The Comorbidity of Pain and Anxiety Related to Procedures in Pediatric Oncology Patients and the Success of Current Treatments

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Abstract

This paper explored the comorbid relationship of pain and anxiety related to procedures in pediatric oncology patients (ages 1-18 years). It discussed the success of different treatments to relieve pain and anxiety associated with cancer treatment in children. Treatment often included: lumbar punctures (LPs), bone marrow aspirations (BMAs), or other needle puncture procedures. Techniques that aided in pain and anxiety relief were: hypnosis, massage therapy, pharmacological sedation, virtual reality (VR), music, and integrative therapies. Additionally, the paper explored the role that parents have in affecting children’s response to pain and anxiety and treatment techniques. After compiling 19 sources, data suggested that an integrative approach is best; hypnosis and VR were the next best treatment options.
The Comorbidity of Pain and Anxiety Related to Procedures in Pediatric Oncology Patients and the Success of Current Treatments

Numerous studies have examined the comorbidity of pain and anxiety. However, few have discussed them in reference to pediatric oncology patients. Ocañez, McHugh & Otto (2010) concluded that individuals with elevated anxiety sensitivity (AS) are more likely to interpret somatic symptoms as aversive or dangerous, and thus may be prone to more negative or catastrophic interpretations of pain sensations. Numerous studies have shown that AS is significantly correlated with fear of pain. In specific relation to children, Castro (1997) found that children with more frequent pain not only had signs of more severe distress, but they also reported more frequent occurrences of distressing problems, such as depressive and anxiety problems. This paper thus examined the nature of pain and anxiety in pediatric oncology patients along with the techniques or treatments being used to help children deal with pain and anxiety related to LPs, BMAs, or other needle puncture procedures.

General Nature of Pain

Bearison and Mulhern (1994), discussed that pain in children is often unrecognized and is therefore not treated or prevented. Later on it requires a psychologist to be called in after a child has already learned to fear a particular medical procedure. As Bearison and Mulhern (1994) stated, once children have one or more negative painful experiences, the memory of that pain experience may be contribute to the development of anxiety reactions in anticipation of future procedures.

Cancer treatment and evaluation often involved BMAs, LPs, or other needle puncture procedures. The researchers suggested that care provider’s focus on preemptive
care as opposed to reacting to the behavior once it has already been learned (sentence not quite clear).

Castro (1997) corroborated Bearison and Mulhern (1994) and findings stated: the physiology of pain (nociception) involves the stimulation of nociceptors and transmission of that information from the peripheral nervous system into the central nervous system. Memories of past pain experiences, expectations of pain, affective states, and other factors from a variety of brain centers can influence the interpretation of nociceptive stimulation as “pain”. The ability to accurately report pain is dependent on age, cognitive/developmental level, language skills, and previous pain experiences.

Castro (1997) later stated that patients reported 40% of the pain to treatment and its side effects. However, another study reported that patients attributed 58% of their pain to treatment and its side effects. Pain was also caused by the actual malignancies; however it was significantly less, as much as half when compared to pain caused by treatment.

Definition and Evaluation of Pain

Symptom evaluation was a difficult matter, as the age of the child plays a central role in their ability to comprehend pain and how they can articulate their discomfort. It is important to note that Bearison and Mulhern (1994) reported that pain is defined at the level of the individual. Furthermore, Bearison and Mulhern (1994) defined the term ‘pain as defined by the International Association for the Study of Pain (IASP), which stated pain is ‘an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage.’
Age, Gender, Race, Ethnicity, and Socioeconomic Factors

Bragado Álvarez and Fernández Marcos (1997) found that clinical observation suggests that smaller children usually reacted with more severe discomfort during medical procedures acting on the body surface that to internal injuries related to the course of an illness. Bearison and Mulhern (1994) reported that young children (2-7) had difficulty understanding the reason for medical procedures; children 8 years and older usually had the capacity to understand the reasons for medical procedures and can respond to psychological interventions commonly used with older children and adolescents. However, adolescents may regress when they become acutely anxious and may require help controlling their fear or coping.

Measurement

Ocañez, McHugh & Otto (2010) showed a strong correlation between cardiac vagal nerve activity for the period immediately prior to needle insertion and the subsequent period that included the insertion itself. Certain learned associations may be formed in these stressful situations, even without the individual’s knowledge. Post-procedural salivary cortisol levels were significantly higher than pre-procedure levels. Bragado Álvarez & Fernández Marcos (1997), used self-report scales, such as Likert-type scales (5pt-scale), pain thermometer (thermometer of pain on 0-100 scale), Analogical-visual scales (AVS)- used for nausea, face scales (1-10 scale matched to faces).

Another researcher, Genius (1995) used self-report measures as baseline data to assess patients’ anxiety and discomfort. Measures of anxiety and discomfort were reordered separately on 5-point Likert scales and were gathered immediately before,
during, and immediately following one of the aforementioned procedures (BMAs, LPs, needle punctures). Castro (1997) found that patient’s gender did not seem to influence pain reports; race, ethnicity, and socioeconomic class did not factor in to reporting of pain. Furthermore, no difference between the length of treatment and reporting of pain or the length of time since diagnosis was noted.

**Role of Parents**

Bearison and Mulhern (1994) found that parental anxiety and children’s distress during BMAs were positively related. Ocañez, et Al’s (2010) findings showed a correlation between child and parent ratings of the child’s anxiety (r=0.66, P = 0.001). In the correlation matrix examining the interrelationships among these variables, a strong relationship between coping and expectation (r =0.76, P = 0.001) and between parent’s ratings of their own and their child’s level of anxiety (r = 0.44, P = 0.024).

Dahlquist & Pendley (2005) corroborated the findings that parent anxiety may play an important role in children’s responses to distraction intervention. The children who did not respond favorably to distraction had parents who were significantly more anxious than the parents of their counterparts.

However, parents could also be a positive influence on their child. Liossi, Hatira, & White (2006) found that parents, when minimally trained along with their children, could successfully facilitate self regulatory pain management interventions.

**Hypnosis as a Treatment Option**

Various techniques or treatments were used to help children with anxiety and pain related to their procedures. Smith, Barabasz, & Barabasz, (1996) found hypnosis to be significantly more effective than distraction in reducing perceptions of behavioral
distress, pain, and anxiety in hypnotizable children. The distraction condition was successful in producing significantly lower anxiety ratings for the low hypnotizable children. The hypnotizable children reduced or eliminated their pains and anxieties by using hypnosis intervention.

Liossi, et Al’s (2009) concluded that despite the evidence of the efficacy of hypnosis, one of the reasons that has prevented its widespread use in the clinical setting is the belief that it may take a number of sessions to master hypnotic skills.

The study tested the efficacy of EMLA and hypnosis in reducing pain and anxiety due to a procedure. Hypnosis was found to be effective in reducing pain, anxiety, and distress during the actual procedure and anticipatory anxiety before the procedure. The application of the anesthetic (EMLA or other type) can become a conditioned stimulus. Liossi, & Hatira (2003) found that patients in the hypnosis groups exhibited high levels of behavioral distress at baseline, and their distress decreased significantly during the intervention and self-phases. The behavioral distress exhibited by the patients during hypnosis interventions was significantly lower than that experienced by patients in the control groups.

Genius, (1995) found pain was reduced significantly more through the use of hypnosis in BMAs than through the use of non-hypnotic behavioral interventions (p<.05). Significant reductions in both anxiety and discomfort in all three time periods (pre, during, and post procedure) were found after hypnotic intervention. There were no significant differences observed if a patient did or did not believe in hypnosis.
**Massage Therapy as a Treatment Option**

A different technique was massage therapy. Post-White, Fitzgerald, Savik, Hooke, Hannahan, & Sencer (2009). The study looked at 23 children/parent dyads. Children were 1-18 years of age. Children reported that massage helped them feel better, lessened their anxiety and worries. Massage in children with cancer is feasible and appears to decrease anxiety in both children and parents. Heart rate \( z = -2.4, P = 0.02 \) was significantly lower and respiratory rate was close to being significantly lower \( z = -1.96, P = 0.05 \) in response to massage than control (quiet time). Mean pain and nausea scores were low before and after each massage and control condition. However, blood pressure and heart rate showed no significant differences between the control and massage group but was likely due to small sample size of 17. The greatest effect was seen on the parents in terms of reduction of stress and anxiety.

**Pharmacological Sedation as a Treatment Option**

A more traditional technique is pharmacological sedation. Dufresne, Dugas, Samson, Barr, Turcot, & Marc (2010), data suggested that light to moderate sedation usually leads to low levels of pain and fear during procedures, as self reported by children. Further, those who anticipated pain and fear during needle insertion tended to experience more pain and fear during the procedure.

**VR as a Treatment Option**

The next technique examined is VR. Gershon (2003) looked at VR. One advantage of VR as a potent distractor is the sense of immersion or presence experienced by the participant. The study was limited because sample size was 1. However, overall results suggested benefit from using VR as a distractor during painful medical procedures.
as indicated by lower pain and anxiety, ratings, and reduced physiological arousal, and reduced behavioral indices of distress. Additionally, the benefit of reduced pain, anxiety and pulse rate continued following the VR condition, even when the VR was not used as a distractor.

Gershon, Zimand, Pickering, Rothbaum, & Hodges (2004) furthered research previously conducted and found that VR allows the human user experiences both visual and auditory stimuli that help immerse the individual into the computer generated reality and create a sense of presence in the environment. Significant differences on pulse rate emerged during the port access procedure. Children in the VR distraction condition had a significantly lower pulse rate than children in the control condition (p < 0.05).

Music as a Treatment Option

The second to last technique examined is music. Nguyen, Nilsson, Hellström, & Bengtson, (2010) found significant differences in reduction of heart rate (P = 0.012) and respiratory rate (P = 0.009) during the procedure in the music group compared with the control group. Significant differences in resting rate (P = 0.003) after LP in the music group compared with the control group were found. The SpO2 and blood pressure did not differ between the two groups.

Integrative Therapy as a Treatment Option

The final technique is integrative or combination therapy. Liossi, Hatira, & White (2006) found the combination of hypnosis with local anesthesia was superior to local anesthesia in the reduction of anticipatory anxiety and procedure related pain, anxiety, and distress behavior in children undergoing LPs. Thrane (2013) found that children are often receptive to integrative therapies such as music, art, guided imagery, massage,
therapeutic play, distraction, and other modalities. Results showed that integrative interventions might be effective for pain and anxiety in pediatric oncology patients. The study looked at the effectiveness and variety of integrative modalities for children with cancer in coping with pain and anxiety during cancer treatment and the painful procedures that are part of the treatment. Mind-body techniques and hypnosis showed good effect sizes for decreased pain and anxiety in several studies examining diverse painful procedures. As such, there was ample evidence to recommend the use of these techniques during painful procedures that are part of childhood cancer treatments.

Discussion

The goal of this paper was to explore different techniques or treatments that health care providers and parents can use to alleviate pain and anxiety in pediatric oncology patients undergoing LPs, BMAs, or other needle puncture procedures. As pain and anxiety are comorbid it is imperative that health care professionals realize this relationship and create plans to alleviate as much pain and anxiety that is associated with the aforementioned procedures.

In general, society does not like to see children suffer; the techniques discussed in this paper offered options to alleviate pain and anxiety in pediatric oncology patients. Bearison and Mulhern (1994), the research showed that these techniques are most effective when they are used pre-emptively instead of after a child has already learned a behavior. Furthermore, it is generally known that stress and anxiety negatively affect one’s health. Pediatric oncology patients already have impaired health via compromised immune systems and so anything that can give them an edge would be beneficial.
Also, Blount, Piira, & Cohen (2003) found diagnosable PTSD has been found in one-fifth of a young adult sample of survivors of childhood cancer. Although the numerous articles analyzed do point to potential solutions to alleviating pain and anxiety, some techniques were more prevalent than others (VR, hypnosis). Further research into music and massage therapy needs to be done to continue exploring the benefits these techniques may have.

Integrative options tended to show the most promising results as Dufresne, et al’s(2010). Even if sedation achieves relief of pain and distress during cancer procedures, this pilot study underlines the need for a non-pharmacological intervention to ease anxiety before they are undertaken. Research should also look at children who survive cancer treatment to look at lasting effects of pain and anxiety that were experienced during treatment.

Despite the success of these studies, the research is lacking in a couple of ways. First, different cancers require different types of treatment that may be more or less invasive, which affects the amount of pain and anxiety a child may experience. Secondly, the articles disproportionally represented some techniques more than others. The less studied techniques may actually be more beneficial, but because they haven’t been studied are seen as less effective. Furthermore, Bearison and Mulhern (1994) documented that children of different ages groups experience pain differently. This review compiled all age groups together.

Conclusion

In order to understand how best to treat pediatric oncology patient’s pain and anxiety related to LPs, BMAs, and needle puncture procedures, it was necessary to
conduct a study that explored a variety of ways to alleviate symptoms. Treatment options included hypnosis, music, massage therapy, VR, and integrative therapy. Although all techniques showed promising results, integrative therapy proved to be the most effective way to treat pain and anxiety associated with medical procedures. Researchers placed an emphasis on creating a treatment plan before the actual procedure as once a behavior has been learned (i.e. fear of a room, or location) it cannot be unlearned.
References


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