Table 3.
<table>
<thead>
<tr>
<th>Year</th>
<th>Type of the study</th>
<th>Sample size</th>
<th>Country</th>
<th>Age range</th>
<th>Acute procedure</th>
<th>Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>Cross-sectional</td>
<td>90</td>
<td>United States</td>
<td>4-6 years</td>
<td>Immunization</td>
<td>Demographic questionnaire, VAS scales (100-mm visual analog scales), CAPS (Children’s Anxiety and Pain Scales)</td>
</tr>
<tr>
<td></td>
<td>study (Observation</td>
<td></td>
<td>(USA)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>study)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2010</td>
<td>Cross-sectional</td>
<td>542</td>
<td>USA</td>
<td>4-10 years</td>
<td>Venipuncture</td>
<td>Demographic questionnaire, Observational Scale of Behavioral Distress-Revised [OSBD-R], Oucher Pain Scale, Perception of Procedures Questionnaire [27], Salivary cortisol before and after the procedure (biological measure of distress), Distraction Coaching Index (DCI) [28]</td>
</tr>
<tr>
<td></td>
<td>study (Observation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>study)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2018</td>
<td>Cross-sectional</td>
<td>537</td>
<td>Canada</td>
<td>12 months</td>
<td>Immunization</td>
<td>Scales were coded at different time points for 10-15 seconds, Modified Behavior Pain Scale (MBPS): measure three behavioral scales (facial expression, cry and body movement), Neonatal Facial Coding System (NFCS), Emotional Availability Scales-4th Edition (EAS), Measure of Adult and Infant Soothing and Distress (MAISD)</td>
</tr>
<tr>
<td></td>
<td>study (Observation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>study)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2010</td>
<td>Cross-sectional</td>
<td>50</td>
<td>United Kingdom</td>
<td>7-16 years</td>
<td>Venipuncture</td>
<td>Anxiety was measured using a scale from “not anxious at all” through to “moderately anxious” to “severely anxious”, Child-Adult Medical Procedure Interaction Scale-Revised (CAMPIS-R) [31]</td>
</tr>
<tr>
<td></td>
<td>study (Observation</td>
<td></td>
<td>(UK)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>study)</td>
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</tr>
</tbody>
</table>
As common characteristics, all articles are observational studies (cross-sectional studies), from English-speaking countries (two from USA, one Canadian and another from UK). The 4 studies analysed healthy children undergoing routine medical visits. However, half of the studies focused on pain during venipuncture and the other half concentrated on immunization procedures.

An important distinction between studies is the sample size, with a wide range from more than 500 participants to 50. In addition, age range also differs from one study to another; while one trial measure procedural anxiety in infants 12 months of age, the others prefer to analyse pain sensation and impact of parent’s behavior in children older than 4-6 years, even youth of 16 years old.

9.4 Risk of bias

Risk of bias evaluation was performed with QUADAS instrument (Cochrane). The checklist reports are illustrated in Table 4.

Data were generally not reported in sufficient detail for detection bias to be assessable (incomplete reporting or selective reporting was judged as unclear). Only two [29, 30] of the four studies were assessed as low risk of bias.

First article [25] has no information about how the results of tests were analysed, blinding of the trial and presence/absence of uninterpretable results. A notorious risk of bias is the confusion regarding the sample size: 90 infants were enrolled together with their parents; however, although all the caregivers reported their pre-procedural anxiety, only 88 children report their own procedural anxiety and pain.

Second study [26] is also unclear regarding results analyzation process, blinding during the trial and the description of uninterpretable results. Methodology declares that families who participate in the research could reject to be videotaped and tested for genetics and cortisol portions (“at the time of the clinic visit, parent consent and child assent for children 7 years of age or older were obtained according to the Institutional Review Broad (IRB) guidelines. A parent or a child could choose to not participate in the videotaping, genetics, and/or cortisol portions of the study”). Nevertheless, this
condition and possible incomplete evaluation or withdrawals are not declared in this article.

Third trial [29] is unclear about blinding. The authors didn’t report about uninterpretable results neither withdrawal.

Finally, the fourth article [30] shows lack of information regarding study blinding and withdrawals. Participant’s clinical data, collected at the beginning of the trial, was more detailed comparing to the data available in normal practices of acute procedures, leading to a risk of bias regarding the amount of relevant clinical information available. Uninterpretable results were correctly reported: “Data from one participant were excluded from multivariate analyses due to being an extreme multivariate outlier. Another participant was an outlier for child coping so was excluded from analysis of this variable only” [30].

Table 4. Risk of Bias: Methodological quality summary of the articles included into the systematic review.

<table>
<thead>
<tr>
<th></th>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Representative spectrum</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Acceptable reference standard</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Acceptable delay between tests</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Partial verification avoided</td>
<td>-</td>
<td>?</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Reference standard results blinded</td>
<td>?</td>
<td>?</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td>Relevant clinical information</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>Uninterpretable results</td>
<td>?</td>
<td>?</td>
<td>?</td>
<td>+</td>
</tr>
<tr>
<td>Withdrawals explained</td>
<td>-</td>
<td>+</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td>Risk of bias</td>
<td>HIGH</td>
<td>MODERATE</td>
<td>LOW</td>
<td>LOW</td>
</tr>
</tbody>
</table>

+ : Optimal methodological characteristics

- : Less than optimal methodological characteristics

? : Insufficient information available to make a judgement
9.5 Results of individual studies and synthesis of results

To arrive to a conclusion about the impact of parent’s behaviour on children’s acute procedural pain, findings and results from the included studies were extracted and synthesized.

**Age:** Articles present diverse results and opinions regarding the influence of age in acute procedural pain. Some trials’ results [25, 26] demonstrate that child-self report data in pre-schoolers didn’t reveal significant mediation, concluding that younger children haven’t developed the self-regulation skills to remain calm in stressful situations comparing to older children. However, another article [30] determined that age was not a significant variable associated with distress behaviors.

**Country:** Some differences have been noticed between trials conducted in USA and UK. The United Kingdom trial [30] reported that humor and nonprocedural talk were more common in parents comparing with those from USA. In addition, children from the UK verbalized fear, distress and pain more frequently. This feature highlights the need to conduct more studies regarding this subject with a wider variation of demography of the sample.

**Procedure:** Two of the four studies [25, 29] were performed during vaccination, while the other articles [26, 30] were venipuncture procedures. All studies utilized questionnaires and scales to score parent’s anxiety state and infant perception of pain before and during the medical procedure. Additionally, three articles [26, 29, 30] videotaped each intervention to visually assess sensation and record different behaviors from the caregivers and their interactions with their children. One of the researches [26] evaluated more variables than only the anxiety level and coping maneuvers. They analysed characteristics as previous experiences with needles, children’s ability to attend, diagnose of anxiety disorders, coping style and preparation for the procedure (time the child finds out about IV).

**Outcome:** All studies coincide in the fact that children rely on their parents during medical stressful events, and that caregiver’s attitude definitely influences children response to pain stimuli. In one research [26], cortisol measures before and after the procedure suggested that some children are more biologically reactive to anticipated pain (infants with higher cortisol responsivity were more upset before
arriving to the clinic for the procedure). In the same study, parent’s variables (gender, age, parenting style, experience, anxiety disorders) were updated with the importance and impact of their distraction performance. Results from another study [30] manifested that parent’s behavior is more associated with child distress, while health professionals’ attitude appeared to have a stronger association with children’s coping behaviors.

9.6 Quality of evidence

Confidences into article’s recommendations were assessed using the GRADE system, as explained in the methodology.

The quality of evidence is low for all the studies, considering the fact that they were designed as observational studies, an indication for a baseline rating of LOW.

Regarding the assessment criteria, articles differ mostly in the risk of bias and the imprecision aspect: risk of bias shows to be a serious concern in three of the four included reports [25, 26, 29]. Imprecision becomes a problem when the number of participants and events are not enough to estimate a significant effect and, for that reason, the two articles with less than 400 participants [25, 30] are downgraded by one level in this criterion.

On the other hand, all researches share a serious concern regarding population indirectness, as the four studies were limited to particular participants (Caucasian mothers, upper-middle class, mostly with an university degree or higher).

Otherwise, the four included articles have no problems of inconsistency, and any publications biases were detected. The GRADE ratings are presented in Table 5.
Table 5. GRADE Summary of Findings table (SoF table).

<table>
<thead>
<tr>
<th>Study Source</th>
<th>Number of participants (Study design)</th>
<th>Risk of Bias¹</th>
<th>Inconsistency</th>
<th>Indirectness²</th>
<th>Imprecision³</th>
<th>Publication Bias</th>
<th>Quality of evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Donald J. Bearden 2012 [25]</td>
<td>90 participants Observational study</td>
<td>Serious (-1)</td>
<td>No serious</td>
<td>Serious (-1)</td>
<td>Serious (-1)</td>
<td>Undetected</td>
<td>Very Low</td>
</tr>
<tr>
<td>Ann Marie McCarthy 2010 [26]</td>
<td>542 participants Observational study</td>
<td>Serious (-1)</td>
<td>No serious</td>
<td>Serious (-1)</td>
<td>No serious</td>
<td>Undetected</td>
<td>Low</td>
</tr>
<tr>
<td>Rebecca Pillai Riddell 2018 [29]</td>
<td>537 participants Observational study</td>
<td>Serious (-1)</td>
<td>No serious</td>
<td>Serious (-1)</td>
<td>No serious</td>
<td>Undetected</td>
<td>Low</td>
</tr>
<tr>
<td>Liam Mahoney 2010 [30]</td>
<td>50 participants Observational study</td>
<td>No serious</td>
<td>No serious</td>
<td>Serious (-1)</td>
<td>Serious (-1)</td>
<td>Undetected</td>
<td>Low</td>
</tr>
</tbody>
</table>

(1) **Risk of bias**: No information about uninterpretable results, possible withdrawals, and if all participants were equally measured during the study. Possible bias may alter results.

(2) **Indirectness**: Study limited to particular participants (Caucasian mothers, upper-middle class, mostly with a university degree or higher).

(3) **Imprecision**: Sample size and number of events are not enough to calculate a precise effect estimate (total number of participants in less than 400).
10. DISCUSSION

The aim of this systematic review was to analyze and systematize previous literature and articles that investigated how parent’s behavior influence their children anxiety and pain during acute procedures.

Pediatric procedural pain is still not enough controlled issue which affects not only the children well-being, but also their parents and the health professionals. A survey conducted in North America, in 2006, evidence that parents in the ED would make their child’s procedure painless and would be willing to spend additional time and costs to make this option possible [32]. However, although all parents want the best for their children, not all of them are able to cope with their kid’s pain. As a consequence, and without realizing, parents often express their own anxiety, exacerbating their children distress.

10.1 Summary of evidences

All four trials, except for one, measured a combination of several parent’s distress-promoting and coping-promoting behaviors.

Studies included in this systematic review manifested to be very variable regarding the risk of bias, being a clear issue the insufficient reported information about the methodology in two of the trials [25, 26]. These conditions hide a possible bias which may alter results and conclusions.

In general, qualities of evidences were scored as low considering the fact that all articles are designed as observational studies (cross-sectional studies), an indication for a baseline rating of LOW. The reason to downgrade is that observational studies only investigate patients exposed to a specific acute procedure, without a control group and an incomplete follow-up of the participants. In addition, all researches present a limitation regarding the homogeneous sample, as most of participants are Caucasian mothers, upper-middle class, with an university degree or higher.
However, every article’s findings prove the correlation between parent’s attitude and children distress, and the importance of the distraction maneuvers for the children’s coping.

Speaking of the age factor, reports disagree about its influence in children. The question about how much the age is related to the children’s sensitivity and pain towards acute procedures is an important matter, as parents might also decrease their coping-promoting behaviors depending on their children age, as they start to be considered “older for crying and complain”. As a result, distress-promoting behaviors, such as flat face, criticism and flit away, increase, exacerbating children pain and harmful behavior outcomes.

10.2 Limitations

Before drawing conclusions it is important to consider methodological limitations during the conduction of this systematic review. The most important issue was the small amount of articles addressing parent’s behavior and the impact on child’s acute pain, and the lack of variability in their designs. The reasons are diverse.

On one hand, articles couldn’t be as new in publication date as wanted because of the lack of trials performed about this topic in the last five years. Because of that, the study selection had to be focused on articles not older than 10 years (instead of 5 years) to have access to a wider bibliography list.

On the other hand, random controlled trials did not abound due to the limitations on their performance. Firstly, because researches focuses on the study of parents-children behavior relationship during a specific moment of distress in a punctual medical procedure, making not easy the chances for future evaluations and follow-ups. Secondly, because parent’s attitude can’t be accurately determined prior the procedure, making difficult the classification of parents with and without anxiety into controlled groups for their comparison. As a consequence, only observational studies were found in the online database.

Lastly, the reduced number of free and English language articles also limited the study selection.
10.3 Conclusions:

In summary, all data supports the theory that parent’s attitude influence children’s distress and pain during routine acute procedures. The use of optimal quantity and quality distraction techniques showed to be very beneficial for the children coping, while parent’s distress-promoting behaviors (anxiety, fear, frustration, flat face or face cover), the lack of distraction manoeuvres or an inappropriate use of them, increase children distress and pain. Type of distraction is determined by the age, culture and the needs of the child/infant at the moment of a procedure.

With the comprehension of pain-modulated by anxiety, parents will understand how their attitude impact on their children, and the need to control their procedural anxiety or fear and any catastrophize behavior for the well-being of the child.

The correct management of procedural pain during the childhood will prevent psychological and physiological consequences that would end in the avoidance of health care once the children become adults.

10.4 Recommendations

Parents and medical professionals should be encouraged and taught to support children using a variety of coping responses, for example reassuring or empathetic comments, non-procedural talk and/or humor.
11. REFERENCES:


