PERSONAL PRACTICE

Incorporating psychological approaches into routine paediatric venepuncture

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Studies of paediatric procedural distress have flourished over the past two decades, with psychological intervention strategies showing consistently high efficacy in reducing pain and fear. This review concentrates briefly on the acquisition and treatment of fear, arguing that what is witnessed clinically is not needle fear or phobia, but anticipatory or procedural distress. The main focus is on how such procedures could be amended to incorporate psychological techniques routinely, outlining specific guidelines for clinical practice.

Children continue to view venepuncture as being the most fearful aspect of attending hospital.^{1 2} While most are able to tolerate the procedure using a wide range of coping strategies depending on their age and gender,³ a large proportion are unable to do so and display high levels of fear, pain, and behavioural distress. Typically, this results in needle insertion being abandoned or the child being restrained or sedated, leading to further distress for all involved.

THE ACQUISITION OF FEAR

The term "distress" refers to a combination of fear, anxiety, and pain. Relationships between these factors are complex and have been extensively reviewed.⁴⁻⁶ Although conditioning theories have long since been used to help understand how children acquire fear,⁷ contemporary explanations have attributed causation to interactions between genetically linked behaviour patterns, temperamental predispositions, normal developmental fears, parental psychopathology, and discrete learning experiences, either direct or vicarious,^{8 9} which over time, are maintained by irrational thoughts and attention biases.⁹ Such experiences themselves depend on a range of equally important factors.

Individual factors

Age has been consistently shown to co-vary with needle pain and fear, ratings decreasing with increasing age,^{1 10-12} and with children over 8 years old, especially girls, rating needles as more "unpleasant" than "intensely painful". Individual temperament has also been shown to be important. Children who are rated by their parents as being either more active or intense or negative in mood, display higher levels of distress.¹³ Furthermore, temperament characteristics determine

whether or not parents are willing to "prepare" their child and how long they believe they can leave their child to tolerate needle insertion.¹³

Variations in children's cognitive abilities affect how they perceive, understand, remember, and report pain and distress. There is good evidence of the Piagetian stages of thinking, showing that conceptualisation progresses from the concrete to the abstract^{6 14 15} (table 1). Although there are no reports of adverse effects arising from the quantity of venepuncture, children's recollections are known to be vivid,^{16 17} the more negative the experience, the greater the subsequent anxiety, distress, and non-cooperation.⁴¹ In a sample of 7-18 year old children and adolescents, 63% recalled having a very unpleasant and painful needle-stick, and of these, 46% rated their subsequent fear as being "very" or "extremely" high.⁴² Such memories are pivotal in leading to increased worry and anticipation (although not always), as sensory stimuli in the clinical setting become more intrusive.

Parental factors

Parents also find visiting hospital with their child an anxiety provoking experience. Not only does distress arise from their child being sick, but also from knowing that they may have to endure painful procedures. There are strong correlations between parental anxiety and child distress during venepuncture,⁴³⁻⁴⁵ and good evidence that parents have insight into this.⁴² Yet most parents do prefer to be present during venepuncture,^{42 46} and irrespective of pain intensity, almost all children perceive this to "help the most".⁴⁷ The benefits of parents being present during the procedure and taking active roles, have been repeatedly shown.^{48 49} Those taught explicit distraction and comforting techniques and encouraged to use them during venepuncture, found them useful and were "more satisfied" with their child's care than those who were present but not taught such strategies.⁵⁰

Situational factors

The setting and conditions under which needle insertion is performed also influences levels of distress. Distinction needs to be drawn between children who present acutely and unwell (for example, in accident and emergency units), or in a more medically stable condition (for example, in routine outpatient clinics), and those with chronic conditions who attend hospital regularly. Although children in the former two groups may only encounter brief venepuncture on a "one off" basis, they often have little familiarity and few pre-existing coping strategies. They have been

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Table 1 Variations in developmental understanding of pain, reporting of pain, and appropriate distraction techniques

Age	Understanding of pain and responses ^a	Measuring pain	Distraction techniques
0–3 months	No apparent understanding of pain Memory for pain likely but not conclusively demonstrated Responses appear reflexive	Self rating —none possible Biophysiological Heart rate ¹⁸ Transcutaneous oxygen ¹⁹ Palm sweat ²⁰	Oral glucose ²⁸ Rocking ²⁹ Oral pacifiers (“dummies”) ²⁹ Visual and auditory stimulation (e.g., blowing bubbles, singing) ¹⁸ (Application of EMLA) ^{30–32}
3–6 months	Response to pain supplemented with sadness and anger	Observations Overt distress (e.g., length of crying)	As above
6–18 months	Development of fear of painful situations Common words for pain evolve Loose localisation of pain	Behavioural indices (e.g., Neonatal Facial Action Coding System N-FACS ²¹ , Children’s Hospital of Eastern Ontario Pain Scale – CHEOPS ²²) Parental ratings ^{23,24}	Interactions that involve active processing and motor responses ³³ (e.g., action rhymes ³⁴ , kaleidoscopes, party blowers ^{35,36} ‘Mummy’s jewellery’ ³⁷ Touch, bubble-blowing ³⁸
18–24 months	Use of the word “hurt” to describe pain and non-cognitive coping strategies Awareness of methods of alleviating pain	As above	As above
24–36 months	Beginnings of pain description External causes attributed to pain Threat of immediate pain is overwhelming Future benefit not understood	As above	Simple cognitive strategies (e.g., counting, being read stories, listening to music) ³⁹ Drawing ⁴⁰
36–60 months	Using more descriptive adjectives and attachment of associated emotions (e.g., “sad”, “mad”) Difficulty in understanding that needle pain will be over quickly Spontaneous use of distraction	Self rating Gross indications ⁶ (no pain, a little pain, a lot of pain) Can grossly mark site of pain on body outline ⁶ “Pieces of Hurt” (poker chips) ²⁵	As above
5–7 years	Clearer differentiation of levels of pain intensity Beginning to use cognitive coping strategies	Self rating Accurately mark on body outline ⁶ Faces Scale ^{26,27} “Pain ladders” ²⁵	Guided imagery Engagement in fantasy scenes (e.g., playing on beaches, watching the biggest TV in the world, “you’re a super-hero”) Reality conversation Listening to music Reading
7–11 years	Additional explanations of why pain hurts Concerns about pain limiting present activities rather than future ability	Self rating Visual Analogue Scales (VAS) and Likert and numerical scaling now possible ⁶	As above
11+ years	Additional explanations of the value of pain Pain acknowledged as a “feeling”	As above	As above

reported to find needle insertion more distressing than those who have the procedure undertaken by known clinicians in familiar settings.⁴⁸ Equally, there is emerging evidence that children recently diagnosed with chronic illness report higher pain and fear levels than those with a longer history of illness.⁵¹ Yet for children who have experienced regular or frequent venepuncture in familiar clinical settings, exposure to procedural “cues” (for example, seeing medical equipment, blood samples from other patients, or hearing other children in distress), can also heighten anxiety unnecessarily. Even on seeing the doctor, venepuncture often only takes place at the end of the consultation, further prolonging the event.

FEAR OR PHOBIA?

Given this range of aetiological factors, what is actually witnessed clinically—fear or phobia? Fear can be considered a normal response to threatening stimuli that involves three response systems: physiological arousal, covert feelings and thoughts, and overt behavioural reactions.⁵² Phobia on the other hand, is an unreasonable response to a benign stimulus, resulting in at least one of the three elements being excessively and persistently activated.^{53–54} While some investigations have attempted to delineate subtypes of needle phobia (for example, vasovagal-type and resistant-type⁷), an entirely different argument exists altogether: that needles and venepuncture are not benign stimuli for children, but unpleasant sensory and emotional experiences which invade physical and psychological “space” and threaten loss of control.^{1–55} Therefore, what is seen clinically, is neither fear nor phobia of needles per se, but anticipatory fear and distress. It is rare that children and adolescents become frightened and upset on seeing needles outside the context of the procedure. Furthermore, ratings of fear are much higher prior to needle insertion, after which they sharply decrease⁴² and are no different when children are offered a needle-less injection system.⁵⁶

TREATMENT

Most psychological treatment packages are based on the seminal cognitive behaviour therapy (CBT) work of Elliot, Jay, Olsen, and colleagues,^{57–58} involving a combination of modelling, relaxation training, guided imagery/distraction, graded exposure/active behavioural rehearsal, and reinforcement/incentive scheduling.

Modelling has been utilised in tackling needle related distress by showing filmed models prior to the procedure. It is based on the premise that observing another child (preferably of the same sex, culture, and age group) displaying some anxiety about needle insertion but overcoming it, will help the observer to utilise successful coping skills too.

Relaxation training involves teaching the child how to gain control over the symptoms of physiological arousal by breathing slowly and deeply and releasing muscle tension. This is usually done in conjunction with guided imagery where the child is encouraged to evoke pleasant imagery and engage in fantasy “scenes”. Such techniques are often referred to as hypnosis although arguments do exist that the latter is something entirely different, involving altered states of consciousness. (However, as the aim is to enable children to actively gain a sense of internal control over their reactions as opposed to being a passive recipient of “mystical” external forces, the use of the term “hypnosis” is best avoided in this context.)

Developmentally appropriate distraction is a well established and commonly practised intervention, which mediates reductions in pain and fear (table 1). The “golden rule” in utilising distraction is that, the more interactive and varied the technique and the more active processing and motor responses are invoked, the greater the chance of distress being reduced.³³

Graded exposure (to the feared stimulus) is achieved by establishing successive approximations of the procedure (for example, needles in packaging being held up to arms with sleeves down), quickly building up to full behavioural rehearsals in a treatment room. Clinical experience suggests that health professionals who are not qualified to undertake venepuncture can help children reach the latter stage quickly as the child’s knowledge that “this person can never stick a needle in me” produces insufficient anxiety to be overcome. Consequently, a “qualified” carer needs to become a co-worker as early as possible in the hierarchy.

Together relaxation training, distraction, and graded exposure are known as systematic desensitisation. Another important aspect of this is reinforcement scheduling, where each accomplishment in a graded exposure hierarchy is attended to positively (that is, rewarded), thus focusing on what the child *is achieving* as distinct from what *remains to be achieved*.

Several meta-analyses and reviews of these techniques exist,^{34–55–59–64} showing them to be highly effective. Trials also show that combinations of CBT and pharmacological approaches (for example, topical application of the easily melted (eutectic) mixture of local anaesthetics lidocaine and prilocaine (EMLA), or conscious sedation using either oral valium, midazolam, or morphine sulphate) are effective,^{11–65–66} even more so than either alone.^{67–68} Yet, despite this knowledge too few psychological strategies have been adopted routinely by too few carers. If venepuncture related distress is to be more consistently reduced, there needs to be greater scope for such approaches to be incorporated prior to needle insertion. While there is a scarcity of psychologically trained professionals working in paediatric settings, this would be an entirely different proposition aimed at encouraging a variety of paediatric health carers to use CBT techniques and reviewing how paediatric venepuncture is routinely administered. What follows are suggestions as to how this might be achieved. These are considered in two phases: what happens beforehand (prevention), and what happens after a child reacts adversely.

PREVENTION

Prior to the procedure there are five stages to consider: assessing knowledge and experience, preparation, actively involving parents, participation and giving permission to cry, and the procedure itself (fig 1).

Assessment of previous experience

As part of initial paediatric assessment, questions need to be asked about children’s previous experience with needles. Were these traumatic? Was restraint used? What was done to ameliorate their distress and what, if anything, was effective? (While the application of EMLA to the skin where needle insertion will take place, approximately one hour beforehand is known to be effective in reducing pain,^{2–30–32–51} for some children this can serve as an early signal that venepuncture is imminent, exacerbating anticipatory distress. Consequently, consideration needs to be given to whether or not this outweighs the potential pain relief that EMLA application offers.) Responses to these issues will then determine how many of the following phases need to be addressed.

Preparation

This part of the process need not be lengthy, perhaps lasting only 10 minutes. However, it must include addressing the expected sensory experiences and the actual steps of the procedure. This information needs to be given to both children and parents, and may be accomplished in a variety of ways (for example, showing equipment to be used and explaining “how it might feel”, and “what it might smell or sound like”). Explanations about the actual needle insertion also need to be given, enabling misconceptions and fears to be openly

Figure 1 Proposed algorithm for incorporating psychological techniques into routine paediatric venepuncture.

addressed. Younger children in particular believe that the needle goes into the arm itself (and in some cases expect it to “come out the other side”). They typically find the idea of it being inserted into a vein difficult to grasp. If a child is particularly anxious, it is at this juncture that observing a filmed model may be most effective. Having a “library” of video clips, with a mixture of age, sex, and cultural “models” is invaluable.

Actively involving parents

Children are likely to experience less distress during venepuncture if a parent is present.⁴⁵⁻⁴⁹ Once “prepared”, parents need to be encouraged to stay and given active roles to take,⁴⁸ the exception being when they themselves have needle fears or show high levels of distress.³⁴ This needs to be discussed as openly as possible in order to avoid causing blame or guilt.

Instructions, either written or spoken, should begin by explaining that parental presence is aimed at “helping their child master a stressful situation” and that they will be expected to not only soothe and comfort them, but also to distract them during the procedure using developmentally appropriate techniques (table 1). This is known to be more effective than if undertaken by a health care professional.³⁶ Parents should be encouraged to sit close enough to their child so that they can both see and touch them and encouraged not to give false reassurances (for example, that the needle “will not hurt”). In the event of restraint being required, where possible parents should not be involved. They need to be present in the room as a resource for the child, not staff.

Participation and giving permission to cry

From a very early age, children can participate in venepuncture (for example, by unwrapping certain medical equipment, cleaning the insertion site, and choosing whether they want to lie down or sit up). With the emphasis on collaborating with children as opposed to doing something *to* them, the older they are, the more proficient co-workers they become.

Giving children permission to cry or shout out when the needle is inserted can result in them experiencing less distress than if they are told not to cry and to be brave.⁶⁹ Indeed, it may be useful to actually plan in advance what kind of noise the child would like to make and for a parent or health care worker to make it too, validating and “normalising” the reaction.

The procedure

When it is known in advance that a child is to undergo venepuncture at an outpatient appointment, it should take place as soon as possible after they arrive. This is crucial in avoiding a prolonged period where the child is exposed to a range of procedure related “cues”, which may serve as reminders of the imminent event and/or of previous traumatic venepuncture(s). Of course, at times this will be impossible (for example, when decisions are only made during the consultation process itself).

Reviewing how and where the procedure takes place is also important. Do children really need to lie down? Are there alternative locations to treatment rooms? For children who are known to be fearful, should those in training be allowed to repeatedly attempt needle insertion? Sometimes, it may be less stressful if a known and trusted health carer inserts the needle. Wherever it takes place and with whom, having as few professionals as possible in the room is vital, as is minimising disturbances (for example, by switching pagers off when possible) and interruptions (for example, by putting up “engaged” signs). Further consideration should be given as to whether the child wants to look at the needle being inserted or not. Older children, particularly those who have experienced few needles and who expect pain, are more likely not to want to look.⁷⁰

Once the “scene is set”, children should be encouraged to engage in their “newly acquired skills”, breathing slowly and deeply, relaxing their muscles, and distracting themselves either individually or with their parents.

Time management issues

In clinics where children regularly attend, time restrictions may be less of an issue with preventative work occurring between appointments. However, where time is pressured, it may be sufficient to only include some of these stages, or indeed, only certain aspects of each one. A “short form” version of the above would include:

- Taking a brief assessment of previous experiences and coping strategies
- Presenting sensory and procedural information and instructions to parents, in leaflets

- Stocking as wide a range of distraction materials in the clinic area as possible
- Telling the child that it is okay to make a noise
- Ensuring that the procedure occurs as soon as possible during the consultation process.

However, children with extreme venepuncture related distress are inordinately time consuming in the long term, consuming a range of resources as their fears become more debilitating and their care, increasingly compromised.

REACTIONS IF IT ALL GOES WRONG

When a child reacts with such distress that needle insertion is impossible, avoiding conflict and coercion is as important as facilitating “trust” and “respect”. However, a response is clearly required and three sequential questions need to be addressed (fig 1).

Firstly, consider if the procedure really *needs* to be undertaken that day. Secondly, if it has to be, then is there time to take a rest and to reintroduce the procedure? If so, allow the child a break away from the clinic and on their return, reintroduce the procedure piecemeal and try again. If the procedure does not need to be undertaken that day, further in-house preparation and practice-only sessions could prove effective and result in success. Ultimately an onward referral may need to be made to a child health professional experienced in CBT (either “in house” or via local child and adolescent mental health services). However, waiting times may be long and interim plans for venepuncture may need to be made.

SUMMARY AND CONCLUSIONS

Children continue to find venepuncture one of the most frightening aspects of coming to hospital. This should not be considered as “phobic” fear but rather “anticipatory” or “procedural” distress. As such, there is an onus to amend the procedures, incorporating effective psychological techniques routinely to avoid conflict, reduce unnecessary anticipation, and promote effective coping strategies. Children and adolescents need assistance to develop trusting relationships with professionals and gain some control over what happens to them.

Much is known about the efficacy of psychological techniques in reducing venepuncture related distress but despite this, some research continues to focus more on replicating findings and less on changing clinical practice. Clinical effectiveness will depend on how such strategies are incorporated routinely. Although psychologically trained professionals are being increasingly employed in paediatric care, this problem will always be too large to remain exclusively in their domain. Other carers do already possess skills in this area (for example, play specialists and nurses), but more will need to acquire and utilise these if real change is to occur. Support from consultants and lead clinicians to include these strategies is vital too, as large general outpatient clinics would need to be restructured to a greater or lesser extent. Empirical evaluation of attempts to do so need to be undertaken.

Future research needs to focus on: practical screening tools to identify which children may be at risk of experiencing venepuncture related distress, which strategies work for whom, group work and peer support, sustaining improvements in the long term, and evaluating the potential for the use of topical anaesthesia to increase anticipatory anxiety in children who already have high levels of fear.

USEFUL RESOURCES

Treatment manuals

A Clinical Practice Guideline for “Acute Pain Management: Operative or Medical Procedures and Trauma” and also the “Clinicians Quick Reference Guide” (1992). US Department of

Health and Human Services (USDHHS). Document numbers 92-0019, 92-0020, and 92-0032 respectively. Obtainable from the Centre for Research Dissemination and Liaison, AHCPR Publications Clearinghouse, PO Box 8547, Silver Spring, MD20907, USA.

Report of the Sub-Committee on the Management of Pain Associated with Procedures in Children with Cancer. Zeltzer L *et al. Pediatrics (Suppl)* 1990;**86**:826–31.

Resource materials

“Being Yourself” (a range of books resource materials for working with children). The Old Bakery, Charlton House, Dour Street, Dover CT16 1ED. Tel: 01304 226 900.

Action for Sick Children. c/o National Children's Bureau, 8 Wakley Street, London EC1V 7QE. Tel: 0207 843 644 (www.actionforsickchildren.org).

101 favorite play therapy techniques 1997. HG Kaduson, CE Schaefer (Eds). Jason Aronson Inc., Northvale, NJ. ISBN 0765702827.

101 more favorite play therapy techniques 2002. HG Kaduson, CE Schaefer (Eds). Jason Aronson Inc., Northvale, NJ. ISBN 0765702991.

Website

www.edc.org/PainLink/plpresents.html (excellent overview of techniques appropriate for use in alleviating children's acute pain).

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REFERENCES

- Humphrey GB, Boon CMJ, Chiquit van Linden van den Heuvel GFE, *et al.* The occurrence of high levels of acute behavioral distress in children and adolescents undergoing routine venipunctures. *Pediatrics* 1992;**90**:87–91.
- Schechter NL, Blankson V, Pachter LM, *et al.* The ouchless place: no pain, children's gain. *Pediatrics* 1997;**99**:890–4.
- Hodgins MJ, Lander J. Children's coping with venipuncture. *J Pain Symptom Manage* 1997;**13**:274–85.
- DeGiovanni IS, Garcia KA. Behavioral treatment of children's fears: a review. *Psych Bulletin* 1979;**86**:804–30.
- McGrath PJ, McAlpine LM. Psychological perspectives on pediatric pain. *J Pediatr* 1993;**122**:S2–8.
- McGrath PJ. Aspects of pain in children and adolescents. *J Child Psychol Psychiatry* 1995;**36**:717–30.
- Davey GCL. *Phobias. A handbook of theory, research and treatment.* Chichester: John Wiley & Sons, 1997.
- Ollendick TH, King NJ, Muris P. Fears and phobias in children: phenomenology, epidemiology and aetiology. *Child Adolesc Mental Health* 2002;**7**:98–106.
- Muris P, Merckelbach H. The etiology of childhood specific phobia: a multifactorial model. In: Vasey MW, Dadds MR, eds. *The developmental psychopathology of anxiety.* New York: Oxford University Press, 2001:355–85.
- Fradet C, McGrath PJ, Kay J, *et al.* A prospective survey of reactions to blood tests by children and adolescents. *Pain* 1990;**40**:783–93.
- Fanurik D, Koh JL, Schmitz ML. Distraction techniques combined with EMLA: effects on IV insertion pain and distress in children. *Child Health Care* 2000;**29**:87–101.
- Goodenough B, Thomas W, Champion GD, *et al.* Unravelling age effects and sex differences in needle pain; ratings of sensory intensity and unpleasantness of venipuncture pain by children and their parents. *Pain* 1999;**80**:179–90.
- Lee LW, White-Traut RC. The role of temperament in pediatric pain response. *Issues in Comprehensive Pediatric Nursing* 1996;**19**:49–63.
- Gaffney A, Dunne EA. Developmental aspects of children's definitions of pain. *Pain* 1986;**26**:105–17.
- Gaffney A, Dunne EA. Children's understanding of the causality of pain. *Pain* 1987;**29**:91–104.
- Shrimpton S, Oates K, Hayes S. Children's, memory of events: effects of age, time delay and location of interview. *Appl Cognitive Psychol* 1998;**12**:133–43.
- Eland JM, Anderson JE. The experience of pain in children. In: Joco AK, ed. *Pain: a sourcebook for nurses and other health professionals.* Boston: Little Brown, 1977:453–73.
- Cohen LL. Reducing infant immunization distress through distraction. *Health Psychol* 2002;**21**:207–11.
- Porter F. Pain assessment in children: infants. In: Schechter NS, Berde C, Yaster M, eds. *Pain in infants, children and adolescents.* Baltimore: Williams & Wilkins, 1993:87–96.
- Harpin VA, Rutter N. Development of emotional sweating in the newborn infant. *Arch Dis Child* 1982;**57**:691–5.
- Grunau RVE, Craig KD. Pain expression in neonate: facial action and cry. *Pain* 1987;**28**:395–410.
- McGrath PJ, Johnson G, Goodman JT, *et al.* CHEOPS: a behavioral scale for rating postoperative pain in children. In: Fields HL, Dubner R, Cervero F, eds. *Advances in pain research & therapy, Vol. 9.* New York: Raven Press, 1985:395–401.
- O'Hara M, McGrath PJ, D'Astous J, *et al.* Oral morphine versus injected meperidine (Demerol) for pain relief in children after orthopedic surgery. *J Pediatr Orthopedics* 1987;**7**:78–82.
- Manne SL, Jacobsen PB, Redd WH. Assessment of acute pediatric pain: do child self-report, parent ratings and nurse ratings measure the same phenomenon? *Pain* 1992;**48**:45–52.
- Hester NK, Foster R, Kristensen K. Measurement of pain in children: generalizability and validity of the pain ladder and the poker chip tool. In: Tyler DC, Krane EJ, eds. *Pediatric pain, Vol. 15.* New York: Raven Press, 1990:79–84.
- Beyer JE, Aradine CR. Convergent and discriminant validity of a self-report measure of pain intensity for children. *Child Health Care* 1988;**16**:274–82.
- Bieri D, Reeve RA, Champion GD, *et al.* The Faces pain scale for the self-assessment of the severity of pain experienced by children: development initial validation and preliminary investigation for ratio scale properties. *Pain* 1990;**41**:139–50.
- Eriksson M, Gradin M, Schollin J. Oral glucose and venepuncture reduce blood sampling pain in newborns. *Early Human Dev* 1999;**55**:211–18.
- Campos RG. Rocking and pacifiers: two comforting interventions for heelstick pain. *Res Nurs Health* 1994;**17**:321–31.
- Lindh V. Assessment of the effect of EMLA during venipuncture in the newborn by analysis of heart-rate variability. *Pain* 2000;**86**:247–54.
- Essink-Tjebbes CM, Hekster YA, Liem KD, *et al.* Topical use of local anesthetics in neonates. *Pharm World Sci* 1999;**21**:173–6.
- Dutta S. Use of eutectic mixture of local anesthetics in children. *Indian J Pediatr* 1999;**66**:707–15.
- Dahlquist LM, Pendley JS, Landtrip DS, *et al.* Distraction interventions for preschoolers undergoing intramuscular injections and subcutaneous port access. *Health Psychol* 2002;**21**:94–9.
- Lansdown R, Sokel B. Approaches to pain management in children. *Association of Child Psychology and Psychiatry Review* 1993;**15**:105–11.
- Manne SL, Redd WH, Jacobsen PB, *et al.* Behavioral intervention to reduce child and parent distress during venipuncture. *J Consult Clin Psychol* 1990;**58**:565–72.
- Manne SL, Bakeman R, Jacobsen PB, *et al.* An analysis of a behavioral intervention for children undergoing venipuncture. *Health Psychol* 1994;**13**:556–66.
- Gonzalez JC, Routh DL. Effects of maternal distraction versus reassurance on children's reactions to injections. *J Pediatr Psychol* 1993;**18**:593–604.
- Sparks L. Taking the “ouch” out of injections. *American Journal of Maternal Child Nursing* 2001;**26**:72–8.
- Mason S, Johnson MH, Woolley C. A comparison of distracters for controlling distress in young children during medical procedures. *Journal of Clinical Psychology in Medical Settings* 1999;**6**:239–48.
- Crenshaw DA. Party hats on monsters: drawing strategies to enable children to master their fears. In: Kaduson HG, Schaefer CE, eds. *101 more favorite play therapy techniques.* Northvale: Jason Aronson Inc., 2002:124–7.
- Bittebier P, Vertommen H. The impact of previous experience on children's reactions to venepunctures. *J Health Psychol* 1998;**3**:39–46.
- Duff AJA, Brownlee KG. The management of emotional distress during venipuncture. *Netherlands J Med* 1999;**54**(suppl):S8.
- Shaw EG, Routh DK. Effects of mothers' presence on children's reactions to aversive procedures. *J Pediatr Psychol* 1982;**7**:33–42.
- Jay SM, Ozolins M, Elliott CH, *et al.* Assessment of children's distress during painful medical procedures. *Health Psychol* 1983;**2**:133–47.
- Wolfram RW, Turner ED. Effects of parental presence during children's venipuncture. *Acad Emerg Med* 1996;**3**:58–64.
- Bauchner H, Vinci R, Waring C. Pediatric procedures: do parents want to watch? *Pediatrics* 1989;**84**:907–9.
- Ross DM, Ross SA. Childhood pain: the school-aged child's viewpoint. *Pain* 1984;**20**:179–91.
- Bauchner H, Vinci R, May A. Teaching parents how to comfort their children during common medical procedures. *Arch Dis Child* 1994;**70**:548–50.
- Wolfram RW, Turner ED, Philput C. Effects of parental presence during young children's venipuncture. *Pediatr Emerg Care* 1997;**13**:325–8.
- Bauchner H, Vinci R, Pearson C. Parental presence during procedures: satisfaction with care. *Am J Dis Child* 1993;**147**:426.
- Robieux I, Eliopoulos C, Hwang P, *et al.* Pain perception and effectiveness of the eutectic mixture of local anaesthetics in children undergoing venipuncture. *Pediatr Res* 1992;**32**:520–3.
- Graziano AM, DeGiovanni IS, Garcia KA. Behavioral treatment of children's fears: a review. *Psychol Bull* 1979;**86**:804–30.
- Marks IM. *Fears and phobias.* New York: Academic Press, 1969.
- Butler G. Phobic disorders. In: Hawton K, Salkovskis P, Kirk J, Clark D, eds. *Cognitive behaviour therapy for psychiatric problems: a practical guide.* Oxford: Oxford University Press, 1999.

- 55 **Ellis JA**, Spanos NP. Cognitive-behavioral interventions for children's distress during bone marrow aspirations and lumbar punctures: a critical review. *J Pain Symptom Manage* 1994;**9**:96-108.
- 56 **Polillo AM**, Kiley J. Does a needleless injection system reduce anxiety in children receiving intramuscular injections? *Pediatr Nurs* 1997;**23**:46-9.
- 57 **Elliott CH**, Olson RA. The management of children's distress in response to painful medical treatment for burn injuries. *Behav Ther Res* 1983;**21**:675-83.
- 58 **Jay SM**, Elliott CH, Ozolins M, *et al*. Behavioral management of children's distress during painful medical procedures. *Behav Ther Res* 1985;**23**:513-20.
- 59 **Anderson KO**, Masur FT. Psychological preparation for invasive medical and dental procedures. *J Behav Med* 1983;**6**:1-40.
- 60 **Jay SM**. Invasive medical procedures: psychological intervention and assessment. In: Routh DK, ed. *Handbook of pediatric psychology*. New York: Guilford Press, 1988:401-25.
- 61 **Powers SW**. Empirically supported treatments in pediatric psychology: procedure-related pain. *J Pediatr Psychol* 1999;**24**:131-45.
- 62 **Smalley A**. Needle phobia. *Pediatr Nurs* 1999;**11**:17-20.
- 63 **Murphy E**, Carr A. Paediatric pain problems. In: Carr A, ed. *What works with children and adolescents? A critical review of psychological interventions with children, adolescents and their families*. Florence: Taylor & Francis, 2000:258-79.
- 64 **Kuppenheimer WG**, Brown RT. Painful procedures in pediatric cancer: a comparison of interventions. *Clin Psychol Rev* 2002;**22**:753-86.
- 65 **Jay SM**, Elliott CH, Katz E, *et al*. Cognitive-behavioral and pharmacological interventions for children's distress during painful medical procedures. *J Consult Clin Psychol* 1987;**55**:860-5.
- 66 **Jay SM**, Elliott CH, Woody PD, *et al*. An investigation of cognitive-behavior therapy combined with oral valium for children undergoing medical procedures. *Health Psychol* 1991;**10**:317-22.
- 67 **Kazak A**, Penati B, Boyer BA, *et al*. A randomized controlled prospective outcome study of a psychological and pharmacological intervention protocol for procedural distress in pediatric leukemia. *J Pediatr Psychol* 1996;**21**:615-31.
- 68 **Schiff WB**, Holtz KD, Peterson N, *et al*. Effect of an intervention to reduce procedural pain and distress for children with HIV infection. *J Pediatr Psychol* 2001;**26**:417-27.
- 69 **Fernald C**, Corry J. Empathic versus directive preparation of children for needles. *Child Health Care Dev* 1981;**10**:44-7.
- 70 **Goodenough B**, Champion GD, Laubreaux L, *et al*. Needle pain severity in children: does the relationship between self-report and observed behaviour vary as a function of age? *Aust J Psychol* 1998;**50**:1-9.

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