Non-pharmacological management of pain in children

H Ekwueme

Commentator: S Naidu  Moderator: L Cronje

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INTRODUCTION

Children and adolescents account for about 34% of hospital visits each year (1) and many of these visits are related to painful conditions (2). Based on family reports, satisfaction with hospital experience is highly dependent on efforts made to manage pain (3). The ideal goal of pain management in children is to make the procedure comfortable for the child and parents, success will be manifested by the child who is not afraid of subsequent procedures and not merely by a child who can be held still for procedures (4).

Children are inconsistently assessed and under-medicated for pain (5). Only during 44.5% of children’s visit were pain scores documented (6) and in a Swiss study, only 37% of anesthesiologists / surgeons reported that they regularly assessed therapeutic success of analgesia (7). It is therefore not unexpected that more than 50% of children experience severe pain while in hospital (8).

Traditionally, health care practitioners have approached pediatric pain management conservatively, such that 50% of Chinese pediatricians use placebos such as vitamin C or saline to relieve pain, they used placebos to “protect” children from becoming addicted to opioids or to test whether children were really experiencing pain. Although practice in controlling moderate to severe pain was far from ideal, majority of surveyed Chinese pediatricians believed that the training they had received in pain management was poor (9).

Effective pain management in children is challenging because there are many special considerations when providing treatment. (10), hence it has been documented that the standard pain care for children lags behind established guidelines (11), and more frightening is the fact that many centres have no guidelines / protocol. More than 75% of US academic centres had no defined protocol for procedures of pain management (4).

LIMITATIONS OF CONVENTIONAL PHARMACOLOGICAL PAIN MANAGEMENT IN CHILDREN

Pain is complex, multidimensional and inherently subjective (10), and is best understood within the context of a biopsychosocial model that incorporates biologic, environmental and cognitive behavioral mechanisms in the development and maintenance of pain (13). Therefore it should be managed as such (10).

Biopsychosocial model of pain (13)

Health care practitioners focused on the treatment of pain rather than the prevention of pain and have erroneously approached pain management in children as “either/or”, that is pharmacological interventions or alternate approaches. Specialties defined which method and interventions were used, physicians rely primarily on drugs and invasive technique to modulate nociceptive processing while non-physicians rely primarily on non pharmacological approaches. “Either/or” as we have noted, does not provide optimal care (14). Biopsychosocial model of pain has showed the inadequacy of conventional approach to control all the factors associated with pain. Furthermore, sole reliance on conventional pharmacological method has been sub-optimal in pain management because of:
Drug pharmacokinetics / pharmodynamics vary in the pediatric ages.

The commonest reason for drug toxicity in children is miscalculating doses from adult preparations.

Some medications are not recommended in children e.g. aspirin.

There are some techniques that are less appropriate in children e.g. PCA (15).

ASSESSMENT OF PAIN IN CHILDREN

Until recently, the management of pain in children was hindered by a lack of reliable and valid instruments for pediatric pain assessment. This lack probably contributed to the general underestimation and treatment of pain in children (13). There are many published guidelines for the assessment of pediatric pain and the assessment should be individualized, comprehensive, measured, continuous, monitored and documented (16).

Self reporting is considered the most reliable indicator of the existence and intensity of pain (17), one dimensional pain scales have been developed for use in the acute pain settings in children above age of 3 years (10), though pain cannot be easily quantified by one dimensional parameters especially in neonates, infants ant those children that cannot verbalize or express appropriately their pain. A multidimensional tool should account for all the factors that influence pain experience (10). However, it is important to be sure that children particularly those between the 3 and 7 years of age are competent to provide information before their report is accepted (18).

METHODS / TECHNIQUES

Given the influence of psychological and behavioral factors on pain, non-pharmacological interventions are important in altering pain perception/behaviors (19). These interventions aim to reduce fear, minimize distress and pain and increase a child’s sense of control. More so, perioperative anxiety is a predictor of post operative pain outcome (20).

To be effective, the techniques must be appropriate to age and developmental abilities and must also be appealing to the recipient.

The techniques can be assigned to three broad categories:

(a) Cognitive methods which includes education/preparation, music, guided imagery, distraction and hypnosis.

(b) Behavioral methods among which are progressive muscle relaxation technique, biofeedback exercises, breathing control, and hypnosis.

(c) Physical methods e.g. heat and cold application, massage and touch, Transcutaneous Electrical Nerve stimulation (TENS), acupuncture/acupressure etc.
Education / Preparation
The goals are to provide information about the medical intervention as appropriate and begin desensitizing the child. Sensations, sounds and visuals that will occur during a procedure are explained in an age/developmentally appropriate manner. The provision of information allows a patient to plan coping strategies and have greater sense of control.

Distraction
Children less than 6 years of age respond well to distraction techniques, such as blowing bubbles, counting, video games etc. The goal is to refocus attention from threatening anxiety provoking aspect of medical treatment to ideally pleasant and engaging situations.

Suggestion
Children are susceptible to the power of suggestion, which makes the magic glove technique especially effective. The basic principle is willingness to be involved and ability to have enough strength and energy to participate. An imaginary glove is placed on a child’s hand, finger by finger where a procedure is to be performed.

Breathing control
Specific patterns of regulated breathing can enhance a child’s relaxation. The pattern requires concentration and attention of the child thereby taking the mind away from the procedural pain. It gives the child the tool to manage stress. Two types of breathing techniques can be used: rhythmic deep chest breathing and patterned shallow breathing.

Guided imagery
It is a form of relaxed focused concentration. It entails using sound and sight in one’s imagination to produce a sense of wellbeing. It has been useful for preoperative anxiety and postoperative pain management. The child is encouraged to imagine being in the favorite place and then imagine the sights, sounds and smell of that favorite place.

Progressive muscle relaxation
Extensive practice with systematic tensing and relaxing of muscle groups allows the child to differentiate painful stimuli. It is designed to help children recognize and reduce body tension associated with pain. Instructions are given to tense a muscle group and hold it in that condition for 10 seconds and notice the way a muscle feels when tense compared with how it feels when the tension is relaxed.

Biofeedback
The principle is to translate the body’s physical state into audio-visual signals. The child may then be able to voluntarily control specific physiological parameters e.g. skin temperature, muscle electromyography etc.

Hypnosis
The technique involves focusing attention towards achieving deeper level of relaxation and pain relief. An altered state of consciousness is used, whereby a child’s attention is focused, narrowed and absorbed. The tendency of children to have a short attention span allows hypnotic technique to better capture that attention span and keep it focused away from the painful procedure.

Acupuncture
It is based on traditional Chinese medicine for pain relief. It originated from the theory that energy (chi) flows through the body along channels (meridians) which are connected by acupuncture points. The obstruction of the flow of energy results in pain and subsequent restoration of that energy eliminates pain. The flow is restored by insertion of fine needles at acupuncture points along the meridians involved. Effectiveness of acupuncture in other conditions has been well documented.

MECHANISM OF ACTION
The precise physiologic mechanisms are unknown, but various postulates have been made.

(a) Gate control hypothesis: It postulates the presence of blocking or gating mechanisms along the pain pathway, prohibiting pain from reaching the brain through stimulation of inhibitory neurons. The neurons close the pain gates through stimulation of non-painful receptors or excitatory messages from the brain (21).

(b) Endogenous opioids mechanism: The body is stimulated to produce and release endorphins and enkaphlins, which then act at the native opioid receptors thereby blocking the perception of pain (14).

(c) Wind up mechanism: via indirect c-fibre activity, some approaches may decrease c-fibre activity, an indirect but major component in the development of hyperalgesia and central sensitization (22).

(d) Relaxation response: A physical state of deep rest that changes physical and emotional response to stress. By focusing attention away from the painful stimuli, alterations may occur in nociceptive responses, thus triggering an internal pain suppressing system and the potential to modify cognitive pain perceptions (23).
ADVANTAGES OVER CONVENTIONAL METHOD

Most of the techniques are non-invasive, carry minimal risks and give a child a degree of control over his/her situation\(^2\), by capitalizing on a child’s natural imaginative skills and high degree of suggestibility \(^1\) where in the sense of mastery seems to replace the sense of helplessness that hospital procedures may produce among the pediatric group \(^2\).

Behavioral program before surgery decreased anxiety, rates of emergence delirium and the use of analgesia and resulted in faster discharge after surgical intervention. By decreasing anticipatory anxiety and distress in children, it has become effective in reducing parental perception of pain distress in children \(^2\).

Generalizability of the skills makes it an attractive adjunctive therapy; moreover, the approach is relatively inexpensive \(^2\).

EVIDENCE

Few qualified studies are available regarding the use of non-pharmacological approach in children; however, there is a body of literature supporting the efficacy of the technique for both acute and chronic pain management.

Non pharmacological approach has been found to be an effective adjunctive method for the control of pain. Jones described its use in pediatric patients undergoing Harrington rods placement. Those taught the technique required less amount of pain medication after surgery \(^2\). Cochrane review recommends the use as an adjunct for the treatment of procedural pain and anxiety in sickle cell patients \(^2\). In a study by Zelter et al, it was shown that combining pharmacological and non pharmacological measures resulted in decreased distress of painful procedures and increase quality of life in children with leukemia \(^\) \(^3\).

A blinded randomized study showed that 75% sucrose dummy before immunization decreased infant crying time, as well as parent and nursing perception of pain and distress \(^\) \(^\). Patients having upper abdominal surgery who were treated post operatively with TENS were shown to have improved pulmonary function compared with control group, pain control was better, they required less opioids and as a result had improved pulmonary function \(^\) \(^\).

Eccleston and colleagues found very strong evidence for the effectiveness of psychological treatment in reducing the pain of chronic and recurrent headache \(^\) \(^\). Non pharmacological methods have played a recognizable important role in the management of chronic pain \(^\) \(^\).

CRITICISMS

Efficacy for acute pain management has not been explored adequately, as it is commonly believed in evidence based medicine, that a treatment is not considered risk free unless evidence suggest otherwise. The findings of studies are difficult to evaluate because of inherent difficulties in such research with standard control.

The approach may require more preparation time with the patient and also more time to complete than conventional method \(^\) \(^\), in a busy establishment, physicians may not be able to provide time for and attention to preparing patients \(^\). However, the participation of other professionals e.g. nurses, psychologists, child life specialist, play therapists, physical/occupational therapists etc is crucial and effective. Once the child acquires the skills, it can be used even without the presence of a coach \(^\).

Sinha et al reported that the approach did not reduce self reported pain, even though that it did reduce self reported anxiety and parental perception of pain in younger children \(^\).

There have been no official generally accepted standards of quality, but it is practiced by qualified and registered professionals, whose practice and conduct are regulated by the registration boards.

Some techniques may not be risk free and have been associated with some hazards e.g certain exercises in yoga have caused documented basilar/vertebral artery occlusion. There have also been reports of serious complications affecting the upper spine during chiropractic manipulation. These complications are very rare and there were other variables associated with the occurrence of these rare complications.

Gunnar et al has cautioned that the reduction of pain by these unconventional methods may be deceiving because it did not cause any significant effect on the serum level of cortisol - a stress hormone - when compared to control \(^\). T. Field in 1995 however reported (from studies in infants) lowered levels of stress hormones \(^\).
CONCLUSION

Attitudes are changing in area of pediatric pain management and the traditional belief that children are incapable of experiencing pain has been abandoned. What is known now suggests that the use of these adjunctive methods of pain management would complement pharmacological management, hence the American Academy of Pediatrics/Canadian Paediatric Society recommend non-pharmacologic interventions to prevent, reduce or eliminate pain. Currently, about 85% of US tertiary institutions offer one or more techniques.

There is continuous need to educate the medical community regarding the long term outcomes of pain control, however, many areas require further study to provide stronger evidence.

REFERENCES

11. MacLaren J, Kain ZN, Research to Practice in Pediatric Pain: What Are We Missing? Pediatrics 2008; 122 (2) 443
15. Thomas AJ. Perioperative Pain Control: Children and adults, Refresher Course 2008