

Procedural Pain Management for Children Receiving Physiotherapy

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ABSTRACT

Purpose: This article provides an overview of literature relevant to the prevention and relief of pain and distress during physiotherapy procedures, with guidance for physiotherapists treating children.

Summary of key points: Physiotherapists are generally well trained in assessing and managing pain as a symptom of injury or disease, but there is a need to improve the identification and management of pain produced by physiotherapy procedures such as stretching and splinting. In contrast to physiotherapy, other health care disciplines, such as dentistry, nursing, paediatrics, emergency medicine, and paediatric psychology, produce extensive literature on painful procedures. Procedural pain in children is particularly important because it can lead to later fear and avoidance of necessary medical care.

Recommendations: We emphasize the need for physiotherapists to recognize procedural pain and fear in the course of treatment using verbal, nonverbal, and contextual cues. We present many methods that physiotherapists can use to prevent or relieve procedural pain and fear in paediatric patients and provide an example of a simple, integrated plan for prevention and relief of distress induced by painful procedures.

Key Words: child, pain, painful procedures, paediatric, physiotherapy

von Baeyer CL, Tupper SM. Procedural pain management for children receiving physiotherapy. *Physiother Can.* 2010;62:327–337

RÉSUMÉ

Objectif : Cet article propose un survol de la documentation relative à la prévention et au soulagement de la douleur et de l'anxiété qui surviennent pendant des interventions de physiothérapie, et propose des avenues en ce sens aux physiothérapeutes qui traitent des enfants.

Résumé des principaux points : Les physiothérapeutes sont généralement bien formés pour l'évaluation et la gestion de la douleur en tant que symptôme d'une blessure ou d'une maladie, mais des améliorations sont nécessaires pour l'identification et la gestion de la douleur qui résultent des procédures de physiothérapie, comme les étirements ou les contractions. Contrairement à la physiothérapie, d'autres disciplines de la santé, notamment la dentisterie, les soins infirmiers, la pédiatrie, la médecine d'urgence et la psychologie pédiatrique ont inspiré une abondante documentation sur les procédures douloureuses. Les douleurs procédurales chez les enfants sont particulièrement importantes, parce qu'elles peuvent les amener à avoir peur des soins médicaux nécessaires ou à les éviter.

Recommandations : Nous insistons sur la nécessité pour les physiothérapeutes de savoir reconnaître la douleur procédurale et la peur qui surviennent en cours de traitement à l'aide d'indices verbaux ou non verbaux et contextuels. Nous présentons plusieurs méthodes que les physiothérapeutes peuvent utiliser pour prévenir ou soulager la douleur procédurale et la peur chez les patients pédiatriques et donnons aussi un exemple de plan intégré simple pour la prévention et le soulagement de l'anxiété causée par les procédures douloureuses.

Mots clés : douleur, enfants, pédiatrique, physiothérapie, procédures douloureuses

INTRODUCTION

Children report pain, discomfort, and distress associated with many routine health care procedures, including some physiotherapy assessment and treatment techniques. There is growing evidence of the negative impact of painful procedures on health outcomes in

children. For example, several studies have found that exposure to painful medical procedures is a significant predictor of post-traumatic stress symptoms, a lower sense of control over health, and heightened medical fears among hospitalized children.^{1–3} Thus, it is essential for physiotherapists who treat children to be skilled in recognizing pain and in delivering care that minimizes pain or, when possible, is free of pain.

The authors have no conflict of interest concerning material presented in this article.

Susan M. Tupper is supported by a doctoral fellowship from the Canadian Institutes of Health Research and the Saskatchewan Health Research Foundation. The authors appreciate the assistance of Brenna Bath, Debby Lake, JoAnn Nilson, and Michael Sangster.

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DOI:10.3138/physio.62.4.327

Information about pain for physiotherapists commonly focuses on the importance of pain as a diagnostic sign and on methods of pain management for various disorders. Little guidance is available for physiotherapists on how to deal with pain produced by hands-on treatment or by recommended home exercises. For example, in three of the prominent textbooks on paediatric physiotherapy, we found no mention of procedural pain, although there are lists of various types of nociceptive and neuropathic disease-related and injury-related pain problems.⁴⁻⁶ In a fourth recent textbook, discussion of procedural pain appears to be limited to several sentences in the section on burn treatment.^{7(p.1040)} Similarly, a recent book about physiotherapy pain management includes no chapter on paediatric pain and no indexed mention of paediatric procedural pain.⁸ By contrast, in the professional literature for nurses, dentists, paediatricians, and child life specialists, much attention has been paid to procedural pain, and especially to needle pain, since the 1980s.⁹ A possible reason for the discrepancy between professions is that the majority of attention to procedural pain has been focused on tissue-damaging procedures that require puncture of the skin with a sharp device or on invasive procedures requiring insertion of a probe or catheter. For the most part, physiotherapy techniques performed on children are not invasive in this sense; yet they are nonetheless sometimes painful and distressing. The lack of research and scholarly literature on procedural pain in physiotherapy does not mean that individual physiotherapists are necessarily falling short in their responsibility to patients. Many paediatric physiotherapists are highly skilled in using coaching, preparatory information, positive language, reward, distraction, thermal techniques, and other methods to minimize their patients' pain and fear during treatment; however, this skill set has not been well documented in the physiotherapy literature.

This article is intended (1) to review the literature on recognition of procedural pain and its impact on children and (2) to outline evidence-based methods of procedural pain management in order to encourage clinicians to consider areas of their own practice where these techniques may be incorporated.

PROCEDURAL PAIN IN PHYSIOTHERAPY

A search of electronic databases (Medline, CINAHL, Web of Science) was carried out to find references to procedural pain during paediatric physiotherapy in English-language journals. Ten such articles were found. Most related to children with cerebral palsy,¹⁰ with a few references to other presenting problems, as noted below. Parents of children with cerebral palsy (with or without impaired communication) reported that home stretching exercises were the most painful activity of daily living and that passive range-of-motion (ROM) exercises carried

out by physiotherapists were also frequently painful.^{11,12} Adults with cerebral palsy reported that pain related to stretching and bracing in physiotherapy was one of their most salient negative memories of childhood.¹³ Another group working with children with cerebral palsy found that referral to a multidisciplinary pain-treatment team was necessary to enable painful physiotherapy to continue.¹⁴ Almost one-third of children with cystic fibrosis complain of pain during physiotherapy.¹⁵ The management of burn injuries is a source of pain and fear in children and parents, and poorly managed pain often increases the time required for care.^{16,17} Pain during post-surgical mobilization has also been addressed in a case report.¹⁸ With respect to complex regional pain syndrome in children and adolescents, it has been suggested that physiotherapy should be the primary treatment and that all other therapies, including psychological treatment, medications, and nerve blocks, should be provided mainly to enable the child to continue the painful physiotherapy regimen.¹⁹

Many common orthopaedic physiotherapy assessment and treatment procedures are known to provoke pain, though research on this topic is lacking. During a physical exam the therapist may reproduce or aggravate pain multiple times with ROM measurement, evaluation of joint end-feel, ligament stress tests, pain-provocation tests, and strength testing. In fact, the objective of several physiotherapy assessment procedures is to reproduce pain in order to identify its source, as, for example, to identify myofascial trigger points.²⁰ The task for the physiotherapist is thus to evoke pain only to the minimum extent needed for diagnostic purposes while preventing the development of fear.

THE IMPACT OF PROCEDURAL PAIN ON HEALTH OUTCOMES AND FUTURE CARE

Physiotherapists, like many other health care practitioners, may have misconceptions about paediatric pain, believing that children do not feel or remember pain in the same way as adults.²¹ In fact, in addition to the discomfort and distress that a child may experience at the time, there is growing evidence of the long-term impact of inadequate management of procedural pain on children. Unless there is research showing otherwise, it should be assumed that pain-provoking physiotherapy procedures have similar effects to those studied by other professions and that steps should be taken to minimize pain for paediatric patients.

Weisman et al. contributed to an understanding of the importance of early adequate management of procedural pain with a follow-up study to a randomized controlled trial in which children (aged 3-8 years) received either fentanyl (a potent opioid analgesic) or placebo during the first of a series of oncologic diagnostic procedures.²² In subsequent procedures, all children received the

fentanyl, but those who had received placebo in the first procedure continued to report significantly higher pain intensity with subsequent procedures than those who had received fentanyl the first time. This indicates that inadequate management of early painful procedures can have lasting effects and can reduce the effectiveness of analgesia in subsequent procedures.²²

Children exposed to repeated procedural pain display altered behavioural responses to pain later in life. These altered behavioural responses are considered to be a result of conditioned (learned) responses as well as of changes in central nervous system processing of pain signals resulting from frequent exposure.²³

Several studies have demonstrated the variable responses to painful procedures that can be seen in children and adolescents, depending on age, developmental status, and previous exposure to pain. Behavioural response to pain changes over time with development, showing a trend toward more elaborate and more intense pain expression with increased age during infancy and early childhood.²³ Premature infants exposed to more frequent pain during the perinatal period displayed a diminished pain response to subsequent pain in infancy compared to less-exposed premature infants.²⁴ Conversely, full-term infants who were circumcised without analgesia displayed increased behavioural response to later pain relative to uncircumcised infants and those circumcised with analgesia.²⁵ Full-term infants with more frequent pain exposure at birth have been reported by their parents to display more physical symptoms and complaints as young school-aged children than those with less frequent early pain exposure.²⁶ Adolescents who were born prematurely had significantly more tender points and lower pain thresholds on pressure-point stimulation by dolorimeter than their peers who were born full term.²⁷ Although this study did not control for the number of painful events experienced during the neonatal period, the preterm group spent an average of 65 days in the neonatal intensive care unit (NICU), compared to 0 days for the full-term group. Infants in the NICU undergo, on average, more than 14 procedures per day.²⁸ Despite the fact that NICU clinicians rate the majority of these procedures as painful, only one-third of infants receive adequate analgesia for procedures.²⁸

In the presence of intense, repeated, or sustained pain-provoking stimuli—as, for example, in physiotherapy treatment of burns and in splinting limbs with contractures—the central nervous system may become sensitized, reducing the threshold and increasing the magnitude of subsequent nociceptive responses.²⁹ In the event of central sensitization, even non-nociceptive afferent inputs are recruited for nociception, and spontaneous activity of nociceptors can occur. Tissue damage and ongoing peripheral stimulation are not necessary for the maintenance of central sensitization. It has been suggested that repeated procedural pain plays a role in the devel-

opment of central sensitization, leading to the increased behavioural responses to pain, more frequent physical symptoms and complaints, and lower pain threshold observed in children exposed to frequent pain in childhood.²³

Children who require ongoing painful therapy may display increased anticipatory fear, frustration, and withdrawal, resulting in decreased participation in treatment and poorer outcomes.³⁰ Two studies found an association between memories of pain and distress during a wide range of childhood medical experiences and avoidance of health care in adulthood.^{31,32} The implication of these findings is that interventions to promote adaptive coping in paediatric patients and to manage pain and distress during therapy will improve both the outcome of the current session and the patient's future willingness to access appropriate health care.

It is important for physiotherapists to be sensitive to the lasting impact that procedural pain may have on pain processing as well as on patients' willingness to accept and participate in future treatment.

PAINFUL DILEMMAS FOR PHYSIOTHERAPISTS

Physiotherapists report two classes of dilemmas related to procedural pain management.* One concern is that it is inherently stressful, particularly for therapists early in their careers, to inflict pain. Therapists may feel guilty or may feel an urge to “go easy” on patients. More experienced therapists may cope with this problem in a proactive way, by developing their skills in distraction and other pain-management techniques, or in a less positive way, by desensitizing themselves to patients' expressions of distress or even by denying that they produce pain.

The other concern reported by therapists is a difficulty imposed by their training to the effect that a proper therapeutic stretch should be “uncomfortable (not painful) and into a new range that a child is not able to do actively.”^{33(p.232)} Identifying the line between “painful” and “uncomfortable” is not easy even for older, verbal children, and it depends heavily on their emotional and motivational state; for younger children, the distinction between painful and uncomfortable is inaccessible by self-report and very difficult to judge by observation. To our knowledge, no studies have focused on this tricky distinction in paediatric physiotherapy. Adults and adolescents are often able to support themselves through

* While preparing this article we conducted an informal survey of paediatric physiotherapist colleagues, asking them about their experiences with procedural pain and about what they and their colleagues do to prevent and minimize pain and fear. Respondents suggested helpful techniques from their clinical experience, which we have included in this review, with citations to relevant literature (see Table 1).

an uncomfortable treatment by thinking about the benefits of the treatment. But children have a lower level of understanding of how something that hurts may be good for them; they also have a shorter temporal orientation, meaning that they live in the moment and are less likely to accept short-term pain in the interests of long-term improvement. Therapists treating burns to prevent contractures, for example, have to find a balance between inducing pain in the short term and preventing pain and disability in the long term.

Related dilemmas occur for physiotherapists in teaching parents to help with their child's therapy. In the context of burn treatment, a textbook notes that parents "can be instructed to assist their child with ROM exercises, but may not be able to deal with the pain or sensation of stretching that it causes their child to experience during therapy sessions."^{7(p.1040)} Similarly, a postural management programme for children with cerebral palsy³⁴ may produce pain that can be relieved in the short term only by removing the braces, but doing so may have the longer-term adverse consequence of contributing to the development of deformity. Should parents "persist with the programme and feel that they are ignoring their child's pain, or should they discontinue the programme and feel that in doing so they may contribute to the development of deformity in their child?"^{34(p.108)}

These conflicting demands on physiotherapists make it desirable to provide some guidance on practical, evidence-based ways to recognize and address pain produced by physiotherapy procedures.

RECOGNITION OF PROCEDURAL PAIN IN CHILDREN

The therapist carrying out a painful procedure has three principal ways of knowing whether it hurts the patient. First, the patient might say that it hurts. Second, the patient's nonverbal behaviour might indicate pain: grimacing, vocalizing, tensing up, and resisting the procedure, as well as subtle signs such as narrowing the eyes or holding the breath. Third, the therapist develops knowledge of the expected reaction to the procedure from prior experience with this patient and with others. Of course, therapists themselves may have different thresholds or decision rules to determine how aggressively they approach or surpass limits to the intensity or duration of therapeutic interventions based on the patient's pain threshold.

To standardize pain measurement, numerous scales exist for self-report and observational assessment.³⁵⁻³⁷ However, such scales are usually impractical and unnecessary for use by a physiotherapist in the midst of a physiotherapy procedure; they are useful for monitoring disease-related and postoperative pain over time rather than for managing procedural pain. The physiotherapist generally cannot and need not interrupt a child's coping

efforts during a procedure to obtain a pain score and then return to the procedure. Instead, in the present context, the therapist's task is to recognize signs of pain as they occur and act to reduce the pain, as opposed to attempting to quantify the pain intensity with a standardized tool. "During a procedure it is important to watch for early warning signs of pain and distress and be prepared to change tack: assess, treat, reassess and modify treatment if necessary."^{38(p.8)} For example, the therapist may be able to watch the child's face while administering a passive stretch and, when the child's eyelids narrow or a grimace appears, suggest a distraction or hold the stretch without pushing it further. Other signs of pain that can be observed and acted upon include changes in breathing, guarding, withdrawal of a limb, vocalizing, verbal complaints, or diverse signs of withdrawal such as giggling or asking to go to the bathroom. The therapist may be able to ask the child directly to give a verbal or nonverbal signal "when it starts to hurt."

We are aware of no research in the physiotherapy literature with respect to these means of recognizing procedural pain and making the ensuing decisions about pain management. On the other hand, this topic has received explicit attention in the field of paediatric dentistry.³⁹ Versloot and Craig presented the *sociocommunications model* of pain and applied it to paediatric dental practice. In this model, pain experience is instigated by physical stimuli but is also highly influenced by thoughts and emotions, intrapersonal factors such as biological sensitivity to pain and previous experiences with pain, and interpersonal factors including the social context and the presence or absence of parents. The experience of pain is "encoded" as a pain expression, verbal and nonverbal. In the next stage of the model, the caregiver "decodes" the child's behaviour, resulting in a judgement that depends heavily on the caregiver's sensitivity, biases, knowledge of the situation, and relationship to the child. In the final stage, the caregiver makes a decision about whether and how to intervene to deal with the child's pain by pharmacological, psychological, or physical means.³⁹ This model, by directing attention to all stages of communication between clinician and patient, may extend clinicians' sensitivity to children's pain and their knowledge of options for preventing and controlling pain.

MANAGING PROCEDURAL PAIN IN CHILDREN: APPLICATION TO CLINICAL PRACTICE

Unfortunately, it may not be possible for all physiotherapy assessment or treatment to be pain free; consider the child with complex regional pain syndrome who experiences increased pain with even the gentlest of touches. However, it is the ethical obligation of clinicians to deliver care that promotes adaptive coping and

Table 1 Overview of Techniques to Prevent and Reduce Procedural Pain That May Be Used by Physiotherapists, with Selected References

<i>Physical and Pharmacological</i>	<ul style="list-style-type: none"> • Cold—ice or cold packs, ice massage, contrast baths, vapocoolants⁶³ • Heat—hot packs, whirlpool, paraffin, fluidotherapy, infrared lamps⁶³ • Transcutaneous electrical nerve stimulation (TENS)⁶⁵ • Positioning for comfort—maximize contact with parent⁶⁴ • Touch—therapist maintains physical contact with the patient⁶⁴ • Positioning to maintain eye contact⁶⁴ • Massage³⁸ • For infants: oral sucrose^{59,60} • Timing physiotherapy to coincide with peak effect of analgesic^{62,66} • Bolus dose of analgesic complementing continuous analgesic infusion⁶⁶
<i>Psychological</i> ⁵⁵	<ul style="list-style-type: none"> • Preparatory information in age-appropriate language: sensory and procedural^{43–46,49,67} <ul style="list-style-type: none"> • What is to be done • Why it will be done • What it will probably feel like (using non-threatening and positive terms) • Calm tone of voice^{38,39} • For infants: holding, rocking^{50,51} • Providing some engagement in the procedure (e.g., having the patient count the seconds required to hold a stretch)³⁸ • Giving breaks from the procedure (contingent on task accomplishment, not pain expression)³⁸ • Diaphragmatic and other breathing exercises^{54,55} <ul style="list-style-type: none"> • Using bubbles, party blowers, or pinwheels • Using imagery—blowing up and deflating a balloon in the patient's stomach • Progressive muscle relaxation³⁸ <ul style="list-style-type: none"> • Tensing phase is often not needed with children • Use imagery with young children: robot then rag doll • Distraction^{16,18,50–53} <ul style="list-style-type: none"> • Singing to the patient • Providing or encouraging patient to bring music to listen to via earphones • Toys for the child to play with using parts of the body not involved in the procedure • Guided or independent imagery: favourite place, favourite TV show • Home practice of relaxation and imagery using audio recording of therapist's instructions • Telling a story or jokes • Television or video • Virtual reality • Coping skills training: teach child to select the best from some of the above strategies^{40,42} • Positive self-talk: replace catastrophic thoughts with more positive ones^{57,58} • Reinforcement by the therapist for successful coping^{57,58} • Teaching children to recognize successful coping and praise themselves^{57,58} • Relapse prevention: identify obstacles to coping in advance of the next procedure and discuss how they can be overcome^{57,58}

minimizes or, if possible, eliminates pain. Techniques to manage procedural pain will be appreciated by patients and their families, make physiotherapy sessions more tolerable and possibly less time consuming, and lessen the possible negative consequences of pain on the developing child.

Miller et al. demonstrated the association between therapists' behaviour and children's coping and distress during muscle stretching administered as part of post-rhizotomy care for spasticity in 32 children aged 2 through 9 years.⁴⁰ In that study, therapists' prompts for children to use a coping strategy and non-procedural talk were associated with greater levels of coping, while therapists' criticism, reassurance, checking child's status, praise, and empathic statements were all associated with greater levels of distress. These correlations cannot be interpreted as indicating a causal relationship between therapists' behaviour and children's coping and distress, but separate experimental evidence exists that identifies these adult coping-promoting and distress-promoting behaviours on the part of parents and staff as having a causal influence.^{41,42}

Table 1 lists a broad array of physical, pharmaco-

logical, and psychological pain-management techniques for children at various ages. Evidence for the efficacy of these techniques, where available, is cited in the text below. Standard techniques that are well known to physiotherapists are not discussed in detail.

Developmental Considerations in Coping

There are marked developmental changes in coping with pain, fear, and distress. Infants, toddlers, and preschool-age children depend on comforting physical contact with caregivers to whom they are attached, and they benefit from distractions during painful procedures, such as singing, novel toys and picture books, and sweet tastes. Starting around age 4 years, children develop increased skills in use of their imagination: for example, to promote deeper breathing, they can be taught to imagine their belly inflating like a balloon and then deflating. From around 8 to 10 years onward, children and adolescents have an increased repertoire of cognitive coping strategies. They start being able to select their own coping strategies; for example, they can choose to listen to music on their earphones or imagine being in their favourite place during the procedure.

Pre-procedure Preparation

Preparing children for a painful or stressful procedure by providing accurate procedural and sensory information is well supported as an effective method for reducing children's distress.^{43–45} Generally, the information has been provided to children in the anticipatory stage of the painful procedure, either verbally or by demonstrating the procedure using a model, an illustrated book, or a doll or stuffed animal. Since literature on this topic is lacking within the discipline of physiotherapy, references are drawn from other disciplines involved in paediatric health care.

To start with, it is important to give the child hope and confidence, both that the treatment can help the child to heal and that the techniques for preventing and relieving pain will help the child to feel comfortable during the treatment.

Preparatory information is classed as either procedural or sensory. *Procedural* information is about what will happen; this is often most clearly conveyed by demonstrating the procedure on a doll or stuffed animal or by showing a picture or video that allows the child to see the sequence of steps. It is important to accompany this demonstration with a non-threatening, organized narration that tells the story of the procedure in child-friendly language.⁴⁶

Sensory information relates to how the procedure will feel. It is helpful to consider what the child already knows about the procedure in question (from previous experience, observation, or instruction). If the child does not expect it to hurt, and it does hurt, then the pain will be surprising and shocking, and the distress will be worse than it would have been if the pain were expected. Research on this theme uses the term "underprediction."^{47,48} It may in fact reduce distress to let the child know that the procedure may hurt,⁴⁵ using language that is not fear inducing. For example, one might comment, "It will be interesting to see what it's like for you. Some children say it feels like pressing, and other children say it feels like a strong stretch, and others say they can hardly feel it."

Provision of preparatory information is highly developed in the field of paediatric dentistry.⁴⁹ The Tell-Show-Do method, for example, is widely taught and practised in this field. According to the American Academy on Pediatric Dentistry, this method

involves verbal explanations of procedures in phrases appropriate to the developmental level of the patient (tell); demonstrations for the patient of the visual, auditory, olfactory, and tactile aspects of the procedure in a carefully defined, non-threatening setting (show); and then, without deviating from the explanation and demonstration, completion of the procedure (do). The tell-show-do technique is used with communication skills (verbal and nonverbal) and positive reinforcement.^{49(p.10)}

Further consideration of how and when to give children information about forthcoming medical procedures has been offered in a recent review.⁴⁴

Distraction and Intermissions

Age-appropriate distractions can be used during physiotherapy procedures to minimize attention to the painful event. Infants are distracted and comforted by music or singing, rocking, swaddling, massage, and sucking.^{50,51} (Oral sucrose is discussed below.) Toddlers may be distracted by singing, blowing bubbles, toys, storytelling, and pop-up books. By early school age, most children can use more active coping mechanisms and, if experienced, may be able to choose the method that is most effective for a given procedure. Effective distractions for older children may include music, stories or jokes, books, conversation, guided imagery, television, or video games. Several studies describe the effective use of virtual reality during physiotherapy to manage procedural pain, including burn care.^{18,52,53}

Between two or more painful procedures, a non-painful activity or touch can be performed by the therapist or the child to serve as an intermission, giving the child a chance to recover, to give the therapist feedback, or to switch to a more effective distraction or coping strategy if necessary. Depending on the child and on the chronicity of pain, it is important for the therapist to consider whether it is more therapeutically beneficial to make an intermission contingent on task completion or to take a break when the child complains of pain. For a child with acute pain, it may be best to take a break if the child complains of pain, in order to change the activity or try a different distraction. However, for a child with chronic pain, when pain is unavoidable with therapy, breaks should be contingent on task completion rather than on pain expression, to prevent reinforcing an avoidance pattern of behaviour.

Deep Breathing and Guided Imagery

Encouraging children to focus on deep, diaphragmatic breathing, with or without the help of imagery, can relax them and take their focus away from a painful procedure. Considerable evidence supports these practices.^{54,55} Most physiotherapists will be familiar with the principles and mechanisms of effective relaxation and deep breathing. For brief and non-stressful procedures, just having the child inhale and exhale two or three times and "get floppy" may suffice; for longer procedures, it is helpful to teach the breathing techniques separately from the painful treatment and, if possible, to encourage practice prior to using the technique during the painful procedure.

The therapist might use words like the following in introducing these concepts to a young school-aged child

(the words will, of course, be tailored to the language of the therapist and the child):

I'd like to tell you about something we call Three Breaths. Don't do it yet, I'll just tell you about it. What you can do is take three slow, deep breaths. On the first breath, you breathe in, and hold it for a moment, and then breathe out, and as you breathe out, you relax the whole lower half of your body, from your waist down, so your belly and legs and feet get all floppy and warm and comfortable. On the second deep breath, you hold it for a moment, and then breathe out, and as you breathe out, you relax the whole upper half of your body, from your waist up, so your chest and arms and neck and head and face all get relaxed and floppy and warm and comfortable. And then on the last breath, as you breathe out, you relax your mind, and go to your very favourite place, and when you are relaxed, and breathing comfortably, it is easy to imagine all the details: what you would see, and hear, and feel, and maybe even taste. And later on, when we start doing the stretching exercise, you can just let your mind stay in that favourite place, and let your body keep on breathing very comfortably by itself, and it might seem like the stretching is happening very far away, so that you can notice it but it won't seem to matter very much because you will be focusing so much on how comfortable you are. Let's practice this now: take your first slow, deep breath and hold it for a moment . . .

Post-procedure Recovery, Reframing, and Reinforcement

Numerous studies have shown that distress and coping with painful procedures are strongly influenced by memories of past procedures.⁵⁶ There are promising indications that memories of painful experiences can be reframed so as to reduce pain and distress experienced during subsequent medical procedures.^{57,58} For example, Chen et al. encouraged children to re-evaluate their reactions after a lumbar puncture, emphasizing the efficacy of their own coping strategies and their memory of positive aspects such as moments when they did not cry. The result was reduced distress with subsequent procedures.⁵⁸ The implication for physiotherapists is that they may be able to help children cope with later procedures by reviewing and rewarding children for their coping with a current procedure: "You did a great job! Did you notice that when you imagined your belly was a balloon blowing up, you relaxed and the stretch got easier? You are getting better and better at this!"

Pharmacological and Physical Interventions

Oral sucrose is an effective non-pharmacological analgesic that has been used to diminish pain responses in infants prior to tissue-damaging procedures such as venipuncture and heel-lance. There have been several reviews describing the literature in support of oral sucrose and non-nutritive sucking for procedural pain in infants.⁵⁹⁻⁶¹ A small amount (between 0.05 and 0.5 mL)

of a 24% sucrose solution is provided orally to the infant. Two minutes prior to the beginning of the procedure, the sucrose is placed either directly on the infant's tongue or on a pacifier that is placed in the infant's mouth. Pain relief achieved with oral sucrose may last as long as 5 to 10 minutes.⁶⁰

The physiotherapist can consult with the medical staff or the family physician, the parents, and the patient to coordinate therapy with the timing of the maximum analgesic effectiveness of medications.⁷ Additionally, if effective pain relief is not being obtained with the usual medications and non-pharmacological techniques, the medical team should be consulted to discuss options for breakthrough medication, a bolus dose of analgesic to coincide with therapy, or other methods. For example, the need for painful postoperative physiotherapy is reported to be one indication for a continuous peripheral nerve block.⁶² The method of delivery of analgesia will depend in part on the type of procedure being done, the location and depth of tissues causing pain, and the duration of the treatment. Physiotherapists should be familiar with the effects and side effects of their patients' medications and should communicate any concerns about ineffective pain management or reported side effects to the medical team.⁴²

Thermal Agents

Therapists use heat and cold in many forms (see Table 1) to relieve pain prior to, during, and after painful treatment. The benefits and application of thermal agents will not be described in depth here, as they have been well described elsewhere and are familiar to most therapists.⁶³ Thermal agents are contraindicated in young children and in those who are unable to communicate sensory changes in the area to be treated or unable to move away from the heat or cold. It should also be noted that cold therapy, in particular, may increase pain in some circumstances and should be chosen carefully based on the child's preference as well as the etiology or stage of healing of the condition.

Positions of Comfort

Many parents and guardians want to be involved in therapy and appreciate clear instructions on how they can help make procedures more tolerable and less threatening for their children. Infants and children benefit from being placed in a position of comfort during assessment and treatment procedures. Positions such as sitting on or straddling the lap of a caregiver are thought to create feelings of security for the child. Stephens et al. describe several positions of comfort.⁶⁴ The majority of children prefer to sit rather than to lie down during procedures, because lying down places them in a vulnerable position in which they feel a loss of control.⁶⁴ Positions of comfort are adaptable to the child's or parent's



Figure 1 Back-to-chest position with parent on a chair. The child is using a View-Master (Fisher-Price) for distraction during a knee-ligament stress test.



Figure 2 Back to chest in a semi-recumbent position with the child supported by the parent on the plinth. The child is distracted by a View-Master during a hip-joint examination.



Figure 3 Chest-to-chest position. The child is distracted with bubbles that the mother is blowing during an elbow-joint examination. This picture demonstrates the child sitting freely on the mother's lap; if greater stability is needed, however, the child can be tucked into a hug position, with the parent bracing the child's arms. Therapists are encouraged to minimize restraint of children, using the position of the parent for additional bracing if needed during procedures.

abilities and to the requirements of the physiotherapist. Figures 1–5 highlight three general positions for the parent and child during an assessment or treatment procedure. Figures 1 and 2 demonstrate the back-to-chest position, which can be adopted for procedures on the distal upper and lower extremities, head, neck, face, and anterior and lateral chest. The chest-to-chest position (Figure 3) can be used for procedures on the distal upper and lower extremities, proximal upper extremity, and some spinal procedures. For techniques requiring the child to adopt a prone or recumbent position, consider placing the child on top of or beside the parent, as demonstrated in Figures 4 and 5. In these positions, parents can also use other techniques to distract the child.

APPLICATION: INTEGRATED PAIN-MANAGEMENT PLANNING

Ideally, physiotherapists getting ready to administer a painful procedure will create brief plans for preparation and pain management. A sample plan is illustrated in Table 2. Plans will include answers to questions such as the following:

- How can I *prepare* the child for the procedure?
- What techniques should I use to demonstrate or illustrate the sequence of steps and to *provide information* about how it might feel?
- Should the procedure be timed in relation to analgesic administration?



Figure 4 Child is prone on top of mother during a spinal procedure. Mother is humming to the child.



Figure 5 Child is supine on the plinth with the parent lying beside him reading a book during a cervical side-flexion stretch.

- How can I provide age-appropriate *distraction*?
- What will *catch the child's attention* before and during the procedure?
- How can I prepare and coach the child's *parent* to promote distraction and confidence?
- How can the child be *positioned* close to or in contact with the parent during the procedure?
- How can I *recognize early signs* of fear or pain and adjust my treatment to them?
- How can I *recognize and reward* the child's efforts to cope with the situation?

CONCLUSION

When physiotherapists have to administer painful procedures to children in the course of treatment, it is stressful for all concerned. While research and clinical literature within physiotherapy is mostly silent on this topic, lessons can be drawn from other disciplines in children's health care. Training programmes and text-

Table 2 Steps in a Sample Plan for Preparation and Management of Pain during the First Administration of Passive Stretching with a 5-Year-Old Patient

1. In advance, choose some distraction materials. These could be items in the room such as a poster on the wall, or music, or a toy brought by the child.
2. Demonstrate the stretch on teddy bear. Narrate the procedure: "First the teddy bear lies down, then the bear takes a deep breath, then ..."
3. Say how it might feel: "Some kids say this feels like pressing, other kids say it feels like pushing, and others say they can hardly feel it."
4. Position the child in contact with or close to the parent.
5. Request self-report: "Please tell me how it feels as we go along."
6. Watch the child's facial expression, eyes, breathing, for signs of pain. If signs are noticed, slow down a bit.
7. Draw the child's attention to the distraction chosen at Step 1.
8. Compliment the child's coping efforts. Even if the child cries, there are moments when efforts to regain control can be seen and complimented.
9. When finished, narrate the procedure that was just completed in a way that emphasizes positive aspects, to set up good expectations for the next time.

books should include information on procedural pain management. There is much that physiotherapists can do to prevent pain and to reduce fear and distress related to pain. In addition to being happier and more comfortable at the time of treatment, children will be more accepting of and more cooperative with future treatment—not only by physiotherapists but also by health care providers in other disciplines.

KEY MESSAGES

What Is Already Known on This Topic

Paediatric physiotherapists, like other health care providers, commonly perform procedures that are painful or stressful, which can lead to patients' fearing and avoiding necessary care. Physiotherapy textbooks, research, and training programmes focus on the diagnostic significance of pain symptoms but generally offer little guidance on the prevention and relief of pain and fear during paediatric procedures.

What This Study Adds

Physical, psychological, and pharmacological methods exist to prevent or minimize pain and fear, often including an active role for parents. We present research findings and evidence-based clinical guidelines from other paediatric disciplines such as dentistry, nursing, paediatrics, emergency medicine, and psychology. These methods can be combined in a simple, integrated plan to help children to have a better experience with painful physiotherapy procedures.

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