

Distraction as a technique to control pain in pediatric patients during venipuncture. A narrative review of literature

La distrazione per il controllo del dolore da venipuntura in ambito pediatrico.
Una revisione narrativa della letteratura

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ABSTRACT

Introduction: Distraction is a non-pharmacological intervention aimed to reduce procedural pain in children. Venipuncture is one of the most widely used diagnostic and therapeutic procedure in pediatric patients. Analgesia during venipuncture may be efficiently achieved with distracting techniques.

Objective: To describe active and passive distraction techniques to reduce distress in children undergoing venipuncture.

Method: Data from CINHALL, PubMed, ILISI and Cochrane's databases were used to review existing literature and primary and secondary studies published between 2003 and 2014 were included. Queries were obtained with keywords such as distraction, complementary therapies, pain, pediatric, the Boolean operators AND and OR were used.

Results: Twenty eligible articles out of the one hundred and forty-three retrieved (20/143) were selected; among these there were 3 systematic and 5 narrative reviews, 11 experimental and quasi-experimental studies and 1 observational study. Active and passive distraction techniques seemed extremely effective to reduce distress and pain in children undergoing venipuncture. Modest evidence of efficacy and absent side effects support this approach.

Conclusion: Further RCTs are needed to compare the different types of existing active and passive distraction techniques. The presence of parents and the location where painful procedures are administered should be included in the assessment of this approach.

Keywords: Venipuncture, Pain, Child, Nurse, Distrazione e CAM (Complementary Alternative Medicine)

RIASSUNTO

Introduzione: La distrazione è un intervento non farmacologico in grado di ridurre l'intensità del dolore procedurale nei bambini. Tra le procedure maggiormente diffuse, la venipuntura è una di quelle maggiormente applicate in area pediatrica, per scopi diagnostici e terapeutici. L'analgesia durante la venipuntura può essere efficacemente raggiunta con tecniche di distrazione.

Obiettivo: descrivere l'efficacia delle tecniche di distrazione attiva e passiva per la riduzione del dolore, nei bambini sottoposti a venipuntura.

Metodi: è stata realizzata una revisione della letteratura consultando i database CINHALL, PubMed, ILISI e Cochrane. Sono stati inclusi tutti studi primari e secondari pubblicati dal 2003 al 2013, utilizzando le query ottenute con le parole chiave distraction, complementary therapies, pain, pediatric con l'operatore booleano AND e OR.

Risultati: sono stati inclusi nella revisione 20 articoli eleggibili su un totale di 143 risultati analizzati, tra cui 3 revisioni sistematiche, 5 revisioni narrative, 11 studi sperimentali e quasi sperimentali, 1 studio osservazionale. In esse emerge come la distrazione, attiva e passiva è indicata sui bambini durante la venipuntura, al fine di ridurre il dolore. Tale approccio è supportato da modeste prove di efficacia e da assenti effetti collaterali.

Conclusioni: sono necessari ulteriori RCT per confrontare l'efficacia dei diversi tipi di distrazione attiva e passiva, integrando la presenza dei genitori e le caratteristiche dei luoghi ove cui vengono realizzate le procedure dolorose.

Keywords: Venipuncture, Pain, Child, Nurse, Disctracion, CAM (Complementary Alternative Medicine)

INTRODUCTION

Venipuncture and venous cannulation are among the most invasive and painful procedures used to

treat hospitalized children (Ellis, et al., 2004; Wong, et al., 1988) and are probably the most frequent cause of anxiety and distress (Duff, 2003; Caprilli, et al., 2007).

Literature reports that over 50% of hospitalized children and adolescents undergoing venipuncture experience a moderate to severe pain (Kolk, et al., 2000) and/or anxiety (Willock, et al., 2004), a reaction which could influence any future attitude towards similar health treatment procedures (McCarthy, et al., 2006). Besides causing anxiety, pain-related stress may not only

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influence physiological, social and cognitive results (Grunau, et al., 2006) but have also an emotional and psychological impact both on the children and their families (Schechter, et al., 1986; Anand, et al., 2006).

Victims of needle phobia may have inherited this disorder from negative past experiences, although such a condition may be inherited, and they present a high risk of morbidity and mortality as they avoid health care; as well, the etiology of needle phobia lies in a vasovagal reflex of shock and in an increase of heart beat and of the level of stress hormones (Hamilton, 1995).

Although international guidelines are now available to provide health personnel with useful suggestions and techniques for pain control management in pediatric patients (American Academy of Pediatrics, 2001), infant pain control is far less well understood than in the adult (Goldman, et al., 2008; Drendel, et al., 2006).

The right to treatment must be extended to patients of any age (International Association for the Study of Pain, 2012; Law 38/2010) and its inappropriate management and assessment is now considered as a medical error (JCI, 2010).

In order to reduce pain, anxiety and distress in children undergoing venipuncture or venous cannulation, both pharmacological and non-pharmacological therapies are used to better manage the pediatric patient's pain (Royal College of Paediatrics and Child Health, 1997; Taddio, et al., 2010).

Many non-pharmacological treatments (TNP) have been successfully used to reduce the perception of pain among school-age children with a sufficient cognitive development (Vassey, et al., 1996). One of the most effective non-pharmacological methods used is the distraction technique, effective in reducing short-duration procedural pain in children (Sinha, et al., 2006; Hoffman, et al., 2000). Distraction techniques aim to shift the attention from the medical treatment to any other stimulant which may help the patient better control his perception of pain (McCaffery, 1990; Hasanpour, et al., 2006). While focusing his attention on something other than pain, the child manages to limit the algogenic perception of pain, thus reducing anxiety and fear (Messerli, et al., 2010). Although little is known on the physiological mechanism which make such a technique an effective tool to reduce the perception of pain, distraction is presumably able to alter the nociceptive responses and to trigger a mechanism which inhibits the symptoms of pain (Haraldstad, et al., 2011).

Distraction is a simple technique which does not require any specific training and can be implemented by nurses, parents or other health staff members (Messerli, et al., 2010); besides, it has a minimal cost

and implies no risks for the patient (Kleiber, et al., 1999). Several are the strategies to be used: watching cartoons (Cassidy, et al., 2002), using party blowers (Manimala, et al., 2000), looking through kaleidoscopes (Vassey, et al., 1994), blowing bubbles (French, et al., 1994), listening to music (Arts, et al., 1994), listening to short stories (Mason, et al., 1999), sense of humor (Dowling, 2002) and virtual reality glasses (Sander Wint, et al., 2002).

Recently, some studies have begun to distinguish between two types of distractive techniques: in the study by MacLaren et al. (2005) toys are used as an active distraction tool, while watching movies is classified as a passive distraction procedure used when the child is in part actively involved in the administration of a medical health treatment. To date, medical care personnel seems to know very little on how to use distraction as a technique to better control pediatric pain. Moreover, the methodological quality of the reviews dealing with infant pain control is low if compared with that of studies focused on pain management techniques in adult patients (Stinson, et al., 2008).

The aim of this narrative review is to describe the difference between active and passive distraction techniques and their implications, thus providing health care personnel of pediatric patients with the indications on how to better manage procedural pain in patients undergoing venipuncture.

METHODS

The purpose of this narrative review of the literature can be translated in few but simple questions: is distraction a truly effective treatment to reduce anxiety and distress in pediatric patients during venipuncture? Which are the most widely used active and passive techniques implemented to reduce pediatric pain? Such questions may find an answer in the English and Italian references on this topic published between 2003 and 2014, which were retrieved to further investigate on the effective potential of distraction as a therapeutic tool in patients between the age of 1 and 18.

Inclusion and exclusion criteria of the research are reported in Table 1.

We accessed databases such as CINAHL, PubMed, Cochrane and ILISI, using as retrieval method the descriptors of the respective Thesaurus, as well as free research strategies (Table 2).

The review was conducted by applying the PICO methodology, structured as below summarized:

P: Pediatric patients (aged 1-18 years);

I: Use of active/passive distractive techniques during venipuncture;

Inclusion criteria:	Exclusion criteria:
<ol style="list-style-type: none"> 1. Primary and secondary studies published in English and Italian; 2. Studies published from January 2013 to May 31, 2014; 3. Articles related to pediatric patients aged 1-18 years; 4. Studies in which distraction techniques are used both active and passive, also in addition to pharmacological treatments, to reduce pain during venipuncture. 	<ul style="list-style-type: none"> - Primary and secondary studies on non-pharmacological treatments on cancer care settings; - Studies in languages other than English and Italian; - Studies that relate exclusively to neonates or to patients of less than one year of age.

Table 1: Inclusion/Exclusion criteria

Database	Query
Pubmed(31/05/14)	("complementary"[All Fields] OR "Alternative"[All Fields] OR "integrative"[All Fields] OR "nonpharmacologic"[All Fields] OR "distraction"[All Fields]) AND "Pain"[All Fields] AND ("Venipuncture"[All Fields] OR "blood draw"[All Fields] OR "peripheral cannulation"[All Fields] OR "procedure related pain"[All Fields] OR "painful procedures"[All Fields]) AND ("2003/07/13"[PDat] : "2014/5/14"[PDat] AND ("infant"[MeSH Terms] OR "child"[MeSH Terms] OR "adolescent"[MeSH Terms]))
CINAHL (31/05/14)	("complementary" OR "Alternative" OR "integrative" OR "nonpharmacologic" OR "distraction") AND ("Pain") AND ("Venipuncture" OR "peripheral cannulation" OR "procedure related pain" OR "painful procedures") Filtri: All child, 2004-2014
Cochrane (31/05/14)	Venipuncture AND Distraction (2004-2014)
ILISI (31/05/14)	Ricerca Libera: Dolore AND Venipuntura

Table 2: Queries used for the review (in attachment).

C: No use of distractive techniques during venipuncture

O: Reduction of self-reported or observer-reported pain in non-verbal patients .

Keywords: Distraction, venipuncture, Pain, Child, Complementary Therapies, Nurse, were used together with the Boolean operators AND and OR, to build their search queries (Table 2).

The snowball methodology was also applied so as to limit the exclusion of specific and relevant articles.

RESULTS

The bibliographical research retrieved a total of 143 articles, 20 of which possessed the applied inclusion criteria. Results are summarized in Table 3. Table 4 describes the results of the systematic reviews, Table 5 describes the results of the secondary studies while Table 6 reports the primary studies.

Eligible articles

The following articles were selected:

- 3 systematic reviews (SR): (Stinson, et al., 2008; Uman, et al., 2013; Wentz, 2013);
- 5 reviews: (Mosiman, et al., 2013; Naletto, et al., 2010; Crowley, et al., 2011; Gilboy, et al., 2009; Murphy, 2009);
- 4 controlled randomized clinical trials (RCTs): (Inal, et al., 2012; Wang, et al., 2008; Tak, et al., 2006; Gupta, et al., 2006);
- 7 quasi-experimental studies: (Lessi, et al., 2011;

Yoo, et al., 2011; June, et al., 2011; Alhani, et al., 2010; Tufekci, et al., 2009; Bellieni, et al., 2006; Cavender, et al., 2004);

- 1 observational study: (Bagnasco, et al., 2012).
- Surprisingly, a limited number of quantitative studies seemed available (i.e., RCT and SR). The study population is numerically limited, as well as the number of SR aimed at studying the effectiveness of distraction techniques (Uman, et al., 2013; Stinson, et al., 2008; Wentz, 2013).

The number of subjects included in RCTs ranged from 75 (Gupta, et al., 2006) to 300 children (Wang, et al., 2008); as for the secondary studies, only one review reported the total number of sampled patients, for a total of 3394 participants (Uman, et al., 2013). Among the primary studies analyzed, the most studied age groups are those between 6-7 and 11-12 years (Bagnasco, et al., 2012; Inal, et al., 2012; Lessi, et al., 2011; Jeffs, et al., 2011; Tufekci, et al., 2009; Wang, et al., 2008; Bellieni, et al., 2006; Gupta, et al., 2006; Tak, et al., 2006; Cavender, et al., 2004); the age group including children between 3 and 6 years of age was analyzed in only 4 studies (Bagnasco, et al., 2012; Lessi, et al., 2011; Yoo, et al., 2011; Tak, et al., 2006). None of the studies obtained from this review referred to distractive techniques applied on pediatric patients aged 1 -3 years.

From a methodological point of view, the selected studies have used non-probability sampling methods; randomization between treatment and control groups was performed in only 6 studies (Cavender, et al., 2004;

Belliemi, et al., 2006; Gupta, et al., 2006; Tak, et al., 2006; Wang, et al., 2008; Inal, et al., 2012).

In Italy the scientific production on this issue is limited and only .4 papers were retrieved (Bagnasco, et al., 2012; Lessi, et al., 2011; Naletto, et al., 2010; Bellieni, et al., 2006).

In 2 cases pharmacological treatments, such as the use of topical anesthetics, combined with non-pharmacological techniques were used (Jeffs, et al., 2011; Tak,

et al., 2006).

None of the works reported any side effects of the use of distraction techniques.

The efficacy studies included in this review were carried out in different care settings, such as emergency departments (Wente, 2013; Bagnasco, et al., 2012; Crowley, et al., 2011; Yoo, et al., 2011; Jeffs, et al., 2011; Cavender, et al., 2004); hospital wards (Lessi, et al., 2011; Jeffs, et al., 2011; Stinson, et al., 2008; Wang,

REFERENCE	OBJECTIVES	DESIGN	RESULTS AND CONCLUSIONS
Uman, et al., 2013 COCHRANE DATABASE SYST REV	Evaluate the effectiveness of psychological interventions, such as distraction and hypnosis, pain and stress from needle-related procedures in children and adolescents Psychological interventions for needle-related procedural pain (ie, immunizations venipuncture, LP, IV insertions, BMA, IM injections)	SR of RCT 39 RCT included 3394 participants (2-19 years) Setting : not defined	Distraction significantly reduced self-reported pain compared with control. In Nineteen studies the effects of distraction on self-reported pain, resulted significant (Z = 4.08, P < 0.0001). Five studies the effects of distraction on observer reported pain, resulted marginally significant (Z = 1.92, P = 0.05)
Stinson, et al., 2008 PAIN RES MANAG	Critically evaluate all systematic reviews on the effectiveness of the management of acute pain related to procedures in hospitalized children (pharmacological and non-pharmacological interventions.)	SR of SR 8 RS included 1-18 years Setting: hospital wards	Evidence that acute procedure-related pain can be effectively reduced through the use of amethocaine, distraction and hypnosis
Wente, 2013 J EMERG NURS	Examine which non-pharmacological interventions are used in emergency departments for the management of pain.	SR 0-18 years 14 studies included Setting: Emergency departments.	N° 5 studies regarding distraction and venipuncture. Distraction was the most common intervention used during procedures to manage pain in children in Emergency department visits

Table 3: Results of bibliographic research in databases

REFERENCE	OBJECTIVES	DESIGN	RESULTS AND CONCLUSIONS
Mosiman & Pile, 2013 J INFUS NURS	Revision of pharmacological and non-pharmacological techniques for pain management in children during venipuncture.	Review 88 cited sources Setting: not defined	Both pharmacological and non-pharmacological treatments have proven efficacy in preventing or reducing pain from venipuncture. The non-pharmacological treatments require planning; age of patient and his previous experience of venipuncture must be considered; It may be useful to perform venipuncture in a special room rather than the child's bed.
Crowley, et al., 2011 J EMERG NURS	Formulation of recommendations concerning non-pharmacological and pharmacological interventions for minor invasive procedures in pediatric patients in emergency departments	Review 28 studies included Setting: Emergency departments.	There is sufficient evidence to support the efficacy of developmentally appropriate distraction, coaching with distraction, cognitive behavioral therapy, hypnosis and breathing exercises (Level A, highly recommended) in reducing pain and distress.
Naletto & Da Col, 2010 GISIP	Identify the most effective protocols reported in the medical literature for the management of discomfort from venipuncture in children with pharmacological and non-pharmacological systems.	Review 12 studies included: Setting: not defined	Anesthesia during venipuncture can effectively be achieved with pharmacological and non-pharmacological systems, this different options can be integrated or being alternative based on characteristics of the population and environmental needs Statistically significant reduction of pain in groups using a distraction technique compared to the control groups (p <0.05)
Gilboy & Hollywood, 2009 PAEDIATR NURS	Topical analgesics, distraction techniques and presence of parents during venipuncture in children.	Review 29 studies included Setting: not defined	Topical anesthesia has become the gold standard for the management of pain in children undergoing venipuncture The distraction can help reduce the discomfort that precedes the venipuncture. Distraction techniques and the presence of parents are all useful tools that can be used by the nurse to facilitate venipuncture
Murphy, 2009 PAEDIATR NURS	Thematic analysis of the literature regarding techniques of distraction during venipuncture	Review 15 studies included 0-18 years Setting: not defined	Passive distraction is more effective than active distraction during venipuncture; the effectiveness of a particular technique depends on the ability of the child's attention and the degree of its involvement in the activity of distraction.

Table 4: Systematic Review

REFERENCE	OBJECTIVES	DESIGN	RESULTS
Inal & Kelleci, 2012 INT J NURS PRACT	Evaluate the effectiveness of the distraction technique with the use of cards Flippits® to reduce procedural pain and anxiety during blood sampling	RCT -123 children -6 - 12 years	The method of distraction with the cards Flippits® reduces anxiety and pain during blood sampling ($p < 0.001$)
Bagnasco, et al., 2012 J PREV MED HYG	Assess pain and the collaboration of children undergoing venipuncture while watching a video	Observational Study -203 children -2 - 15 years Setting: Department of Emergency, Outpatient endocrinology Passive distraction with audiovisual (chosen by the child)	Significant differences were observed between the mean score of pain in patients undergoing venipuncture with audiovisual distracting technique (2.53 ± 1.76) and the mean score obtained in those undergoing venipuncture without this technique (5.22 ± 2.53).
Yoo, et al., 2011 APPL NURS RES	Study the effects of distraction animated (with a passive video) on pain related to blood sampling	Quasi-experimental 40 children 3 - 7 years Setting: Emergency room 1. Group experimental (N20): Distraction with passive audiovisual PC laptop 2. Group control (N20): standard treatment	There were statistically significant differences in self-reported pain response, behavioral pain response, blood cortisol, and blood glucose between the experimental group and the control group. ($P < 0.05$)
Lessi, et al., 2011 GISIP	Compare two distractive mode for the control of pain from venipuncture (active distraction vs. distraction with audiovisual)	Quasi-experimental 65 children 3 - 12 years Setting: Hospital department of pediatrics 1. control group (N 33): children before performing venipuncture were distracted by the normal practices of care (mainly performed active distraction by his mother and father and the use of toys) 2. Experimental Group (N32): Distraction with audiovisual, chosen by the child	No significant difference between the two groups for self-reported pain measured by the VAS scale ($p = 0.15$). In children aged 3 to 7 years, pain detected with FLACC scale is significantly lower in the experimental group than in the control group ($P = 0.01$) In children aged 8 to 12 years, pain detected with the CHEOPS scale, appears to be significantly lower in the experimental group than in the control group ($P = 0.04$)
Jeffs, et al., 2011 J NURS CARE QUAL	EBP approach to reduce pain from puncture; implementation of the practice with pharmacological interventions (4 different types of topical anesthetic creams) and non-pharmacological interventions (comfortable positioning during procedure, methods of distraction, more control and power to decide by the child, preparation before the procedure, distraction box, use of toys for age-appropriate distraction).	Quasi-experimental 3-18 years Setting: Emergency department 1. group Pre-Soft on Stiks (N106) 2. group Post-Soft on Stiks (N27)	Children's pain with needlesticks decreased from pre- to postpractice change. The overall mean pain score decreased from 3.0 to 1.8. The Cohen d, calculated to estimate the effect size, was 0.67, reflecting a moderate effect.
Alhani, et al., 2010 PAIN MANAG NURS	Test the effect of a program of active distraction (find the differences between two figures) on pain caused by venipuncture (in 12 consecutive sessions) among adolescents on hemodialysis.	Quasi-experimental 42 adolescents 10-21 years Setting: hemodialysis 1. Experimental group (N=21) 12 sessions of venipuncture 2. Control group (N21) 12 sessions of venipuncture, without the intervention of distraction.	The program of distraction may decrease the pain caused by venipuncture among adolescents on hemodialysis; After distraction, pain intensity during venipuncture significantly decreased ($p = .003$); but this decrease began from the sixth session; at the five first sessions, pain intensity had not changed
Tufekci, et al., 2009 J CLIN NURS	To study the effect of distraction with the use of the kaleidoscope to reduce pain during blood sampling in children	Quasi-experimental 206 children 7-11 years Setting: outpatient clinic for analysis 1. Intervention Group Look into the kaleidoscope (N = 105) 2. Control Group, no intervention (N = 101)	Results. Pain levels of the children according to both scales in intervention group were lower than those of control group. But, it was detected that the distinction between score averages of intervention and control group of Wong-Baker FACES Pain Rating Scale, not Visual Analogue Scale, was statistically significant ($p < 0.001$). Conclusion. It was detected that the distraction made with kaleidoscope effectively reduced the pain related to venipuncture in healthy school children and that some features of the children influenced the perception of pain.

Table 5: Review

REFERENCE	OBJECTIVES	DESIGN	RESULTS
Wang, et al., 2008 SWISS MED WKLY	Comparison of the effects of visual distraction with psychological routine interventions (explaining, therapeutic touch, encouragement and guided imagery) during venipuncture.	RCT 300 children 8 - 9 years Setting: Hospital department of pediatrics 1. Audiovisual Distraction (n = 100): cartoon child's choice 2. Psychological Interventions (n = 100): explaining before venipuncture, comfort provided, procedure explained, therapeutic touch, guided imagery, and encouragement 3. Control Condition (n = 100)	The method of distraction with watching a movie chosen by the child was effective in reducing self-reported pain, improves collaboration and increases the percentage of successful venipuncture. VAS scores indicated that procedures were more painful in the control group than in the audiovisual distraction or the intervention group (VAS score: 4.55 ± 2.26 and 4.38 ± 2.32 in the audiovisual distraction and intervention groups respectively, $P < 0.05$). There was no significant difference ($P > 0.05$) between the audiovisual distraction and the intervention groups for cooperation, venipuncture times and pain intensity
Tak & Van Bon, 2006 CHILD CARE HLTH DEV	Compare the effect of a total anesthetic (EMLA) cream compared with a placebo and investigate the effect of prior information and distraction during venipuncture	RCT 136 children 3 - 12 years Setting: outpatients 1. Placebo, audiovisual distraction, Information (n = 20) 2. EMLA, audiovisual distraction, Information (n = 21) 3. Placebo, Information (n = 20) 4. EMLA, Information (n = 21) 5. Information (n = 26) 6. Non-Treatment Control (n = 28)	No significant difference in pain between groups 1 and 3 (p-value not reported) The method of distraction with the vision of a movie (same for everyone) did not lead to evidence of a reduction in pain from the procedure; instead there is evidence in the data for the reduction of stress; this type of distraction does not influence the functioning of EMLA.
Gupta, et al., 2006 ANESTH ANALG	Inflation of a balloon by a pediatric patient during venipuncture may involve a Valsalva maneuver, and then decrease pain. Furthermore, the inflation of the balloon can also act as a distraction. The present study was therefore designed to evaluate the efficacy of balloon inflation on pain from venipuncture in pediatric patients	RCT 75 children 6-12 years Setting: Hospital department of surgery 1. Distraction group (n=25): Patients were given a rubber ball (which produces a squeaky sound on being compressed) 2. Balloon group (n=25): Patients were asked to inflate a balloon at least for 20 seconds before initiation of the venipuncture. 3. Control group (n=25): Patients did not press a rubber ball nor were they asked to inflate a balloon	Significant reduction in VAS was observed in the distraction and the balloon groups compared with the control group ($P < 0.05$) VAS in the balloon group was reduced compared with the distraction group ($P < 0.05$).
Bellieni, et al., 2006 ARCH DIS CHILD	To evaluate the analgesic effect of active or passive distraction (TV) for venipuncture	Quasi-experimental: 69 children 7-12 years Setting: outpatients 1. Cartoon TV Distraction (n = 23): movies started at least 120 s before venipuncture age appropriate cartoon 2. Mother-Directed Distraction (n = 23) 3. No Distraction Control group (n = 23)	the scores of mothers and children indicated that venipuncture is significantly less painful in group 1 (cartoon tv distraction) than in Group 3 ($p = 0.045$) and group 2 ($p = 0.037$) statistically significant reduction in pain in the group TV VS other groups No difference between different gender and age
Cavender, et al., 2004 J HOLISTIC NURS	The purpose of this study was to determine the effectiveness of a multimodal intervention package that consisted of parental participation using positioning for comfort and distraction to divert attention on the level of pain, fear, and distress of pediatric patients undergoing venipuncture.	Experimental: 43 children 4-11 years Setting: emergence department 1. Parental Positioning +active distraction (n = 20): 2. Standard Care Control group (n = 23)	The experimental group showed significantly lower fear compared with the control group as reported by Child Life Specialist and parents ($P = .003$, $P b .001$). No significant difference was found between child's self-report of pain or fear. No difference in behavioral distress was found between groups as rated by the CLS.

Table 6: Primary studies

et al., 2008); clinics (Inal, et al., 2012; Tufekci, et al., 2009; Tak, et al., 2006; Bellieni, et al., 2006); day hospitals (Bagnasco, et al., 2012); and hemodialysis centers (Alhani, et al., 2010).

In some secondary studies, care setting was not specifically mentioned (Uman, et al., 2013; Mosiman, et al., 2013; Naletto, et al., 2010; Gilboy, et al., 2009; Murphy, 2009) while no paper reported investigations carried out in the patients' homes or in locations other than health institutions.

In all the primary studies and in two secondary ones (Uman, et al., 2013; Naletto, et al., 2010) statistical tests were performed where a P value <0.05 was considered as significant.

Tools used for pain assessment

Several types of one-dimensional tools were used to assess the intensity of pain. In some instances, a double tool was used, according to the different age group of the children included in the studies selected for this review. Self-report, parents report, and observer report approaches were taken into consideration. Among the self-report-pain tools, the most frequently used was the Visual Analogue Scale (VAS) (Wang, et al., 2008; Tak, et al., 2006; Gupta, et al., 2006; Lessi, et al., 2011; Tufekci, et al., 2009), followed by the Wong Baker FACES Pain Rating Scales (Jeffs, et al., 2011; Alhani, et al., 2010; Tufekci, et al., 2009; Cavender, et al., 2004); the Oucher scale was used in 2 studies (Tak, et al., 2006; Bellieni, et al., 2006), while the Faces Pain Scales Revised (FPS-R) (Inal, et al., 2012), the Numeric Rating Scale (NRS) (Bagnasco, et al., 2012) and the 5 point Poker Chip Scale (PCS) (Yoo, et al., 2011) were used in the reported reference alone.

Two studies used parents-report-pain tools, such as the Oucher scale (Bellieni, et al., 2006) and the FPS-R scale (Inal, et al., 2012). Finally, among the observer-report-pain scale, i.e. the Face, Legs, Activity, Cry, Consolability scale (FLACC) was used in 2 papers (Bagnasco, et al., 2012; Lessi, et al., 2011), while the Children's Hospital of Eastern Ontario Pain Scale (CHEOPS) was chosen for 1 study (Lessi, et al., 2011), as well as the FPS-R scale (Inal, et al., 2012).

This revision shows that two different kinds of distraction techniques exist: active and passive. Among the most common active distraction techniques drawings and figures are used (Inal, et al., 2012; Alhani, et al., 2010), as well as toys (Lessi, et al., 2011; Jeffs, et al., 2011; Gupta, et al., 2006) and a kaleidoscope (Tufekci, et al., 2009; Cavender, et al., 2004); inflating a balloon (Gupta, et al., 2006) and active distraction by parents (Lessi, et al., 2011; Bellieni, et al., 2006; Cavender, et al., 2004) seemed to play a relaxing effect. In 6 primary studies included in this review, the effect of active distraction techniques were analyzed; results

report a significant decrease in self-reported pain thanks to the use of these techniques (Inal, et al., 2012; Gupta, et al., 2006; Alhani, et al., 2010; Tufekci, et al., 2009; Jeffs, et al., 2011). In one study (Cavender, et al., 2004) no significant result on pain reduction was reported, although the reduction of anxiety in the child facing the procedure was observed. In one study (Gupta, et al., 2006), where the balloon inflation technique was used during venipuncture, the Valsalva maneuver (forced expiration with closed glottis) was assumed to have an analgesic effect.

Shifting to the passive distraction techniques, the most common include watching movies and cartoons (Wang, et al., 2008; Tak, et al., 2006; Lessi, et al., 2011; Yoo, et al., 2011; Bellieni, et al., 2006; Bagnasco, et al., 2012). In the 3 studies which investigated the use of passive distraction with audiovisual tools, the reduction of self-reported pain (Wang, et al., 2008; Yoo, et al., 2011; Bagnasco, et al., 2012) appeared to be statistically effective; on the contrary, one study (Tak, et al., 2006), where all the subjects included in the study (children aged 3-2 years) were made to watch the same movie, no significant reduction of pain was observed, although the level of stress seemed to have decreased.

Two primary studies compared the different effects of active and passive distraction techniques (Lessi, et al., 2011; Bellieni, et al., 2006), and both of them concluded that passive distraction is the most effective when using an audiovisual tool chosen by the child and appropriate to his age

DISCUSSION

Until a few years ago, pain in childhood was underestimated when compared to pain in adults, as the central nervous system (CNS) in infants and children was believed to be inadequate to translate, transmit, modulate and perceive painful sensations. Thanks to the steps forward in the physiology and behavioral fields, we are now aware that the CNS is anatomically and functionally adequate to translate, transmit and modulate nociceptive stimuli starting from the 23rd week of gestation (Fazio, 2010).

In Italy, the number of papers dealing with the non-pharmacological treatment of pain is still limited. On the regulatory front, Italian law 38/2010 has finally given great emphasis to a health problem which is so widespread within the population: pain is in fact considered as the 5th vital sign. Good pain management is a vital component aimed to ensure that the dignity and autonomy of the patient is promoted and protected, it is absolutely mandatory to be able to guarantee an equal treatment in the access to health care interventions to all patients, regardless of their age. The law makes a

clear distinction between the pain treatment network for children from that intended for adults (Italian law 15 March 2010, n.38).

The objective of this review not only intends to investigate the effectiveness of both active and passive distraction techniques, but aims to describe their different clinical applications in pediatric patients facing venipuncture.

This review has highlighted a limited number of primary and secondary studies (RCT and SR) in the period between January 2013 and May 31, 2014.

From the obtained results it is clear that all the primary studies used non-probability sampling methods. As we know, when using this method the sample is selected in a non-causal way, which means that subjects do not all have the same probability of being chosen. Moreover, in non-probability sampling the chances of inclusion are not known and it is not clear whether the selected sample is representative of the population under investigation. This method is however faster, more simple and more cost-effective than probabilistic sampling, which conversely guarantees the reduction of potential sampling bias and assures a greater external validity of the study (Fain, 2013).

The use of drugs alone, as described in many studies, is not always sufficient for pain control management: this is why in some instances a non-pharmacological treatment is also recommended so as to shift the patient's attention to alternative elements. Several reviews (Wente, 2013; Mosiman, et al., 2013; Naletto, et al., 2010) agree on the effectiveness of the non-pharmacological treatment of pain in combination with drug administration: the use of a non-pharmacological approach does not imply the elimination of a pharmacological treatment (i.e., local anesthetic during venipuncture), which remains the first choice treatment in pain management (Mosiman, et al., 2013).

It is interesting to note, however, that in some cases drug treatment may cause side effects, which have not been noted when using active/passive distraction techniques. In addition, the use of distraction techniques does not seem to increase health-related costs (Wente, 2013).

Studies have demonstrated that the most investigated setting in the assessment of the distraction technique is either a Hospital or a clinic, or any other setting implying health care assistance. researches carried out at the homes of young patients are never described.

We know that the emergency department is the most widely used interface between citizen and population. In Italy, the access to pediatric emergency departments has increased from 418,000 in 2002 to 457,000 in 2010 (10%) in the last 10 years; young patients often undergo venipuncture for diagnostic purposes (SIMEUP, 2012).

The use of distractive techniques is a useful intervention strategy to improve the emotional impact and reduce suffering in young patients, and at the same time it guarantees the right not to suffer (IASP, 2012).

All the selected studies provide an analysis of the statistical significance of the data, even if biases of pain assessment are plausible, especially when using objective rating scales. The evaluation based on self-report is considered as gold-standard for the measurement of a subjective vital parameter.

Some distraction techniques can also have an analgesic effect which is different from the conventional ones. One paper (Gupta, et al., 2006) describes how blowing up a balloon can lead to an effect similar to the one resulting from the Valsalva maneuver (forced expiration with closed glottis), which can induce an analgesic action during venipuncture (already observed in adult patients (Agarwal, et al., 2005)). As for the studies which compare the analgesic effect between active and passive distraction techniques, these latter seem to be more effective (Lessi, et al., 2011; Bellieni, et al., 2006).

Two revisions (Murphy, 2009; Crowley, et al., 2011) describe with sufficient evidence the efficacy of distraction techniques to reduce pain perception in pediatric patients, although they should be applied taking into account the age and the level of cognitive development in the child. It is also interesting to note how some studies included in a systematic review by Uman et al.(2013) dwell on the importance and the need to adapt the type of distraction in relation to the preference of the child, if he is old enough to choose independently. Some revision papers focus the attention on the importance of the 'environment' where these distractive techniques should be implemented, i.e., "distraction boxes", which are special rooms where different toys are appropriate for children of different age groups. This can facilitate the involvement of the child and enhance his level of distraction (Wente, 2013; Mosiman, et al., 2013).

The child considers his bed as a place where not to be constantly afraid of sudden and unexpected treatments by doctors and nurses. Using a room especially equipped for health care procedures, in particular for the most painful and invasive ones, not only preserves the privacy of the child (Mosiman, et al., 2013) but may help him consider the bed as a safe place. In addition, the presence of the child's parents may have a key role for a successful analgesic outcome during venipuncture (Gilboy, et al., 2009; Murphy, 2009). In particular, one study reveals that the participation of the parents distracts the children, lessens the stress and has the potential to improve the success of the procedure (Cavender, et al., 2004). Future research should investigate this issue further, emphasizing the role that

parents have in pain management and anxiety control in the children undergoing painful procedures, such as venipuncture.

LIMITATIONS OF THE STUDY

This review is mainly focused on the reduction of pain and on the effectiveness of distraction techniques, deliberately omitting other important welfare indicators, such as anxiety, stress and fear. Other variables were purposely neglected, i.e., the experience of the operator and the concomitant treatment administered using topical anesthetics. Such a global approach emphasizes the importance of providing the necessary assistance to pediatric patients who have to face for the first or the nth time a painful and unpleasant experience of life. These elements are fundamental for a holistic approach, both for health assistance in general and nursing care.

Besides, the data obtained are not able to differentiate between the different types of distraction techniques according to the child's age (1-18 years and related outcomes).

CONCLUSIONS

Analgesia during venipuncture can be successfully achieved by using pharmacological and non-pharmacological treatments. Distraction is the most common intervention used in children, although there is a modest scientific production which supports the efficacy of such a technique to pain and stress during venipuncture. Indeed, 'distraction' is an intervention which presents no side effects and can be performed with an easy workout and minimum costs.

Further RCTs are needed to compare the effectiveness of the different active and passive distraction strategies, based on child's age and preference, on the presence of the parents and on the use of a the concomitant drug treatment with topical anesthetics.

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