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*UTILIZING DISTRACTION
STRATEGIES TO RELIEVE PAIN
AND DISTRESS IN CHILDREN
UNDERGOING MEDICAL
PROCEDURES*

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Selwyn Mason

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ABSTRACT

Attention diversion or distraction is a strategy which has been shown to be effective and safe in the control of pain and distress. The purpose of the present study was to assess the utility of distraction in reducing children's pain and distress during medical procedures. The study was divided into two experiments. The first experiment involved eight oncology patients ranging in age from 2.5 to 4.5 years. Three conditions, baseline, brief film, short story, were delivered in a randomized counterbalanced sequence. The second experiment involved three oncology patients ranging in age from 6.5 to eleven years. A single case design was used to assess the efficacy of video games as distractors during painful medical procedures. The dependent measures for both experiments included observer ratings of behavioural distress scored on the Observational Scale of Behavioural Distress (*OSBD*) as well as overall ratings of behavioural distress and self reported pain ratings from the children in experiment two. Results showed that in experiment one both distractors were attended to. Statistically significant reductions in observed distress were found with the short story condition. In experiment two the video game produced high levels of attention diversion which had an observable effect on behaviour. The results are discussed in relation to the sensitivity of the measures and the reason for the efficacy of the short story in experiment one.

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OVERVIEW

"Disease can destroy the body but pain can destroy the soul."

(Lission, 1987, p. 649).

Annually approximately 120 children aged 0-14 are diagnosed with cancer which is the main non accidental cause of childhood death in New Zealand (Macfarlane, 1991). The most common childhood cancers are acute leukaemia (31% of the total), central nervous system tumours (22%), neuroblastoma (7%), lymphomas (6%), and Wilms' tumour (6%), (Dockerty & Elwood, 1991). With improved treatment methods and supportive care there has been a dramatic improvement in outcome for children diagnosed with cancer in the last 20 years. This success is often at the cost of repeated painful medical procedures (Adams, 1990).

Many children with cancer will suffer pain from the disease, from the diagnostic and monitoring procedures, and from treatment (McGrath, et al., 1990). The recent interest in childhood pain has stemmed in part from inadequacies in the management of pain resulting from treatment and diagnostic procedures. It seems with our preoccupation with survival and improved outcome, little attention has been paid to pain and its control (Fletcher, 1988) and consequently analgesia and anaesthetic agents maybe withheld (Elliott and Jay, 1987; McGrath et al., 1990).

Procedure associated pain is a fact of life for children with particular medical conditions such as burns, cancer, or children who are insulin dependent. For most children the pain, distress, and fear associated with repeated procedures does not diminish with increased exposure, and habituation does not occur (Katz, Kellerman and Siegel, 1980). That is, past experience with procedures does not decrease the discomfort of subsequent ones.

Medical procedures that are painful can have a traumatic impact on the child, parents and medical staff. As a result health professionals today are becoming increasingly concerned about the relief of pain and distress associated with invasive medical procedures. Reduction of pain and distress is considered a key element in providing a child with a better quality of life. The present study investigates the use of distraction (diverting the child's attention from his or her present discomfort) to alleviate pain and distress in children undergoing medical procedures.

CHAPTER ONE

PAIN

The word pain is derived from the greek word "poine" meaning punishment or penalty. In the past pain was often thought to occur as a consequence of wrongdoing by the sufferer. The International Association for the Study of Pain, Subcommittee on Taxonomy in 1979 defined pain as;

"an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage"

(p. 250).

Pain in these terms is not simply somatic or nociceptive but a complex psychophysiological event involving nociception, pain perception, and pain expression. Conceptually, the definition accepts the notion that pain consists of sensory, behavioural and emotional components. Pain is viewed as being a subjective psychological state and as an unpleasant experience. The current definitions of pain generally consider two components, the physiological message acting as a warning of tissue damage which is the pain sensation, and the perception or experience of pain, that is, how much suffering the sensation engenders.

Theoretical Concepts of Pain

Historically, there have been many theories of pain. Prior to 1965 the two main approaches were the specificity and pattern theories. The traditional specificity theory of pain proposed that pain is a specific sensation and that the intensity of pain is proportional to the extent of tissue damage. The theory implies a fixed direct transmission from pain receptors to a pain centre. The pattern theory opposes the notion that pain has its own set of specialized receptors. This theory suggests that pain perception is based on a summation of a pattern of input. More recent psychological

and neurological data discredits the concept of a single straight through "pain pathway". This traditional concept implies that human pain perception is determined only by the quality and extent of tissue damage. However, both theories have been criticised for their failure to account for pain for which no noxious input can be specified, notably phantom limb pain.

Our understanding of how pain is experienced has changed dramatically since the gate control theory postulated by Melzack and Wall in 1965. We now know that the signals from a noxious stimulus can be modified by environmental and psychological variables. Pain can also occur in the absence of tissue damage and therefore not be synonymous with activity in nociceptive pathways or with nociceptive stimulation (Weisenberg, Aviram, Wolf, & Raphaeli, 1984). Therefore, pain is a psychological experience based on actual human perception, whereas nociception is the activity in the neuron system that may lead to pain (McGrath, 1990a). As many variables can alter the final perception of pain, the nociceptive system is regarded as plastic and complex (McGrath & Hillier, 1989).

With the plasticity of the nociceptive system, pain produced by a relatively constant stimulus can be different for each individual. The intensity of pain sensations is not exclusively related to the extent of tissue damage, neuronal activity and pain suppressing systems. Some of the components that affect nociceptive processing are; age of the individual, use of coping strategies, site of injury, analgesic usage, and a variety of environmental and internal factors (McGrath, 1990a). Psychological data lends strong support to the concept of pain as a complex perceptual and affective experience determined by the unique history of the individual, the meaning of the stimulus to this person and their "state of mind" at the time (Jeans & Melzack, 1992).

Gate Control Theory

Gate control theory was developed to explain the variable relationship of pain to the stimulus that produced it. The basic assumption of the gate control theory is that there is, within the substantia gelatinosa of the dorsal horns, a neural mechanism which acts as a pain gate. In principle, Melzack and Wall said that the information resulting from

a painful stimulus is altered in its passage from the peripheral nerves to the spinal cord. This is achieved in the substantia gelatinosa (SG) in the spinal cord where the impulses from the large (L) and small (S) diameter peripheral nerve fibres which are activated by painful and other stimuli alter the flow of impulses through transmission cells (T) to the central nervous system.

Melzack and Wall (1965) proposed two methods by which modification of pain information might occur. The first is through inhibition of pain transmission by the stimulation of low threshold afferents that carry benign information. Secondly, pain information can be modified through the facilitation or inhibition of pain messages by descending channels in the central nervous system (CNS). Sensory input produced by such methods as distraction, imagery and relaxation, can inhibit the pain signals theoretically "closing" the gate to the central nervous system (Tyrer, 1992). Thus psychological interventions produce inputs that inhibit or decrease the pain signals to the central nervous system and modulate the perception of pain at higher levels.

Acute and Chronic Pain

Recently there has been interest in classifying the diversities of pain into meaningful categories to facilitate communication, understanding and therapeutic intervention (Ross & Ross, 1988). We commonly refer to pain experiences as acute or chronic. Acute pains include those caused by tissue damaging stimuli such as trauma, burns and diseases such as sickle cell crises or cancer (Goldman & Lloyd-Thomas, 1991). Acute pain is seen as emanating directly from discrete, time-limited nociceptive stimulus events (Jay, Elliott, & Varni, 1986). McGrath and Hillier, (1989) describe three types of acute pain in children: (1) a relatively brief, mild to moderate pain from common diseases, routine injuries, and typical health treatments; (2) a more prolonged, moderate to strong pain caused by major disease, accidental trauma, invasive treatments and surgery, and (3) varying mild to strong pain caused by repeated invasive procedures.

Chronic pain is defined as pain that persists beyond the period usually required for healing or pain persisting without obvious physical damage. Chronic pain often fails to respond to treatment and may lead to changes in the individual creating "abnormal illness behaviour" (Pilowsky, 1969). Sleep and appetite disturbances, decreased physical and social activity are some of the symptoms associated with chronic pain. Chronic pain occurs in many individuals and is possibly a result of unsuccessful pain management and disease control. Chronic pain may also develop as a consequence of psychological factors, such as anxiety and depression (McGrath & Hillier, 1989).

CHAPTER TWO

PAIN AND DISTRESS IN CHILDREN WITH CANCER

Developmental Aspects of Pain in Children

Children's ability to comprehend the causes and processes of their disease and its associated pain is partially dependent on their general cognitive development. Much research in this area has been tightly tied to developmental theory (McGrath & Craig, 1989). Generally children in earlier stages of cognitive development differ from more mature children. For example, younger children often believe that they deserve their pain as a form of punishment for something they did wrong (Rice, 1989), with increasing age children's understanding of pain changes.

Early research by Katz et al., (1980) found evidence to support developmental components in pain perception and experience. The authors found that essential change occurred in the intermediate group (6 years 6 months to 9 years 11 months). At approximately 7 years of age overt motoric distress decreased, which corresponds to the onset of preoperational thinking according to Piaget's theory. At this stage in development the child is able to think more logically as to why events occur. Therefore, the child is able to understand the reasons behind invasive procedures. It is perhaps this knowledge that alleviates the child's anxieties producing less overt distress.

Gaffney and Dunne (1986) examined children's definitions of pain in answer to the open ended statement "*Pain is ...*", to clarify children's ability to understand pain. The authors concluded that children's concepts of pain corresponded to their cognitive developmental stage. From ages five, six, and seven, (pre-operational stage) there is a tendency for the child to focus on perceptually dominant features, that is, "*Pain is ..in your tummy it hurts you*" (p. 111). During this stage the child is said to lack the

understanding of the relationship between pain and illness. With the development of concrete operations (ages eight, nine, and ten) children's view of pain is basic in definition but more abstract, "*Pain is ... a sore feeling ... in part of the body*" (p. 114). The child is able to use analogies to describe pain with psychological content "*Pain is ... something that hurts you, you feel miserable and unhappy and you start crying with pain*" (p. 114). Children aged eleven, twelve, thirteen and fourteen, thought to be capable of formal speculation and having the capacity for introspection refer to pain in both physiological and psychological terms. "*Pain is ... something that can either be physical or mental, a mental pain is much worse because you can relieve a physical one*" (p. 112).

It is essential that children who do not understand the word *pain* are provided with the opportunity to clarify their understanding.

"... a 5-year-old boy seemed unable to respond to the question 'What is Pain?'. When prompted by 'Imagine that you have a friend who has never felt pain; how would you tell him what it was like?'. He thought for a moment and then quickly and eagerly responded, 'I'd kick him in the leg'."

(McGrath & Hillier, 1989, p. 8).

Research that relates children's understanding of pain to their developmental level helps establish the conviction that young children understand and experience pain. In addition, this research weakens the presumptions that infants do not experience pain and children experience less pain than adults.

Children's Pain and Distress

The majority of acute pains are caused by frequently performed procedures; venipunctures, bone marrow aspirations, and lumbar punctures (Manne & Anderson, 1991). Medical procedures which cause acute pain often heighten a child's anxiety, "*anxiety may directly affect both physiological parameters and the interpretation of sensory information either of which can influence and exacerbate pain perception*" (Turk and Fernandez, 1990, p. 7). The relationship between pain and anxiety is reciprocal

(Davis, Vasterling, Bransfield and Burish, 1987). That is to say, the occurrence of psychological distress may influence the child's perception of pain, while the occurrence of pain may contribute to the child's psychological distress. In children, anxiety produced in anticipation of a procedure, or, distress during a procedure is clearly intertwined with perceived pain. Both variables have been combined into a single construct "*behavioural distress*" (Katz et al., 1980).

A child's cognitive-developmental level is also considered to have a significant effect on their behavioural response to painful stimuli. Katz et al., (1980) examined the developmental aspects of behavioural distress in children undergoing painful medical procedures. The total sample population of 115 children was divided into three distinct age groups. The authors found that children in the youngest age group (i.e., range 8 months to 6 years - 4 months) exhibited a wider range of behavioural distress across all phases of the procedure than older children. These children exhibited distress over the longest period of time. They were most likely to express their fear and pain by screaming, crying, verbalizing their pain and needing physical restraint. The oldest group of children (i.e., range 10 years to 17 years - 9 months) in comparison to the youngest group displayed the least behavioural distress. The behavioural distress exhibited was confined to the actual Bone Marrow Aspiration procedure and consisted of verbalizations of pain as well as muscular rigidity.

LeBaron and Zeltzer (1984) studied 50 cancer patients ranging from 6 to 18 years of age. This study used a checklist of distress behaviours and compared this scale to patient and observer ratings. The study confirms similar findings in that the observed behavioural distress during bone marrow aspirations declined significantly with age of the child. However, unlike the Katz et al's., (1980) observation system, LeBaron and Zeltzer (1984) also included categories in the Procedure Behaviour Checklist for flinching and groaning both of which occurred significantly more often for adolescents than children.

Both findings agree with the opinion of Lavigne, Schulein, and Hahn (1986) that in general emotional outbursts associated with pain decline with age, whereas muscular

rigidity increases with age. However, behavioural distress may not be an accurate indicator of the pain a child experiences. Although an older child may display less overall behavioural manifestations of pain none the less this does not mean they are not experiencing pain. What may be happening with an increase in age is an increase in the use of coping strategies not just decrease in pain (Routh & Sanfilippo, 1991). Alternatively, there may be an increase in stoicism.

In addition to a child's cognitive developmental level, there are a vast array of situational, behavioural and emotional factors that can affect an individual's pain response and perceptions (McGrath, 1990b). For example, prolonged distress associated with medical procedures, living with the disease, side effects of treatment, disrupted living patterns, hospitalisation, and parental presence during a procedure modify children's pain and distress levels.

For children with cancer, experienced pain may come from a variety of sources. The five main sources consist of, cancer related (e.g., bone metastasis), therapy related (e.g., mucositis), debilitation (e.g., bed sores, infection), procedure-related (e.g., lumbar puncture), and incidental (e.g., unrelated medical condition), (Miser, 1990). In the present study, procedure-related pain is of interest.

Procedure-related Pain and Distress

For many children with cancer, the repeated pain from procedures is the most distressing part of their disease (Schechter, 1990). Procedure-related pain is associated with injections and other invasive medical procedures such as bone marrow aspirations and lumbar punctures (Jay et al., 1986).

A child diagnosed with cancer may frequently experience intramuscular injections, lumbar punctures, finger pricks and bone marrow aspirations as a part of treatment or monitoring procedures. Procedures such as venous blood sampling are acknowledged to be particularly frightening and painful (Fassler, 1985). Injections remain the most common painful and distressing medical procedure experienced. Children typically come to fear needles and may become overly distressed when needle access is

mentioned prior to the procedure. The child's distress is further escalated when there are complications during the procedure. With heightened behavioural distress comes the increasing chance of accidental injury, conditioned fear of the procedure, less compliance to future medical procedures, and as Schechter et al., (1990) found, a greater tolerance to the analgesic effects of pharmacologic agents.

With aggressive treatment programmes many cancer treatment centres use devices known as Hickman catheters or Port-A-Cath systems (see Appendix F). The external Hickman catheter is inserted under the skin of the chest and attached to a main vein. When injections are required they can be administered into the Hickman line rather than the child's arm. The Port-A-Cath is a drug delivery device which is implanted under the child's skin and is noticeable by a small bump. As the Port-A-Cath system is implanted completely under the skin no parts protrude. Both devices can be left in place for long periods of time. They are maintained by flushing with a solution of heparinised saline to keep the lines clear of blood clots and prevent infection. Children are able to carry out almost all of their activities without risk of infection or damage to the devices. The Port-A-Cath is accessed with a needle inserted through the skin into the portal chamber. There are few reports of pain and anxiety associated with this procedure (Borst, de Kruif, van Dam, de Graaf, 1992).

Children with cancer usually describe lumbar punctures and bone marrow aspirations as the most painful procedures they have experienced (Jay, Elliott, Ozolins, Olson, & Pruitt, 1985). Zeltzer and LeBaron (1982) asked thirty three children aged between 6-17 years of age to rate on a visual analogue scale (VAS) the amount of pain and anxiety associated with these procedures (1=no pain to 5=most pain imaginable). The mean rating for pain during lumbar punctures was 3.75, and for bone marrow procedures 4.51. The anxiety rating during bone marrow aspirations was 4.20, and during lumbar punctures 3.75. Consistent with other research in this area, children find these procedures very distressing and painful. However, in many paediatric oncology settings, these procedures are performed without analgesia due to the child's vulnerable physical condition and short duration of the procedure (Adams, 1990).

Fradet, McGrath, Kay, Adams, and Luke (1990) examined the distress exhibited by 177 children between the ages of 3-7 years during venipuncture and finger pricks. The Children's Hospital of Eastern Ontario Pain Scale (CHEOPS) was used to measure the behavioural distress during venipuncture procedures. After the blood test the nurse and parent were asked to indicate how much pain the child had on a visual analogue scale. The children were also asked to report the pain experienced on an 'ouch' scale. The observations indicated that the children exhibited significantly more distress from the actual needle puncture in comparison with anticipatory distress to the procedure.

Blount, Sturges and Powers (1990) study of child coping and distress behaviours indicated that there were phase-specific patterns in the levels and types of child distress. Not surprisingly distress varied as a function of the phase of the medical procedure, increasing at the beginning of the Bone Marrow Aspiration and decreasing as the procedure was completed. Specifically the children exhibited apprehensive distress during the non painful phases while demonstrative distress was greater during the procedure.

At some stage during their cancer treatment children will become distressed in response to a medical procedure they must experience. The intensity of this distress will be dependent on a variety of variables such as age, diagnosis, physical wellbeing, child temperament, procedure-related pain, the child's understanding of and experience with previous medical procedures, and level of anticipatory distress. Factors not directly related to the child such as duration and invasiveness of the procedure, and technical skill of medical personnel, are also said to influence the child's behaviour during the procedure (Zeltzer, Jay & Fisher, 1989).

Treatment-related Pain and Distress

When a child is diagnosed with cancer in the paediatric setting three main therapies are considered for treatment of their disease: surgery, radiation therapy, and chemotherapy. The proportion of each modality used in actual treatment is dependent on the type of cancer the child has, the extent to which it has spread, the age and physical condition of the child and other considerations such as treatment goals and consequences of a

particular therapy. Pain is categorized as treatment-related when it results from a side effect of anticancer therapy, i.e., surgery, chemotherapy, or irradiation, (Elliott et al., 1991).

Radiotherapy is designed to kill cells while respecting the underlying healthy structures. There are two distinct therapeutic approaches in the use of irradiation. The first is a curative approach which is concerned with complete eradication of the cancer. In contrast to this radical approach is the palliative approach to cancer. This consists of therapy aimed at the relief of cancer-pain (Roberts, 1982). Side effects common to radiotherapy such as skin burns, nausea, vomiting and diarrhea (Rosenbaum, 1975) are often associated with pain in children with cancer.

Often a large part of a child's treatment regime for cancer is chemotherapy. One in four patients experience nausea and vomiting in anticipation of chemotherapy treatment (Morrow & Morrell, 1982; Morrow, Lindke & Black, 1991). Although anticipatory nausea and vomiting is not a significant clinical problem for a large number of patients receiving chemotherapy (Stefanek, Sheidler & Fetting, 1988) when anticipatory nausea and vomiting does occur in patients they produce considerable concern. Pretreatment nausea and vomiting not only increase the aversiveness of the chemotherapeutic experience but add to heightened anxiety and physiological arousal (Ahles, et al., 1984). In particular, adolescents in comparison to young children are found to have higher distress levels both pre and post chemotherapy (Dolgin, Katz, Zeltzer, & Landsverk 1989).

The degree of pain experienced during chemotherapy treatment varies depending on the type of chemotherapeutic drugs used and the protocol followed. Chemotherapeutic agents alone or in combination with other medications can produce headache and facial pain, jaw pain or jaw claudication as seen in vincristine therapy (Kanner, 1988). Other

side effects common to cytotoxic drug usage are, nausea and vomiting, skin irritations, dry retching, and sore throat. These side effects are also known to cause or exacerbate distress and pain in children. It has not been established whether cytotoxic drugs, after systematic administration, have analgesic properties independent of their anticancer effect (MacDonald, 1990).

A common distressing symptom seen in children is constipation. This symptom is caused by a number of factors (e.g. chemotherapeutic agents) but is most commonly an adverse effect of opioid analgesics. Analgesics are known to act on the gastrointestinal tract and spinal cord, decreasing intestinal secretions creating dry stool and constipation (Inturrisi, 1990). Other than causing pain in some cancer patients constipation can exacerbate anorexia, nausea and vomiting (Twycross, 1990).

Pain attributable to surgery varies according to the particular operation. One problem in dealing with pain in an area that has been subject to surgical intervention is deciding whether the pain is a result of the surgery or related to the cancer (Kanner, 1988). Various other pain problems can affect the child after surgery including postoperative infection, surgical complications, and phantom sensations.

Miser, Dothage, Wesley, and Miser (1987) examined the prevalence and nature of pain in a population of children and young adults having treatment for cancer. The authors found that the predominant cause of pain in both the in-patient and out-patient populations was treatment-related rather than tumour related. Although the source of pain occurring as a result of either disease, treatment or diagnostics was reported, the severity of pain from the different sources was not. The population sample was drawn from the National Cancer Institute, a sample not typical of all agencies. However, one might speculate that institutions that follow aggressive protocols are likely to have a higher prevalence of therapy-related pain.

Malignancy-related Pain and Distress

Children with cancer generally do not experience the same chronic debilitating pain as adults with cancer, presumably because of the different types of cancer (Jay, et al.,

1986; Kellerman & Varni, 1982) that are less invasive. Nevertheless, children with cancer do suffer pain from the disease.

Miser, McCalla, Dothage, Wesley and Miser, (1987) surveyed the incidence and nature of pain in 92 young children and adults. At the time of assessment almost two thirds of the patients experienced pain as a symptom of the cancer. McGrath et al., (1990) reported that moderate to severe pain for children aged 2-19 years was 37% from disease, 41% from chemotherapy, 78% from bone marrow aspirations and 61% from lumbar punctures. Although pain is attributable to malignancy prior to treatment, it is not as prevalent as pain from treatment or diagnostic procedures.

Parental Involvement

When considering the issue of children's pain and distress one must consider the parent, that is, the nature of the parent's relationship with the child, and the parent's ability to enhance or interfere with their child's ability to cope (Zeltzer, et al., 1989). To examine the effect of parental presence on child distress a typical manipulation is to include or exclude the parent in the treatment or pretreatment environment (Gross, Stern, Levin, Dale, & Wojnilower, 1983; Shaw & Routh, 1982). Results have been equivocal as to whether a parent's presence in the treatment room exacerbates or reduces children's distress.

Shaw and Routh (1982) assessed the effects of mothers' presence or absence during routine immunizations on the pain behaviour of 18-month old and 5-year old children. Children in both groups exhibited significantly more negative behaviour, e.g., cried and fussed longer when their mother was present than when she was absent. The authors interpret these findings as indicating that younger children are more likely to express their feelings when their mother is present.

Gross et al., (1983) studied children's response to blood drawing in the presence and absence of their mothers. They found that more fear was expressed immediately before the procedure if the mother was there. The children accompanied by their mothers cried more than unaccompanied children just prior to venipuncture.

Manne et al., (1992) examined adult and child interaction during a venipuncture procedure. From a video recording of the procedure they obtained evidence of adult behaviours that had a negative impact on child distress. However, this result was dependent on the child's level of upset during the anticipatory phase of the procedure. The authors also found that the only adult behaviour that had a beneficial effect on both the child's coping and distress was distraction. The adult use of distraction ("*look at the drawing*", "*look at mummy*", p. 242) resulted in both an increase in the likelihood of child coping behaviour and a reduction in child distress behaviours.

Blount et al., (1989) examined what serves to increase or decrease child distress and coping through continuous coding of child and adult interactions during Bone Marrow Aspirations (BMA's) and Lumbar Punctures (LP's). The transcriptions of audio tape interactions between the parents, children, and health professionals were coded together using the Child-Adult Medical Procedure Interaction Scale (CAMPIS). This scale allowed for categorization of the subject, speaker, phases of the medical procedure, and adult/child vocal content. They found that reassuring comments, apologies, statements giving the control to the child, or criticism tended to precede the child's distress. However, particular adult commands to the child, humour directed toward the child, nonprocedure talk to the child preceded and followed coping by the child.

Blount et al., (1990) examined children's pain and distress behaviours as well as coping efforts during Bone Marrow Aspiration's (BMA's) and Lumbar Punctures (LP's). They found that adult distress promoting behaviours were significantly correlated with the amount of child distress during the anticipatory phases of the procedure. In addition, the authors found that adult nonprocedural talk and humour facilitated the child's ability to distract themselves during the anticipatory phases of the procedure.

Jacobsen et al., (1990) examined the relationship of individual parent behaviours to child distress across phases of a venipuncture procedure. Several factors influenced overall distress. These include the child's age, venous access, and parent expectations of cooperativeness. For example, younger children who were rated as poorly cooperative and experienced poor venous access, exhibited greater distress than older

children. The results suggest that timing of the explanation is crucial to how the child will cope during the treatment. For example, explanations are only beneficial if they are provided before the procedure. It is possible that the explanation during the procedure disrupts the child's successful coping efforts resulting in heightened distress.

An all too common incident in the paediatric setting is the child who has been reassured and relaxed by medical personnel only to have this calm disrupted by the parents presence (Ross and Ross, 1988). This may be in part due to a child's attempt to elicit support and emotional comfort from a caregiver or transmission of parental anxiety to the child through nonverbal means during the event (Melamed, Siegel, & Ridley-Johnson, 1988). The parent may initially be reassuring but in the face of the child's treatment may flinch, cringe, or gasp, and have a negative effect on the child (Ross & Ross, 1988).

In a critical review of empirical research in the area of children's coping and distress, Blount, Davis, Powers and Roberts (1991) concluded that people in the children's environment, particularly parents, do influence children's display of coping and distress during acute painful events. They do this through the display of specific behaviours (i.e., their own level of fear and anxiety) which serve as cues for children's behaviour.

On the other hand, parents are often able to help their child cope more comfortably with medical procedures. The parent can be used by their child as a protective buffer between them and the medical personnel. The child is also able to view the parent as having some sort of control over the medical event even if they do not. Research by Ross and Ross (1984) found that almost all children prefer to have a parent present during medical procedures, even though they cannot specify what the parents could do that would help. Parental absence during a medical procedure seems inconsistent with the knowledge that children need their parents most during times of stress.

CHAPTER THREE

MANAGEMENT OF PAIN AND DISTRESS IN CHILDREN WITH CANCER

Evidence has begun to accumulate documenting past and current inadequacies in the management of children's pain. Much of the problem stems from the withholding of available analgesic and anaesthetic agents (McGrath, 1991; Schechter, 1989; & Schechter, 1990).

"The doctor and the nurse were having a disagreement. The nurse had requested a prescription for pain for a young patient. The doctor objected, stating firmly that the child 'shouldn't be having pain.' The nurse countered by saying that she had been at the child's bedside a good part of the night, and the way he acted indicated the he definitely was in pain"

(Kavanaugh, O'Connor, & Codden, 1984, p.1).

This is the case not only for disease and injury pain but also the pain from intrusive medical procedures. Much of the study in the field of adequate pain control in children is based on children's reports of pain and the analgesics that are or are not administered (Johnston, Abbott, Gray-Donald & Jeans, 1992). Although the literature is limited and individual studies may be methodologically flawed, this body of research clearly suggests that children who experience pain do so because of inadequate analgesic treatment (Elliott & Jay, 1987; McGrath et al., 1990; Elliott et al., 1991). Studies which have focused on the undertreatment of pain in children have documented the marked discrepancies in analgesic administration between children and adults.

Beyer, DeGood, Ashley, and Russell (1983) compared the post operative prescriptions and administrations after cardiac surgery for 50 adults and 50 children. They found that

children were prescribed significantly fewer opioids. They received only 30% of all the analgesics that were prescribed compared to adults who received 70%. Schechter, Allen and Hanson (1986) found that adults with the same pathophysiologic problems are treated differently than children with regards to narcotic administration.

Miser, McCalla, et al., (1987) assessed the incidence and nature of pain in 92 children and young adults presenting with newly diagnosed malignancy over a 26 month period. They found that pain due to malignancy continues to be a significant problem. A large number of patients who experienced pain were receiving no analgesia or inadequately prescribed analgesics.

Sedatives and cardiac cocktails are often administered to children prior to less invasive medical treatments. However, Hockenberry and Bologna-Vaughan (1985) surveyed institutions associated with the paediatric oncology group and found that 20% never used premedication for children undergoing bone marrow aspirations, and 34% of the respondents never used premedication for lumbar punctures.

McGrath et al., (1990) found that many children in their study suffered pain from the disease and its treatment in addition to associated diagnostic and monitoring procedures. Although available to children in the clinic, analgesics were not widely used.

It seems that if children are not routinely and systematically asked about their pain then analgesics are not administered. This occurs for a number of reasons. Firstly children will often withdraw rather than cry or ask for medication (Rice, 1989). Secondly, children's fear of needles may inhibit their request for medication (Jay et al., 1986). Also, children do not often complain about pain or communicate that they are in pain. In addition to these factors medical personnel and societal attitudes to pain affect the efficacy of pain management in children.

Myths and Incorrect Assumptions

Schechter (1989) suggests that poor pain management in children has arisen as a result of incorrect assumptions about pain and its management, personal and societal attitudes

about pain, and inadequacies in research and training. Without question, the major myth regarding childhood pain is that, 'children because of neurological immaturity do not experience pain'. This belief was largely based on the assumption that complete myelinization of the nerve fibres must occur for pain perception. However, it appears myelinization is not necessary for pain transmission (Eland, 1985).

Anand, Phil and Hickey (1987) cite a number of studies demonstrating that the anatomical, functional and neurochemical systems are sufficiently well developed at birth to permit pain perception. There is also evidence of cardiorespiratory, hormonal and behavioural responses in the infant that indicate pain is experienced. It is clear that children have in place the neurologic mechanisms to experience pain and in fact, because of the smaller surface area per nociceptor, may experience more pain than adults for a given stimulus.

The attitudes and misconceptions about the intensity of the pain experience, (Dugan, 1984) fear of inducing psychological dependence on narcotics, the lack of treatment guidelines for children, the inadequacy of pain management assessment tools (Miser, McCalla, et al., 1987) as well as distorted perceptions regarding the nature of childhood pain have created and maintained the failure to respond to children's pain. The recognition of inadequate pain management in children has in part stimulated research that explores coping responses children make. The following section reviews the literature on children coping with cancer.

COPING IN CHILDREN WITH CANCER

Children play a significant role in the management of their own pain and distress. A number of investigations have measured children's characteristic methods of coping prior to and during treatment (LaMontagne, 1987). This section focuses on children's repertoires of coping strategies and how they are used to manage procedure-related distress.

"The challenge for every cancer patient is to cope with disease symptoms and aggressive treatments such as, surgery, radiation therapy, and chemotherapy, while tolerating the frustration of personal and interpersonal needs and aspirations. Living with significant pain for a long period of time makes this challenge harder."

(Fishman, 1990, p. 304).

Coping has been defined by Holmes and Stevenson (1990) as *"cognitive or behavioural responses that individuals use to lessen the impact of stressful life events, such as pain"*. (p. 577). It is suggested that behaviours do not have to be classified as adaptive to be considered coping strategies (Broome, Bates, Lillis & McGahee, 1990). Children adjust their coping behaviours according to the changing demands associated with the different phases of the medical procedure. Behaviours such as crying, screaming, fighting, kicking and biting prior to a medical procedure are often a form of reactive coping with the fears generated by the impending medical procedure.

Coping and Control

Control is defined as the belief that an individual has at their command a response that can influence tolerance to an aversive event (Thompson, 1981). Control techniques can be categorized into three main groups, behavioural control, cognitive control and decisional control. The essential element in decisional control is the belief the child has a choice in the pain situation. Cognitive control is the *"belief that one has a cognitive strategy available that can affect the aversiveness of an event"* (Thompson, 1981, p. 90). Behavioural control is defined as a *"behavioural response available that can affect the aversiveness of an event"* (Thompson, 1981, p. 90). It is alleged that when people believe they have control in a demanding situation, they do not perceive themselves as completely vulnerable and therefore not as threatened as they might be without the perception of control (Fishman, 1990).

In Manne et al., (1992) observations of adult-child interaction during venipuncture found that giving control to the child took the form of decisional control (e.g., *"Which*

hand do you want me to look at first ?" or "Do you want a board to rest your arm on ?"). Although giving control to the child in this study did not increase the chance of the child engaging in coping behaviour, it did result in a reduction in crying during all three phases of the procedure. In a contradictory finding, Blount et al., (1989) found that giving control to the child increased child distress. However, the control offered to the child in this study was in a behavioral form (e.g., *"Tell me when you are ready"*), rather than in a decisional form.

Worchel, Copeland and Barker (1987) examined the use of control related coping strategies in 52 paediatric oncology children. The coping strategies were defined as informational, cognitive, decisional, and behavioural techniques utilized to decrease anxiety associated with the cancer experience. Children and adolescents completed a control questionnaire regarding their perceptions of and strategies for gaining control. Emotional adjustment was assessed utilising a Children's Depression Index, a Somatic Complaints Scale, a Child Behaviour Checklist completed by the parent and a Nurse's Rating Form completed by the child's clinic nurse. Analyses suggested that behavioural control was the best predictor of a child's emotional adjustment. Overall the authors suggest that it appears adolescents utilize more cognitive control than young children and more decisional control with regard to nonmedical events.

Enhancement of Coping

A commonly utilised technique in the paediatric setting aimed at enhancing coping is "verbally informing" the child in a positive manner about the impending procedure and answering any questions the child may have. Preparatory information is the most utilized intervention for paediatric patients undergoing medical and surgical procedures (Jay et al., 1986). Preparatory information is characterized by its sensory and procedural data. The sensory information provides the child with a description of the sensations to expect, such as noises, smells and physical feelings, whereas procedural information involves providing information about the steps of the procedure (Zeltzer,

et al., 1989). Preparation programmes have been successful in altering children's pain perceptions (Mansson, Bjorkhem & Wiebe 1993), experienced pain during blood sampling (Harrison, 1991) and have also been found to enhance children's judgements of their capability to cope with injections (Ross and Ross, 1985).

Children's Spontaneous Coping Mechanisms

The research examining spontaneous strategies for coping with pain is limited. A study by Branson, McGrath, Craig, Rubin, and Vair (1990) evaluated the effectiveness of children's spontaneous strategies for coping with postoperative pain. In an interview the investigators asked adolescents about the thoughts and behaviours they used to reduce postoperative pain. The coping strategies adolescents reported using to cope with pain were coded into 13 subtypes of behavioural and cognitive coping (e.g., external and internal attention diversion, calming self talk, thought stopping, cognitive reappraisal, etc). Although the sample was small, in all but one case adolescents had a repertoire of behavioural and cognitive coping strategies that they perceived to be at least moderately helpful. Furthermore, the adolescents reported primarily learning the strategies through the suggestions of nurses or self discovery.

Coping and Attention Diversion

Children often spontaneously use distraction techniques as strategies to cope with medical stressors. In a two dimensional model of encounter coping Peterson, Harbeck, Chaney, Farmer and Thomas (1990) illustrated five possible coping strategies children use in response to medical procedures. Based empirically on responses that children suggest they use to cope, the model describes how children high on both proactive coping and on stimulus blocking use methods of distraction to distance themselves from threatening stimuli.

Band and Weisz (1988) found that one of the various strategies used by children was thinking happy thoughts to distract themselves from the pain of "getting a shot". The particular distraction style used by a child is dependent on their developmental level and the medical situation.

Ross and Ross (1984) documented some of the internal and external distraction activities used by 93 of the children in their study.

"I made myself stop thinking about it until I said the alphabet backwards 3 times" (Boy, CA 7 at the dentist).

"I counted the tiles on the roof till I couldn't count any higher, then I started over again and did it again" (Girl, CA 6, Having a Shot)" (p. 186).

Research by Blount et al., (1989) found that particular adult behaviours were closely related to a child's coping or distress. Adult commands such as, nonprocedural talk and humour (distracting from the procedure) directed to the child tended to precede and follow coping by the child. The authors concluded that these adult behaviours provide the cues necessary for eliciting and maintaining distraction with the child.

Psychological Interventions

There has been increasing interest in the use of psychological interventions to manage pain and distress in children undergoing medical procedures. This section describes some of the various techniques that have been used with children. The primary objective of the techniques is to modify behaviours of either the child or parent that exacerbate or maintain pain and distress in children.

Manne et al., (1990) used a simple distraction technique with children undergoing venipuncture procedures. The child used a party blower during the intervention while the parent coached their child to blow by counting out loud to the child's blowing pace. Reward stickers were given to the child. The stickers were contingent upon the child's blowing pace and their capacity to hold their arm still during the procedure. The parent and child were taught the intervention technique before the first trial. During the procedure the psychologist aided the parent in coaching the child. Over the next two interventions the psychologist's participation decreased. The findings suggested that

parents could be taught simple and effective strategies to help children through venipuncture. Although the procedures were effective in reducing the children's behavioural distress and lowering parents' anxiety, there was no effect on the degree of self reported pain by the children.

Dahlquist, Gil, Armstrong, Ginsberg, and Jones (1985) conducted a single subject, multiple baseline design with three adolescents aged 11, 12 and 13 years. The children were undergoing cancer chemotherapy treatment. During the treatment each child was coached in cue-controlled muscle relaxation, controlled breathing, pleasant imagery and positive self talk. The children were rewarded for practising relaxation techniques between chemotherapy procedures and for using the positive self talk statements during the procedure. For all three subjects, observed and self reported distress were decreased during the intervention. A 46-68% reduction from baseline levels of observed behavioural distress was found during intervention. Unanticipated positive results were also obtained. Subjects were able to maintain low levels of distress in the absence of live coaching. In addition, one subject increased food intake and a decrease in post chemotherapy nausea was found in two subjects.

Jay et al., (1985) carried out a pilot study using a psychological intervention package to reduce children's distress during bone marrow aspirations and lumbar punctures. The package included five components. The children were taught simple breathing exercises. Emotive imagery was used with the children's favourite super heroes woven into the scenario. Children were reinforced with a trophy. The experimenter explained that the trophy was for children who were brave during the procedure. The child was allowed to play doctor with a doll and carry out the medical procedure (i.e., behavioral rehearsal). A filmed modelling component was used showing the patients a 12 minute film entitled '*Joy gets a bone marrow and spinal tap*', this provided a coping model for the children. The results of the study suggest that the psychological package had a significant effect in reducing children's observed distress by approximately 50% during bone marrow aspirations and lumbar punctures. An additional benefit was that no children required physical restraint although several had a previous history of requiring restraint.

Elliott and Olson (1983) used a multicomponent package (attention distraction, relaxation breathing, emotive imagery and reinforcement) with children undergoing medical treatments of debridement, hydrotherapy and dressing changes. Each child was taught pain and stress management reduction strategies by a psychologist. Although the design of the study does not allow for determination of the effectiveness of specific components within the psychological treatment package the authors found that a reduction in distress was evident. This reduction in distress occurred only when the psychologist was present to coach the child.

Another multicomponent clinical study was conducted by McGrath and de Veber (1986a). The interventions in this study consisted of procedural information, desensitization (i.e., role playing lumbar punctures with a stuffed animal), training distraction (i.e., squeezing the patients hand), imagery techniques, and cognitive instruction for pain sensations. Six weeks prior to a child's next lumbar puncture children were provided with four forty five minute sessions (approximately one a week) consisting of the intervention. They found that children's pain and anxiety decreased significantly when the interventions were employed. These reductions remained at three and six month follow-ups.

Despite psychologic measures to reduce distress and pain, some children will require pharmacologic assistance to help cope with paediatric procedures (Zeltzer et al., 1989). Jay, Elliott, Katz and Siegel (1987) compared the efficacy of a multicomponent package with both cognitive-behavioral, attentional control (Cartoon viewing) and pharmacological therapy (Valium). The cognitive-behavioural package included five components; filmed modelling (i.e., a child watches the use of techniques during a Bone Marrow Aspiration) breathing exercises, positive reinforcement (i.e., receiving a trophy for lying still or doing the breathing exercises) imagery-distraction, teaching the child a pleasant form of imagery that is incompatible to the pain experience (i.e., hero images such as Superwoman or batman) and behavioural rehearsal (i.e., child plays doctor and conducts a Bone Marrow Aspiration on a doll). The results indicated that the cognitive behavioural interventions were slightly more effective than the attentional-control condition in reducing behavioural distress, self reported pain, and physiological arousal during the anticipatory period.

Most of the behavioural approaches to pain management are integrated into multicomponent programmes. The rationale for using multicomponent packages is based on the grounds that offering individuals more than one strategy will maximize the likelihood they will experience some benefit. Several behavioural interventions have shown promise in the prevention and management of conditioned side effects of cancer treatment. Strategies which have shown promise in the control of conditioned nausea and vomiting are progressive muscle relaxation, (Carey & Burish, 1987; Lyles, Burish, Krozely & Oldham, 1982; Lerman et al., 1990) guided imagery (Burish, Carey, Krozely, & Greco, 1987) distraction, (Redd et al., 1987) hypnosis, (Burish & Jenkins, 1992) and systematic desensitization, (Morrow & Morrell, 1982; Morrow et al., 1992).

Physical Interventions

There are a variety of methods available to the paediatrician to pharmacologically manage acute pain in children. In New Zealand EMLA cream (i.e., eutectic mixture of local anaesthetics) is commonly used to reduce the trauma associated with frequently performed treatment-related procedures requiring needle insertion. EMLA cream is administered to the skin site where needle access is to be performed. The topical cream anaesthetizes the area making the procedure less painful or pain free.

Early work by Wahlstedt, Kollberg, Moller, and Uppfeldt (1984) demonstrated the efficacy of EMLA cream in a double blind placebo controlled study of 60 children ages 5-15 years. Children's ratings of pain (none, slight or severe) were significantly lower for the group that had EMLA cream administered. The staff also rated the medical procedure as easier to administer to children in the EMLA cream group.

However, no medical or pharmacological approaches to pain management have been consistently effective in ameliorating pain and distress in children (Jay et al., 1985). This is partly due to the observation that not all children experience the same type of pain (McGrath & de Veber, 1986b).

CHAPTER FOUR

DISTRACTION

Distraction of attention is a technique commonly used by children during invasive medical procedures (Rasco, 1992). The attention-diversion hypothesis assumes that a task of complexity will require utilization of a general purpose information processing system. Due to the limited capacity of this system, the subject's conscious awareness of pain is reduced to the extent that he or she directs attention to alternate internal or external stimuli (Farthing, Venturino, & Brown 1984). The subject is able to actively reduce pain to the maximal possible degree through attention to the distracting stimulus. In the case where a patient is provided with a hypnotic suggestion (*e.g., your arm is numb to pain*) there is an active diversion of consciousness away from pain perception. MaCaul and Malott (1984) reviewed studies that used different distractors which required different demands on attentional capacity. The authors suggested that distracting tasks which were more highly demanding of an individual's limited attentional resources had a higher analgesic potency.

Role of Attention

The gate control theory of pain (Melzack and Wall, 1965) proposes that cognitive activities such as attention and suggestion can influence pain by acting at the earliest levels of sensory transmission. For distraction to reduce pain or distress McCaul and Malott (1984) postulate that one must assume that pain perception is a controlled rather than automatic process, therefore drawing on attentional resources.

"the child who focuses intently on ongoing nociceptive input will generally report more severe discomfort and typically show more upset than the one who is either distracted by competing external events or, of his own volition, is able to focus his attention elsewhere"

(Ross & Ross, 1988, p. 95).

Kahneman's (1973) capacity model of attention assumes there is a general limit on resources available for mental operations. Therefore, a distracting task that requires controlled processing consumes some degree of attentional capacity that would otherwise have been devoted to pain perception. Distractors that are highly demanding should be more potent because they demand more of the limited attentional resources thus having the greatest effect on pain and distress.

Focusing on Auditory Stimulus

Fowler-Kerry and Lander (1987) examined the value of distraction in the management of injection pain with two hundred children ages 4-6 years. The authors found a decrease in pain for those children who listened to music during intramuscular injections. The older children in the study benefitted more from the distraction than the younger ones. The authors suggested that this result was due to the distractors capturing the attention of the older children more than the younger children.

Although using an auditory distractor has advantages, the procedure may also have disadvantages. For example, in a study of children receiving music through headphones during a lumbar puncture, children could not hear the comforting words of parents or staff (Rasco, 1992). This flaw in the procedure illustrates a general concern, that often interventions are employed without regard for a child's current coping mechanisms.

Focusing on Visual Stimulus

Redd and Andrykowski (1982) suggested distraction from the sensory input can mediate the subjective experience of pain or psychological distress. The research in the area of visual distractors has examined the efficacy of video games and cartoons in altering children's pain and distress.

Kelly, Jarvie, Middlebrook, McNeer and Drabman (1984) as part of a multicomponent behavioural treatment approach evaluated the effects of cartoon viewing on burned children's behaviour during their physical therapy sessions. The children exhibited

lower levels of pain with higher levels of cartoon viewing. It is suggested in this case that the cartoon viewing may have functioned to interrupt the pairing of environmental stimuli with pain, therefore decreasing the salience of pain eliciting stimuli.

Similarly, Kolko, and Rickard-Figueroa (1985) demonstrated that by introducing video games during the administration of chemotherapy, self reported and observer recorded posttreatment distress and anticipatory symptoms were lower. The selection of video games was intended to maximize attentional distraction by using a highly salient and continuous stimulus.

McGrath (1990a) reports similar findings when distraction was used to assist several children who were given intravenous chemotherapy. The children were encouraged to play video games. In order to earn points the task required their complete attention for 3-4 hours while the intravenous drug was administered. Weekly high scores were recorded on a large poster in the clinic, along with the times at which they played. The author found that children became less anxious about treatments, vomited less during treatment, and resumed more of their normal activities after treatment, than they did before the introduction of the video games.

Redd et al., (1987) conducted two studies to evaluate a video game based distractor for 26 children undergoing chemotherapy. In the first study, which used a group comparison design, the authors found a significant decrease in the intensity of nausea for those children who employed distraction in comparison to the children who did not. In the subsequent experimental repeated measures reversal design (i.e., no distraction baseline, introduction to distraction, return to no distraction, and return to distraction), the authors found additional evidence for the efficacy of distraction for reducing nausea and anxiety. According to Redd and Colleagues (1987) reductions in anticipatory nausea can be achieved with a distracting task independently of physiological relaxation and anxiety reduction.

Redd et al., (1987) suggested several advantages for an external distractor. The external distractor does not require the patient to master or self administer the techniques in

contrast to other behavioural interventions, and there is no lengthy time required for training in therapist involvement. However, in a critical review of the literature concerning visual distraction Carey and Burish (1988) note several cautions. For example, will repeated use of an external distractor (e.g., video games) reduce the distractor novelty and efficacy over time?. Is it possible to maintain the distraction once this has been withdrawn and the patient is left with his or her own resources?. Can external distractors retain novelty and change over time as internally generated distractors do?.

Focusing on Internal Stimulus

Research that has examined the efficacy of imagery has usually required subjects to focus on images that are pleasant in content. It is theorized from this research that distraction through pleasant imagery will produce better control of pain than neutral imagery. However, there are contradictory findings on the efficacy of imagery (Worthington, 1978).

Broome, Lillis, McGahee and Bates (1992) provided children who were to receive lumbar punctures with additional sensory information. The programme involved imagery relaxation and two different breathing techniques. Reductions in pain were achieved over time. However, the study does not specify which of the interventions aided in reducing self reported pain.

Zeltzer and LeBaron (1982) compared nonhypnotic and hypnotic behavioural techniques for their efficacy in reducing pain and anxiety. Children and adolescents who were to experience lumbar puncture and bone marrow procedures were assigned to either the hypnotic or nonhypnotic group. Patients in the hypnotic group were assisted in becoming increasingly involved in interesting and pleasant images. The patients in the nonhypnotic group were encouraged to engage in focusing on objects in the room, and self control behaviours such as breathing. The results indicated that during bone marrow aspiration's pain was reduced to a large extent by hypnosis and a lesser degree by nonhypnotic techniques. The hypnosis group demonstrated a large reduction in anxiety during lumbar puncture procedures.

The research depicts that the child's ability to concentrate and attend fully to something else besides his/her pain is the essential feature for producing pain relief by distraction. Furthermore, the child's active absorption or concentration may be the key factor for triggering an internal pain suppressing system to block pain (McGrath, 1990a).

CHAPTER FIVE

THE PROPOSED RESEARCH

Children, Pain and Distress.

Medical procedures are encountered by almost all children and are universally regarded as stressful (Peterson, 1990). Prior to and throughout a medical procedure a child may experience an increase in the level of their anxiety. Although there are an infinite number of possible distress-provoking stressors, we can postulate that the salience of the medical setting with its disinfectant smells, doctors, nurses, special chairs as well as the actual stressors; needles for injections, materials for the procedure etc, all aid in heightening a child's anxiety. As the relationship between pain and anxiety is reciprocal (Davis, et. al., 1987) heightened anxiety is likely to influence the child's pain perception. However, from the literature it is possible to conclude that the extent to which these discriminative stimuli are likely to distress the child is dependent on child age, coping abilities, learned experiences, paediatric personnel, parental presence, type of medical procedure, and previous medical experiences.

Assessment of Pain

Those who endeavour to understand the nociceptive experiences of children require reliable and clinically sensitive methods for assessing and quantifying children's pain. Pain assessment in children is a continuing problem, handicapping both the clinical treatment of pain in children as well as research efforts to improve pain control (Schechter, 1990). An ideal assessment of paediatric pain requires a combination of self report, behavioural, cognitive, socioenvironmental, medical and biologic parameters (Varni, 1990).

This study utilises age appropriate assessment procedures such as behavioural observation procedures where raters record children's physical behaviours and their

frequency. Behavioural observation may have value for assessing behavioural distress in the very young child. However, this method of assessment with older children can be unreliable given the fact that older children show less behavioural manifestations of pain but nonetheless experience pain. Given this consideration the study uses a visual analogue scale with the older children. Visual analogue scales are described as one of the best methods of pain assessment (McGrath, 1987).

Children and Distraction

Almost everyone has used distraction at one time or another for pain relief. *"Distraction is a powerful pain relief intervention that children are accustomed to using. Most children already use television, music, or books to focus their attention away from the pain they are experiencing"* (Eland, 1990, p. 880). Distraction can either increase pain tolerance (McCaul & Malott, 1984) or raise the child's perception threshold. By placing pain at the periphery of awareness distraction enables the patient to "tune out" the pain for the time it is used (Edgar, Smith-Hanrahan, 1992, p. 188).

The attentional literature suggests that distractor tasks cause a competition between the child's processing of the pain experience and the processing of the distraction information at the level of the "gate" system in the spinal cord. The ability of an individual to focus attention on something other than the pain experience should not be confused with pain relief. Edgar and Smith-Hanrahan (1992) comment how distraction can be fatiguing and that distraction is most useful for brief periods. Therefore, distraction tasks are most applicable in situations where the medical procedure is brief and related pain is acute in nature. This is possibly why, as Eland (1990) suggests, children experiencing severe pain often cannot be distracted.

The literature indicates the effectiveness of distraction is dependent on age and interaction with distress. While distraction has been effective with a variety of pain it has yet to be used with young children undergoing procedure-related pain. Two experiments were conducted which aimed to investigate the value of distraction in reducing behavioural distress in children. As the experiments involved different age groups three distractors, video games, storytelling and cartoon viewing were chosen for

age appropriateness. The rationale for this study was based on research evidence that has examined distraction in the reduction of pain (Fowler-Kerry & Lander, 1987; Kelly et al., 1984) and distress (Zeltzer & LeBaron, 1982).

The first experiment compared the two distractors, cartoon viewing and story telling against baseline. The expectation was that the active involvement of the child in the short story condition would cause this distractor to be more attention diverting than the cartoon viewing. However, it was anticipated that the cartoon viewing would be better than baseline conditions in reducing behavioural distress. The second experiment used a reversal design to examine the impact of video game playing on the level of behavioural distress. The expectation was that the video game playing is likely to engage much of the child's active attention because of the motor and cognitive activity required which should lessen behavioural distress and have an impact on self reported pain.

CHAPTER SIX

METHOD

Subjects

Eleven children between the ages of 2 and 11 years, undergoing treatment at the Paediatric Oncology ward at Wellington hospital, were approached to participate in this study. Children with cancer were selected because of the necessity for repeated Hickman line or Port-A-Cath accessing (see Appendix F) as part of the standard treatment protocol. The parents were first approached and provided with a thorough explanation of the study and information sheets (see Appendix A). Informed consent was then obtained from each parent allowing their child to participate in the study (see Appendix B). Following this the older children in experiment 2 were then approached for consent (see Appendix C).

Subjects in experiment 1 consisted of eight pre-school children four females and four males ranging in age from 2 years 5 months old to 4 years 6 months old. Six children had implanted Port-A-Cath systems and two of the children had Hickman lines. Five of the children were recent admissions for treatment and three children had secondary cancers requiring further treatment. Diagnoses included, Acute Lymphocytic Leukaemia (*ALL*), Wilms' Tumour (*Wilms'*), Medullablastoma (*Medull*), and Non-Hodgkin's Lymphoma (*NHL*) (see tables 1 & 2).

Table 1. EXPERIMENT ONE SUBJECT DATA

Child	Age*	Gender	Diagnosis	Procedure	Conditions
Case 1	4.6	Male	ALL	Port access	BCA
Case 2	3.2	Female	Wilms'	Hickman access	ACB
Case 3	2.5	Female	Wilms'	Hickman access	CBA
Case 4 _a	3.2	Male	ALL	Port access	ABC
Case 4 _b	3.2	Male	ALL	Intramuscular	BAC
Case 5 _a	3.6	Female	Wilms'	Port access	BAC
Case 5 _b	3.6	Female	Wilms'	Port deaccess	CBA
Case 6	4.0	Male	ALL	Port access	ABC
Case 7	3.10	Female	Wilms'	Port access	CBA
Case 8	3.11	Male	Medull	Port access	CAB

* Children's ages displayed in years and months

Subjects in experiment 2 were three males ranging from 6 years 6 months to eleven years old. One of the children in experiment 2 also participated in a pilot study. All these children had had recent implantation of a Port-A-Cath. Much of their oncology treatment was administered by accessing their Port-A-Cath.

Table 2. EXPERIMENT TWO SUBJECT DATA

Child	Age*	Gender	Diagnosis	Procedure	Conditions
Case 1a	7.5	Male	Wilms'	Port access	(AABBAA)
Case 1b	7.5	Male	Wilms'	Port deaccess	(AABBAA)
Case 2a	11	Male	Medull	Port access	(AABBAA)
Case 2b	11	Male	Medull	Port deaccess	(AABBAA)
Case 3	6.6	Male	NHL	Port access	(AABBCCAA)

* Children's ages displayed in years and months

Setting

Observations took place in the treatment room on the Oncology Ward, and on occasion in the treatment room of the childrens outpatients ward, Wellington hospital.

Equipment

All procedures were video taped using a Panasonic M7 camcorder. The materials included;

- Sega Master System II,
- Master System II games (in order of popularity, Asterix, Thunder Blade, Alex the Kid, Shaker Run,),
- 14" Panasonic Visual Display Unit,
- Assessment tools (e.g., Faces Scale),
- Brief films (Play School, Sesame Street, Baloo the Flying Bear, Dark Wing Duck, Donald Duck, Mr Bean, Lassie, etc) ,
- Musical Golden Books, (The Berenstain Bears Big Rummage Sale, Sergeant Murphy's Busiest Day Ever and Beauty and the Beast).

MEASURES

Assessment Instruments and Procedures

Measures were selected to provide information regarding the effectiveness of behavioral intervention in reducing distress and pain during medical procedures. The children's experiences of behavioural distress and pain were measured by:

- Observational Scale of Behavioural Distress - Revised (OSBD) designed by Jay & Elliott (1986).
- Interobserver rating of child behavioural distress.
- Qualitative Observations.
- FACES pain scale designed by Wong & Baker (1988).

Observational Scale of Behavioural Distress (OSBD)

The Observation Scale of Behavioral Distress was developed by Susan M. Jay and Charles Elliott. Permission to use the scale was obtained.

The OSBD is an interval rating scale which consists of operationally defined behaviours indicative of anxiety and pain in children (see Appendix E). At the end of a timer rated 15 second interval two independent observers noted the occurrence of any operationally defined distress behaviours and if the child was attending to the distractor from beginning to end of each video taped medical procedure. At the conclusion of each procedure an overall weighted distress score and level of distraction was calculated for each child.

Level of Distraction

During the sessions where distraction was used the percentage of time the child attended to the distractor was calculated for each phase of the procedure. The observers noted if the child was attending to the distractor at the end of each of the 15 second intervals in which OSBD ratings occurred.

Interobserver Agreement

Interobserver agreement was computed by the number of agreements between both observers on each of 8 behaviours occurring within each 15-second interval. This was divided by the total number of agreements plus disagreements multiplied by 100. If there was less than 85% interobserver agreement then the video recording was observed again to maintain reliability in assessment.

The medical procedures vary considerably in length between children (or between persons conducting the procedure). This can distort OSBD scores (Jay and Elliott, 1986). To adjust for this an interobserver rating was calculated. Two observers rated the child's overall observed distress on a scale of 0-10, (0 = not at all distressed, 10 = extremely distressed) following the completion of each observed procedure.

Qualitative Observations

Observers noted the occurrence of other behaviours in addition to the quantitative measures used in both experiments.

Wong and Baker Faces Scale

In experiment 2 the children's perceptions of pain were measured using the Wong and Baker Faces Scale. This tool was used to examine the child's self reported pain ratings over time. It consisted of six round faces depicting emotions from very happy (no Pain) to very sad (the worst pain) (see Appendix D).

Prior to any experimental conditions it was explained to each child that each face is for a person who feels happy because s/he has no pain (hurt) or sad because s/he has some or a lot of pain. The following description was given to each child;

"Face 0 is very happy because s/he doesn't hurt at all. Face 1 hurts just a little bit. Face 2 hurts a little more. Face 3 hurts even more. Face 4 hurts a whole lot, but face 5 hurts as much as you can imagine, although you don't have to be crying to feel this bad".

This scale was developed by Wong and Baker and has been extensively used with good reliability and validity.

Immediately after the procedure was carried out, the child was given the scale and asked how s/he felt during the medical procedure. Due to the ages of the children in experiment 1 a self report measure of pain was either unobtainable or unreliable for a majority of the children.

Procedure Phases

The children in this study underwent one or several of four main procedures followed in this study:

- 1) The accessing and deaccessing of a child's Port-A-Cath.
- 2) The accessing of a child's Hickman line.
- 3) Intramuscular injections.
- 4) Lumbar puncture.

Each procedure was divided into two or three specific phases. From this, the phase length and level of distraction achieved for each condition are calculated. The first phase of each medical procedure was the *prep phase*. This was the period of time in which medical materials were readied for the actual procedure. The second phase was the actual procedure e.g., actual needle insertion (*accessing*) or withdrawal (*deaccessing*). Phase three was the concluding phase of the medical procedure.

Port-A-Cath accessing.

Phase 1 began when the child was on the treatment room bed and ended when the nurse began to cleanse the area. Phase 2 began from cleansing and ended when needle access of the Port-A-Cath was completed. Phase 3 began from the completion of Port-A-Cath access and ended when the line was flushed or bloods were taken off, or after four minutes passed.

Port-A-Cath deaccessing.

Phase 1 began when the child was on the treatment room bed and ended when the outer bandage covering the needle was removed and line flush began. Phase 2 began from line flush and ended when the needle was removed from the child's Port-A-Cath. Phase 3 began from needle removal and ended when a sterile bandage was placed over the child's Port-A-Cath site.

Hickman line accessing.

Phase 1 began when the child was positioned ready for the procedure and ended when the bandage around the Hickman line was removed. Phase 2 began at bandage removal and ended when the final flush was given. Phase 3 began from the final flush and ended when the Hickman line was bandaged or after four minutes passed.

Intramuscular injection.

Phase 1 began when the EMLA cream was removed from the child's puncture site and ended when the needle was withdrawn from this area. Phase 2 began from needle withdrawal and ended when a sterile plaster was placed over the puncture site.

Lumbar Puncture.

Phase 1 began when the child was positioned on the bed and ended when the local was applied to the puncture site. Phase 2 began from local anaesthetic application and ended when the lumbar puncture needle was withdrawn. Phase 3 began from needle withdrawal and ended when a plaster was placed over the puncture site.

PROCEDURES

EXPERIMENT ONE

Conditions

Baseline (A). Each session was video taped when the child's Port-A-Cath or Hickman line was accessed. The session began as the nurse entered the room and finished when s/he left. During baseline no intervention occurred

A Brief Film (B). All procedures were identical to baseline conditions except for the introduction of an age appropriate video to watch during treatment. The child was given a number of choices of film to watch (e.g., play school, Baloo the flying bear). Prior to the procedure each child was asked which of the films they would like to watch.

Short Story (C). During this stage the parent was asked to read a story with their child. The story book was like most, except the book would emit musical sounds when the small pictures down one side of the book were pushed. As the parent read the story they would indicate to the child the appropriate time to push the accompanying sound (see Appendix I). For example, the parent would read "*Papa bear pushed the horn (picture of a horn) on his car*" the parent would then indicate to the child, or the child would, upon seeing the picture of the horn, push the accompanying picture and a "beep beep" sound would be emitted from the book.

Following the completion of the study each child was provided with a special certificate for participation (see Appendix G).

Design Randomization

A counterbalanced order repeated measures design assessed the effectiveness of two distractors. There were three conditions, baseline (A), cartoon video (B), and short story intervention (C). Each of the children in the study were randomly assigned to an order of the experimental conditions. For example, where one child followed an (ABC) design another child followed an (BAC) design (see table 1). The parent and child were informed about the order of conditions to expect.

EXPERIMENT TWO

Conditions

Video Absent Condition. Baseline data was taken for both the first two sessions when the child's Port-A-Cath was accessed and deaccessed. Children scheduled for chemotherapy infusion or blood tests received EMLA cream to the Port-A-Cath area an hour before as per clinic protocol. Each session was video taped and began as the nurse entered the room and finished when s/he left. Immediately following the end of the procedure the child was asked to choose the face that best described how he felt during the medical procedure.

Video Games. All procedures were identical to those in baseline except for the introduction of a video game. The children were given instructions on how to use the Sega Master system II prior to the start of the session. The children were provided with a selection of eleven games from which to choose (e.g., Asterix, Shaker Run, etc). The apparatus was placed adjacent to the treatment table. The child had freedom of access to the sega system from entry to departure from the treatment room.

Video Games + Reward. The same procedures and apparatus used in the first video game condition were employed with the addition of reward. The reward in this condition consisted of sweets. Only one of the children participated in this stage. During the treatment session a parent was instructed to place sweets in a jar at 45

second intervals if the child was attending to the game. If the child was not attending to the game the sweet was not given within the 45 second period until attention was again directed at the game. At completion of the medical procedure the child collected all the sweets from the jar and also a prize for doing his best.

Video Absent Condition. For the next two treatment sessions subjects returned to baseline conditions. In this final phase no video games were played. Measurements were taken as in the previous experimental sessions. Each of the children were given certificates for their participation in the study (see Appendix H).

Experimental Design

A single case study design was used in this experiment. This technique involved intensive exploration of a single unit of study with a relatively small number of subjects measured thoroughly over time. The experiment typically followed a design that allowed two baseline sessions (*no video game*), two intervention sessions (*video game*), two intervention - reward sessions (*video game + reward*) and a return to two final baseline sessions (*no video game*). This design was followed for Port-A-Cath access and Port-A-Cath deaccess (see table 2).

PILOT STUDY

At parental request distraction was used with a child during lumbar punctures. This child was 6.5 years of age, recruited from experiment two. When a child receives a lumbar puncture s/he must remain completely still during the procedure to enable spinal access. Distractors that did not require excessive motor movement were chosen for this reason. The procedure followed an (*ABC*) design (Baseline, Brief Film and Short Story). The conditions and measures were the same in experiment 1 except the child was old enough to provide ratings using a faces scale.

CHAPTER SEVEN

RESULTS

EXPERIMENT ONE

The data for each child in experiment one are presented by graph and table. The graph illustrates the level of child observed behavioural distress for each condition, *baseline (A)*, *brief film (B)* and *short story (C)* as rated by the observers and the OSBD scoring protocol. The tables for each case show treatment duration and the level of distraction achieved per phase for each condition.

Reliability checks were used for each observer's OSBD score and each independent observer's ratings of the child's behavioural distress. For experiment one 30 procedural sessions were rated. The percentage of interobserver agreement on the child's level of behavioural distress was 90%. For experiment two over the 32 procedural sessions viewed the percentage of interobserver agreement on the child's behavioural distress was 85%.

Statistical analysis of the data from experiment one was carried out. Skewness and kurtosis were such (up to 2.4 and 6 respectively) that a conservative approach to analysis was taken using the non-parametric test, Friedman Two-Way ANOVA.

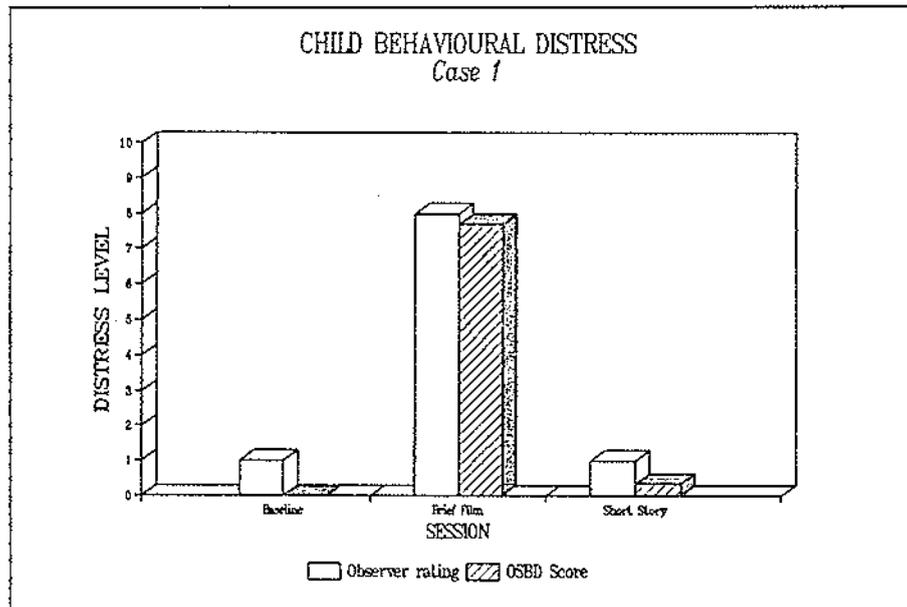


Figure 1. Case one OSBD scores and observer ratings of behavioural distress across treatment conditions.

Table 3. Treatment Duration and Level of Distraction

	Phase 1		Phase 2		Phase 3	
	8 min	..	3 min	..	3 min	..
Baseline	8 min	..	3 min	..	3 min	..
Brief Film	4 min	88%	3 min	0%	4 min	56%
Short Story	1 min	100%	4 min	94%	4 min	50%

Medical Procedure: Port-A-Cath access, (BCA).

Figure one shows that behavioural distress was evident in all conditions and most prominent during the brief film condition. Table three shows that attention diversion was created by both distractors. However, no attention diversion occurred during phase 2 of the brief film condition.

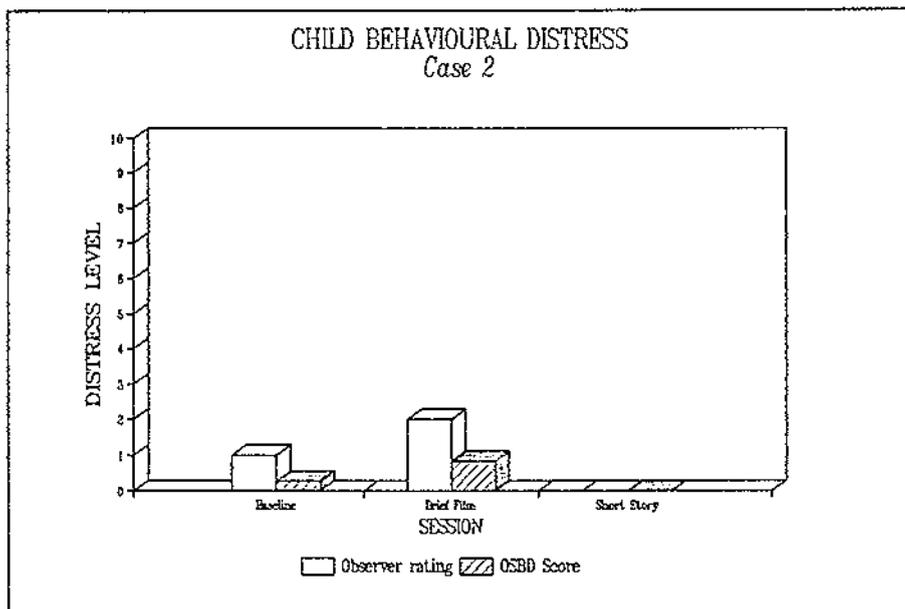


Figure 2. Case two OSBD scores and observer ratings of behavioural distress across treatment conditions.

Table 4. Treatment Duration and Level of Distraction

	Phase 1		Phase 2		Phase 3	
	Baseline	4m 30s	..	5 min	..	2m 45s
Brief Film	1m 15s	100%	2m 30s	70%	2m 15s	11%
Short Story	5 min	100%	6m 45s	89%	3m 30s	79%

Medical Procedure: Hickman Line Access, (ACB).

Figure two shows that overall the behavioural distress level of the child is low and no behavioural distress is evident during the short story condition. Table four depicts that attention diversion was created by both distractors. Overall, the procedure was longer in duration during the short story condition. However, this distractor maintained the highest level of attention diversion.

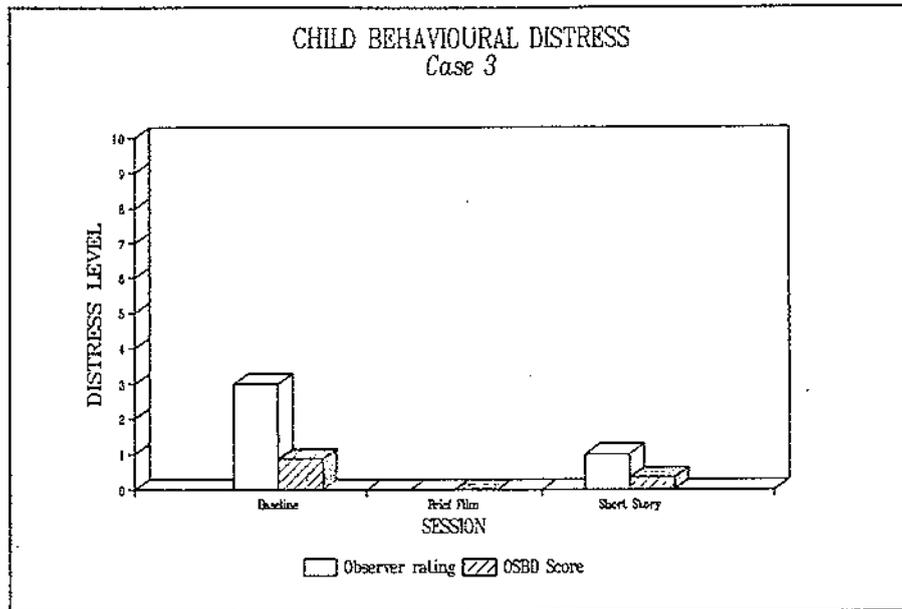


Figure 3. Case three OSBD scores and observer ratings of behavioural distress across treatment conditions.

Table 5. Treatment Duration and Level of Distraction

	Phase 1		Phase 2		Phase 3	
	Baseline	1 min	..	9m 30s	..	1m 45s
Brief Film	1 min	50%	2m 30s	80%	1 min	17%
Short Story	1m 15s	100%	5m 30s	86%	1m 45s	100%

Medical Procedure: Hickman Line Access (CBA).

Figure three shows that the highest level of behavioural distress was during the baseline condition. In comparison to the short story condition, during the brief film no behavioural distress was evident. Table five depicts that the short story created the highest level of attention diversion.

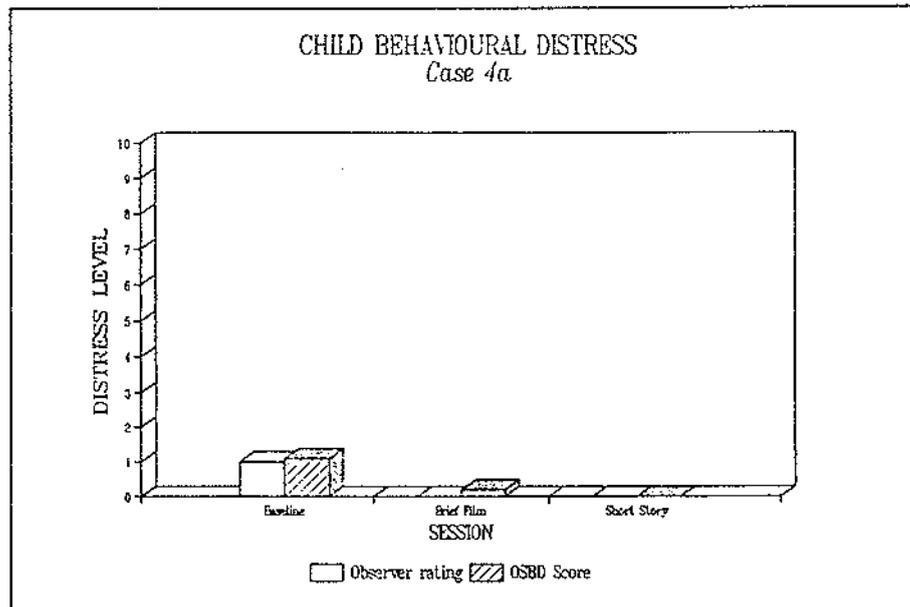


Figure 4. Case four_(a) OSBD scores and observer ratings of behavioural distress across treatment conditions.

Table 6. Treatment Duration and Level of Distraction

	Phase 1		Phase 2		Phase 3	
	Baseline	1 min	..	5 min	..	3 min
Brief Film	3m 30s	100%	6m 30s	73%	3m 30s	14%
Short Story	1 min	50%	3m 45s	100%	1m 30s	67%

Medical Procedure: Port-A-Cath access (ABC).

Figure four shows that the highest level of behavioural distress was during the baseline condition. Table six depicts that the longest procedure duration was during the brief film condition. In comparison to the short story the brief film distractor diverted the child's attention for the greatest period of time.

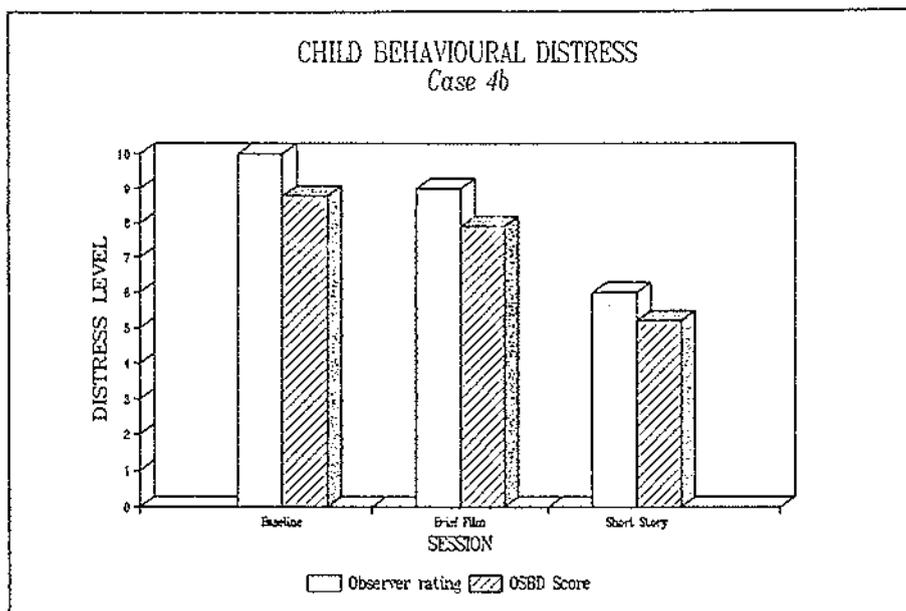


Figure 5. Case four_(b) OSBD scores and observer ratings of behavioural distress across treatment conditions.

Table 7. Treatment Duration and Level of Distraction

	Phase 1		Phase 2	
	Baseline	1 min 45s	..	1 min 30s
Brief Film	2 minutes	25%	1 min 15s	40%
Short Story	1 min 30s	17%	1 minute	25%

Medical Procedure: Intramuscular Injection, (BAC).

Figure five shows that the child's level of behavioural distress was high over all sessions. However, behavioural distress is slightly lower during the distraction sessions in comparison to the baseline condition. Table seven depicts that the duration of procedures in this case were short in comparison to other procedures followed in the study. The table shows that both distractors created levels of attention diversion. However, the levels of attention diversion were not as high as in case four's previous medical procedure (i.e., Case four_(a)).

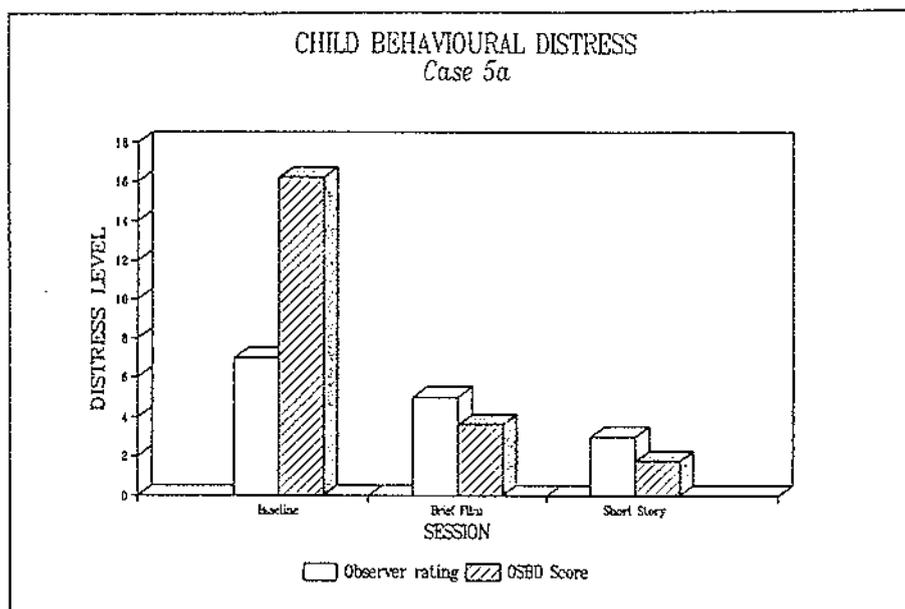


Figure 6. Case five_(a) OSBD scores and observer ratings of behavioural distress across treatment conditions.

Table 8. Treatment Duration and Level of Distraction

	Phase 1		Phase 2		Phase 3	
	Duration	Distraction	Duration	Distraction	Duration	Distraction
Baseline	2m 30s	..	4m 30s	..	4 min	..
Brief Film	2 min	100%	4 min	96%	2m 30s	60%
Short Story	1 min	**	4 min	75%	3m 30s	86%

Medical Procedure: Port-A-Cath access (BAC).

Figure six shows high behavioural distress during the baseline condition. During the distraction conditions the child's level of behavioural distress is lower. Table eight depicts that attention diversion was reached with both distractors, with the exception of phase 1 of the short story condition where the distractor was not available to the child.

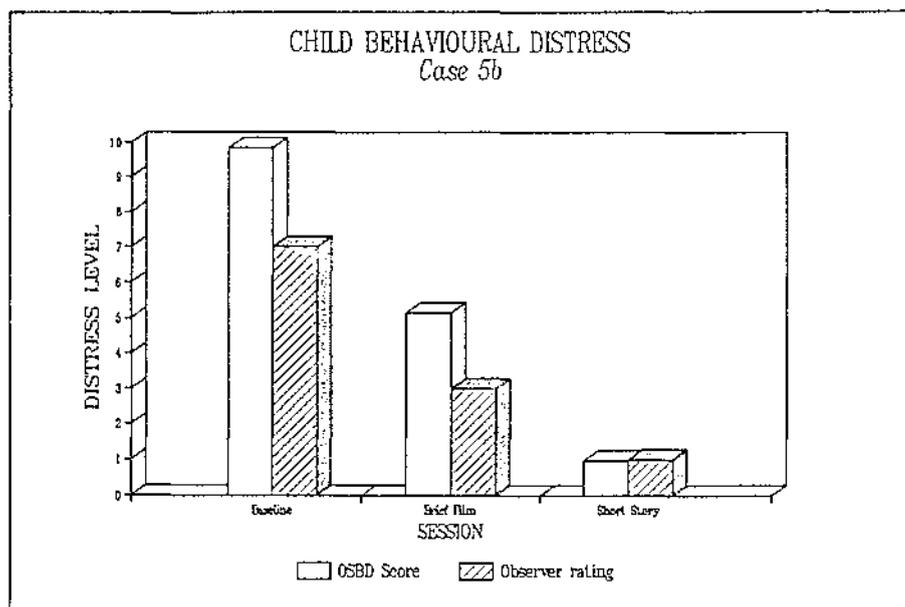


Figure 7. Case five_(b) OSBD scores and observer ratings of behavioural distress across treatment conditions.

Table 9. Treatment Duration and Level of Distraction

	Phase 1		Phase 2		Phase 3	
	5m 30s	..	2m 30s	..	1 min	..
Baseline	5m 30s	..	2m 30s	..	1 min	..
Brief Film	4 min	38%	1 min	75%	1m 30s	17%
Short Story	12 min	85%	1 min	100%	1m 30s	100%

Medical Procedure: Port-A-Cath deaccess, (CBA).

The child's level of behavioural distress across sessions in figure seven are similar to behavioural distress levels in the previous medical procedure for this case (see figure six). The graph illustrates significantly different levels of child distress between baseline and distraction conditions. Table nine depicts that attention diversion was created with both distractors. The short story creating higher levels of attention diversion than the brief film.

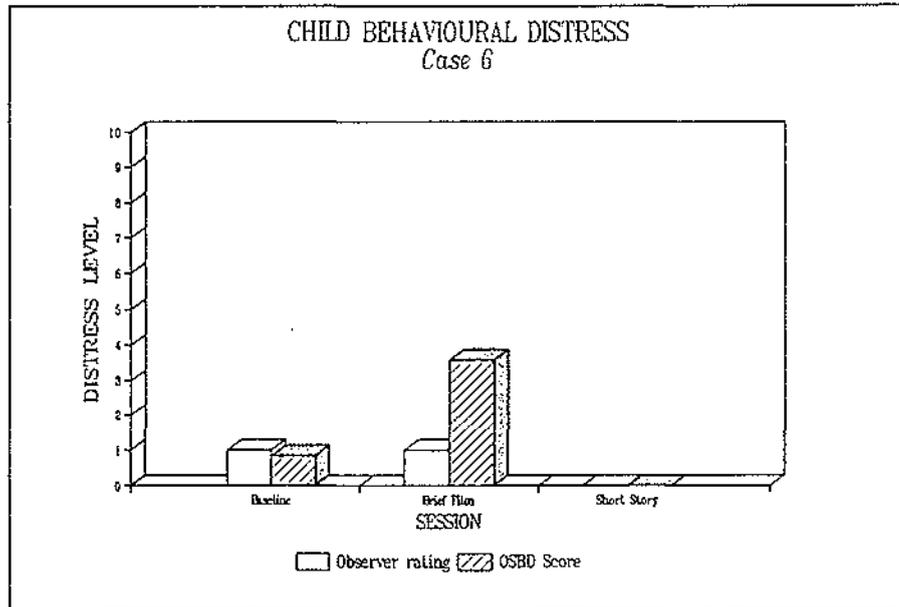


Figure 8. Case six OSBD scores and observer ratings of behavioural distress across treatment conditions.

Table 10. Treatment Duration and Level of Distraction

	Phase 1		Phase 2		Phase 3	
	Baseline	6 min	..	2 min	..	4 min
Brief Film	2m 30s	* *	4m 30s	100%	3 min	100%
Short Story	8 min	100%	2 min	100%	2m 30s	100%

Medical Procedure: Port-A-Cath access, (ABC).

Figure eight shows that the child's level of behavioural distress is highest during the brief film condition. In comparison, no behavioural distress was evident during the short story condition. Table ten depicts that overall the child reached very high levels of attention diversion with both distractors with the exception of phase 1 of the brief film condition where the distractor was not available to the child.

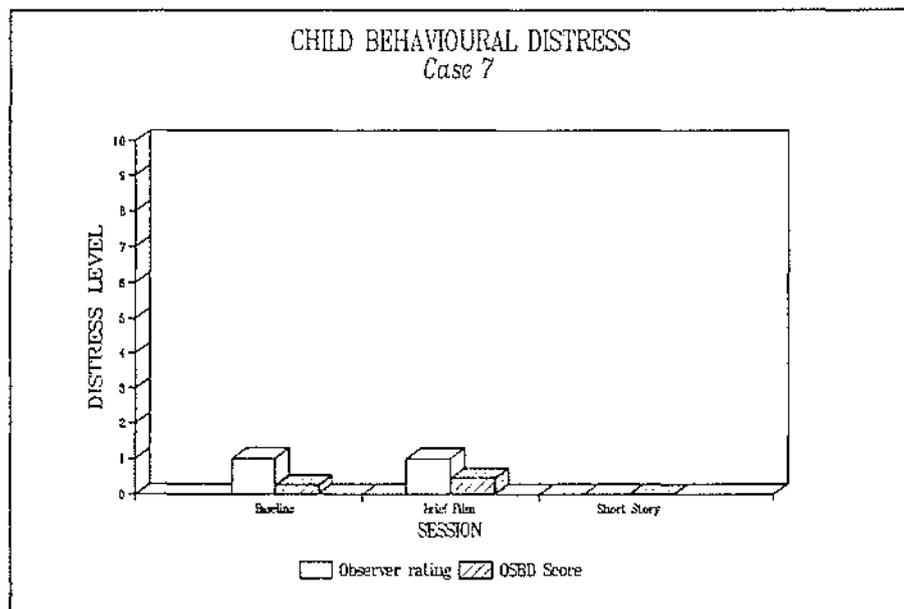


Figure 9. Case seven OSBD scores and observer ratings of behavioural distress across treatment conditions.

Table 11. Treatment Duration and Level of Distraction

	Phase 1		Phase 2		Phase 3	
Baseline	1m 30s	..	2 min	..	4 min	..
Brief Film	45 sec	100%	3m 30s	100%	4 min	88%
Short Story	3m 30s	100%	2m 30s	100%	3 min	100%

Medical Procedure: Port-A-Cath access, (CBA).

Figure nine shows that overall the child's level of behavioural distress is low across all conditions. The graph shows that during the short story condition no behavioural distress is evident. Table eleven depicts that very high levels of attention diversion were reached with both distractors across each phase of the medical procedure.

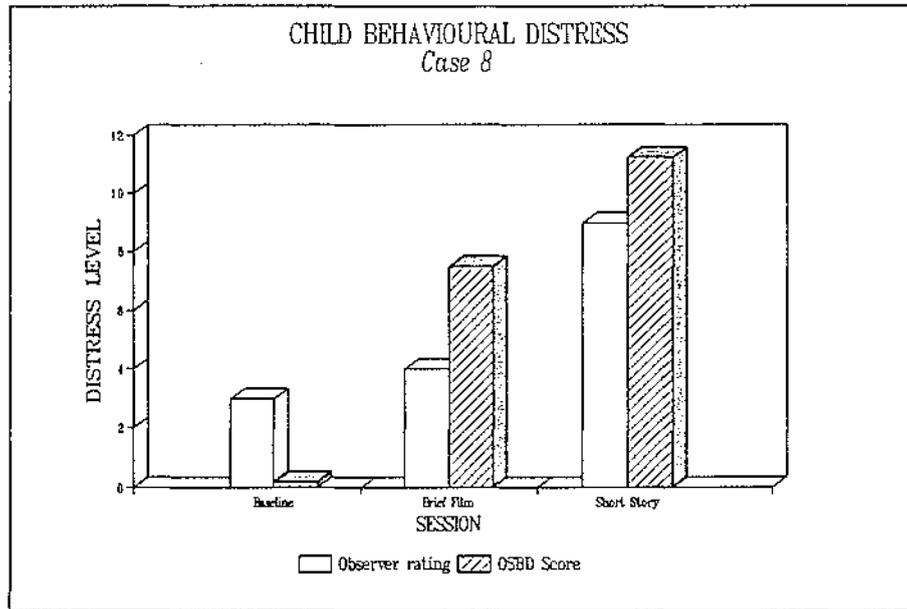


Figure 10. Case eight OSBD scores and observer ratings of behavioural distress across treatment conditions.

Table 12. Treatment Duration and Level of Distraction

	Phase 1		Phase 2		Phase 3	
	Baseline	8m 30s	..	4 min	..	2 min
Brief Film	4m 30s	0%	2 min	0%	4 min	25%
Short Story	4 min	50%	6 min	67%	3 min	0%

Medical Procedure: Port-A-Cath access, (CBA).

Figure ten shows that the child's behavioural distress level is higher during distraction conditions in comparison to the baseline condition. Table twelve depicts that overall the brief film did not gain a high level of attention diversion. In comparison the short story was significantly better in attaining attention diversion from the child.

Summary of Table and Graph Trends

The tables in experiment one show that when the children encountered the distractors a level of attention diversion was reached in each case. The graphical trends illustrate that for most cases less behavioural distress occurred when the short story distractor was in play. The graphs also show that the Observational Scale of Behavioural Distress scores are similar in trend to the observer ratings of child behavioural distress throughout the experiment.

Statistical Analysis Experiment One

Case nine was excluded from the data as a different parent was present during the baseline session and visibly intervened by talking the child through the procedure as well as using a variety of distraction strategies to lower the child's level of distress.

In two cases two different procedures have been treated as independent for the purposes of analysis. Unfortunately the data was not coded in such a way that the relationship between behavioural distress and level of distraction can be assessed.

Table 13. FRIEDMAN TWO-WAY ANOVA FOR OSBD DATA.

MEAN RANK	VARIABLE	CHI-SQUARE	SIGNIFICANCE
2.44	Baseline	8.22	0.0164
2.33	Brief film		
1.22	Short story		

Table thirteen shows an overall reduction in mean rank of the variables. Pairwise comparison show no difference between baseline and brief film OSBD scores ($X^2=0.1111$, $p=0.7389$). However, the short story OSBD score was significantly lower than both the baseline ($X^2=5.44$, $p=0.0196$), and the brief film OSBD scores ($X^2=5.44$, $p=0.0196$).

Table 14. FRIEDMAN TWO-WAY ANOVA FOR OBSERVER DATA.

MEAN RANK	VARIABLE	CHI-SQUARE	SIGNIFICANCE
2.61	Baseline	9.06	0.0108
2.17	Brief film		
1.22	Short story		

Table fourteen shows an overall reduction in mean rank of the variables. Parwise comparison show no difference between baseline and brief film observer ratings ($X^2=1.00$, $p=0.3173$). However, the short story observer rating was significantly lower than both the baseline ($X^2=7.11$, $p=0.0077$), and brief film observer ratings ($X^2=4.00$, $p=0.0455$).

Interobserver ratings showed similar effects to the OSBD scores. The overall data shown in tables 13 & 14 show significant parwise comparisons.

Young Children's Spontaneous Coping Strategies

The young children in this experiment used a variety of coping strategies during medical procedures when the distractors were not in effect. The use of these strategies varied across the phases of the medical procedure. The strategies used by the children can be grouped into subtypes based on a spontaneous coping strategies inventory designed by Branson et al., (1990). The coping strategies were observed but not quantified in terms of frequency, quantity or duration.

Self Talk:

This tended to take the form of child initiated talk continuously through out the procedure without responses from the parent or medical personnel.

External Attention Diversion:

The child tended to focus on activities or sounds outside the treatment room or external stimulus and objects inside the room.

Restricting Movement:

Although all the children in experiment two engaged in this form of coping some of the younger children also purposely laid still while the medical procedure was being carried.

Verbal Complaint of Pain:

The child communicates to the nurse or parent s/he is in pain "*it hurts mummy*", "*it stings*".

Requesting Comfort:

The children request that their parent be near them or hold their hand during the medical phases of the procedure.

Additional spontaneous coping strategies not quantified by Branson et al., (1990) were visual distancing, muscular rigidity, information seeking and dissociation.

Visual Distancing:

At the time where the needle was to be inserted the children would close their eyes, request their parents to place their hand over their eyes, or turn their head away to occlude the sight of the needle entry.

Dissociation:

The child tended to focus his or her attention internally or externally on no specific object or activity.

Muscular Rigidity:

This behaviour was commonly observed in experiment two. The children would often holding their bodies tight and rigid, clenching their fists and grimacing during the medical phase of the procedure.

Information Seeking:

The child actively asked about the procedure "*has the needle gone in*", "*is it out yet*". Information seeking was commonly used by the older children.

EXPERIMENT TWO

Each child was considered as an individual case. The data from each case are presented by graph, table and brief qualitative observations. The graph represents the level of the child's observed distress as rated by the observers and OSBD scoring protocol. The graphs also include the child's self reported pain ratings which have been inflated to be comparable to the observer behavioural distress ratings. A reversal design was followed i.e., (AABBAA). For the graphical data each condition is displayed as an average. The average was calculated by adding the two baseline ($A_1 + A_2 =$) or two intervention sessions ($B_1 + B_2 =$) scores together and dividing this sum by two. This produced one score for each two sessions i.e., (ABA). The graphs also include the child's self reported pain ratings. For these ratings to be comparable to observer scores of behavioural distress (ratings from 0-10) the child's pain ratings (faces scale 0-5) have been multiplied by two. The tables for each case show treatment duration and the level of distraction achieved per phase. The tables depict the experimental conditions, i.e., baseline (*no video game*) or intervention (*video game*) and the procedure duration (*minutes*).

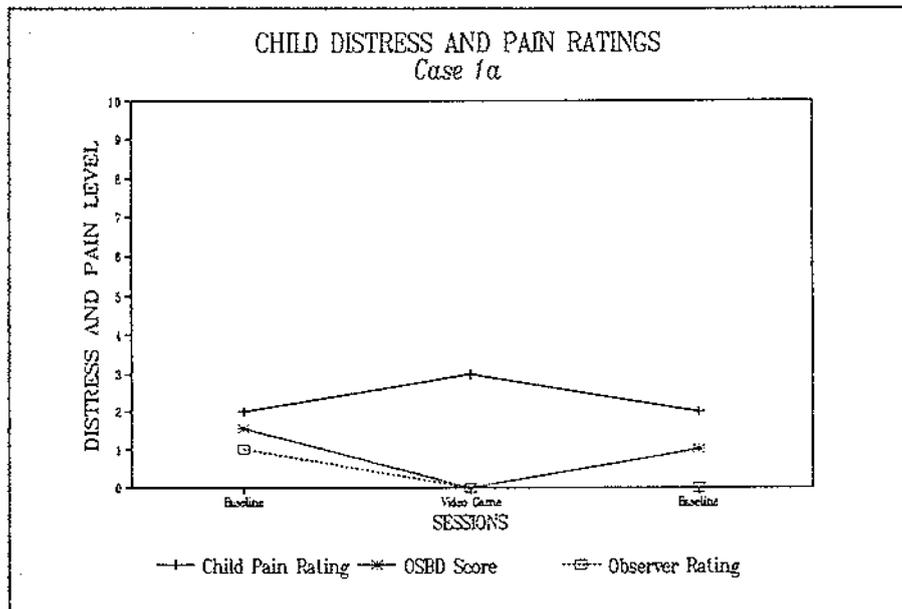


Figure 11. Case One_(a) child self reported pain ratings, OSBD scores and observer ratings of child behavioural distress across treatment conditions.

Table 15. Treatment Duration and Level of Distraction

	Phase 1		Phase 2		Phase 3	
	Baselines	6m 15s	..	4m 30s	..	2 min
	4 min	..	5 min	..	3m 30s	..
Video Game	6 min	100%	6 min	100%	3 min	100%
	3m 30s	100%	6 min	100%	4 min	100%
Baselines	8 min	..	4m 45s	..	4min	..
	7m 30s	..	2 min	..	2 min	..

Medical Procedure: Port-A-Cath access

Figure eleven shows that across sessions the child's pain ratings do not vary much between baseline and intervention sessions. The OSBD scores and observer ratings of

the child's behavioural distress are slightly lower during the video game session. Table fifteen depicts that across the duration of the procedure the child reached maximal attention diversion when the video game was in play.

Session Observations.

Baseline 1:

The child asked for procedural information throughout the procedure. During the procedure the child informed the nurse when to stop each cleansing phase of the Port-A-Cath.

Baseline 2:

There were signs of distress but very internal to the child. The child requested the parent to hold his hand. Throughout the procedure the child called out the end times for each cleansing phase of the Port-A-Cath.

Intervention 1:

The child was very involved in the game. The child moved his body in tune to the game's movements.

Intervention 2:

The child was completely absorbed in the game, totally distracted from the procedure. Throughout the medical phases of the procedure the nurse continually asked the child how he was feeling.

Baseline 3:

The child focused on the needle during the medical phases of the procedure. The nurses engaged in nonprocedural-related talk with the child. Later in the procedure the doctor continued the conversation with procedure-related issues.

Baseline 4:

The child exhibited some anxious behaviour throughout the procedure. The parent restrained the child for short periods although the child did not flail.

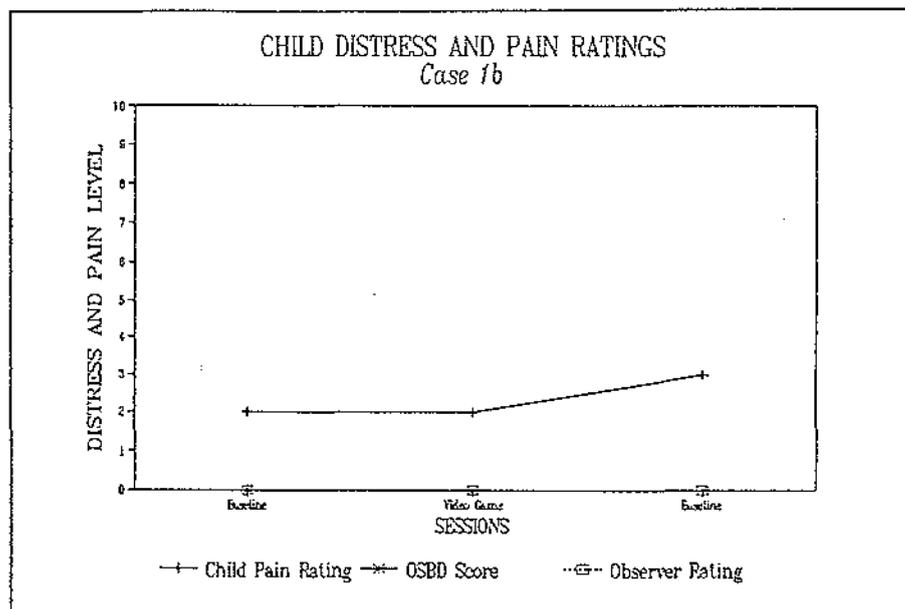


Figure 12. Case One_(b) child self reported pain ratings, OSBD and observer ratings of child behavioural distress across treatment conditions.

Table 16. Treatment Duration and Level of Distraction

	Phase 1		Phase 2		Phase 3	
	Baselines	7m 15s	..	1 min	..	1 min
	6m 15s	..	5m 15s	..	1m 15s	..
Video Game	6m 30s	100%	2m 30s	100%	1 min	100%
	10m 15s	76%	5 min	100%	1 m 15s	100%
Baselines	7m 30s	..	3m 45s	..	1 min	..
	7m 15s	..	5 min	..	45 sec	..

Medical Procedure: Port-A-Cath deaccess.

Figure twelve shows that across sessions the child's pain ratings again do not vary considerably between baseline and intervention sessions. The OSBD and observer

ratings of the child's behavioural distress are zero across sessions. Table sixteen depicts that the child reached high levels of attention diversion with the video game.

Session Observations.

Baseline 1:

The child appeared tense, responding briefly to the nurse's communications. The treatment room had a very flat atmosphere.

Baseline 2:

There was no conversation throughout the procedure. The child focused on the medical materials. The child exhibited very stoic behaviour with no outward signs of distress or pain.

Intervention 1:

The child was very absorbed and lively in response to the game. Throughout the procedure the child told the parent and nurse what was happening in the game.

Intervention 2:

The child became nauseated during the procedure but managed to request that the game be paused. The game was immediately resumed when the child had finished being ill.

Baseline 1:

There was no verbal interchange between the parent, nurse and child throughout the procedure. The child remained very still laying on his hands.

Baseline 2:

The social interaction between the nurse and the child was high. The child presented a very relaxed body posture.

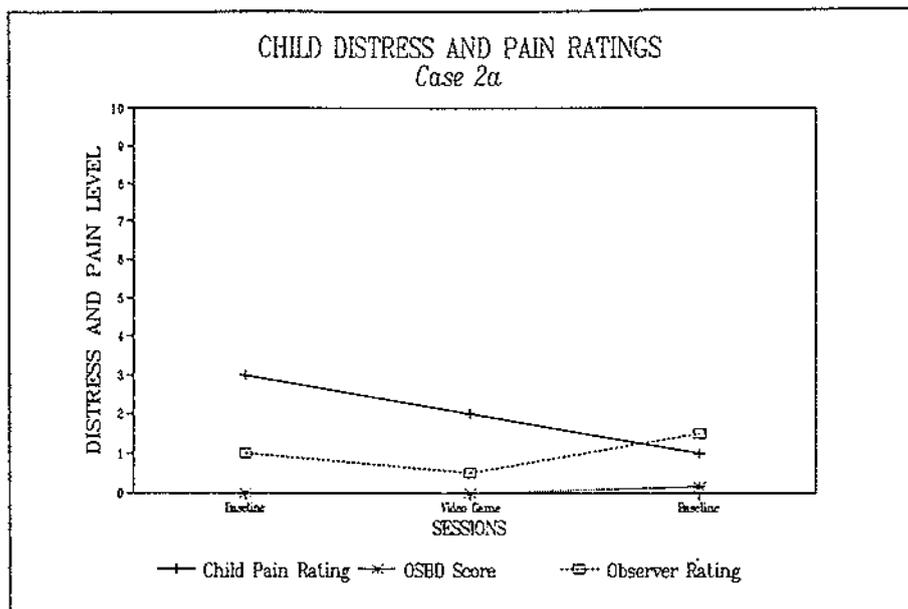


Figure 13. Case Two_(a) child self reported pain ratings, OSBD scores and observer ratings of child behavioural distress across treatment conditions.

Table 17. Treatment Duration and Level of Distraction

	Phase 1		Phase 2		Phase 3	
	Baselines	4m 45s	..	3m 30s	..	4 min
	9m 45s	..	4 min	..	2m 30s	..
Video Game	11 min	100%	5m 15s	100%	3m 15s	100%
	5 min	100%	5 min	100%	4 min	100%
Baselines	8 min	..	2m 15s	..	2m 15s	..
	5m 30s	..	2m 15s	..	3 min	..

Medical Procedure: Port-A-Cath access

Figure thirteen shows that the child's pain ratings decreased across sessions. Figure thirteen also shows that the OSBD scores are slightly higher during the baseline sessions

in comparison to the intervention session. In addition, the graph shows little variation in the observer ratings of child behavioural distress across sessions. Table seventeen depicts that the child reached maximal levels of attention diversion when the distractor was in play.

Session Observations.

Baseline 1:

The child showed few signs of overt distress. The nurse provided distracting talk throughout the procedure. A second nurse also offered to hold the child's hand during the invasive phases of the procedure.

Baseline 2:

The child displayed a low level of distress until phase two where he exhibited pain responses upon needle insertion. The child displayed anxiety throughout the remainder of the procedure. The final phase was dominated with procedure-related talk between the nurse and parent.

Intervention 1:

The child exhibited no overt distress. He was distracted by the game throughout the procedure. There were times when the child laughed in response to his achievements on the game.

Intervention 2:

There were no overt signs of behavioural distress. The child played the game throughout the procedure, grimacing only upon needle insertion but still focusing on the game. There were periods of procedure-related talk between the parent and nurse.

Baseline 3:

No overt distress behaviours were exhibited by the child. However, on a few occasions the child mentioned how the procedure was hurting.

Baseline 4:

The child displayed a defended (curled up) body position. During the medical phases the child exhibited tense body position and continually grimaced during scrubbing of the Port-A-Cath site.

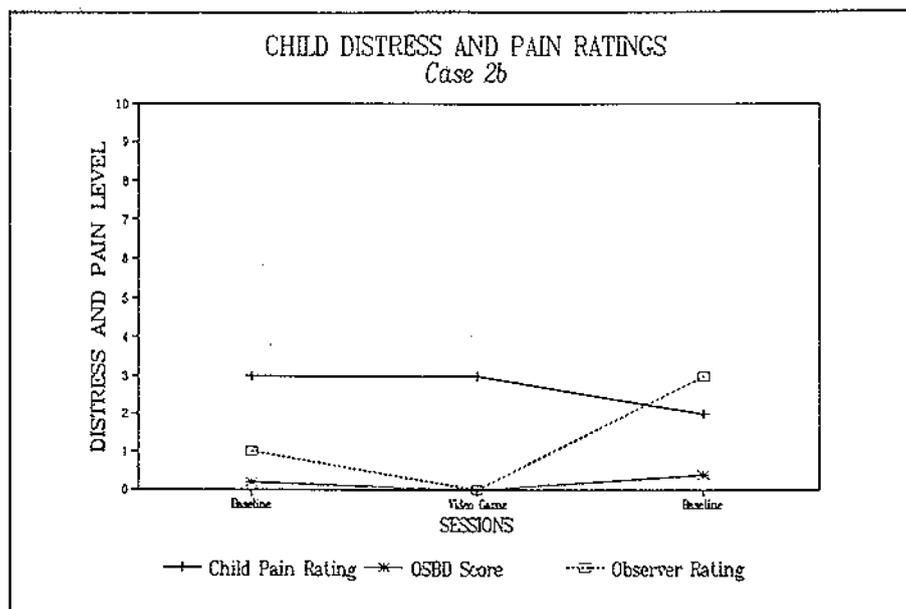


Figure 14. Case Two_(b) child self reported pain ratings, OSBD scores and observer ratings of child behavioural distress across treatment conditions.

Table 18. Treatment Duration and Level of Distraction

	Phase 1		Phase 2		Phase 3	
	Baselines	7m 45s	..	1m 30s	..	1m 30s
	6m 15s	..	3 min	..	45 sec	..
Video Game	12m 30s	100%	2m 30s	100%	1m 15s	100%
	3m 45s	100%	1m 15s	100%	45 sec	100%
Baselines	6m 30s	..	1m 15s	..	1 min	..
	6m 15s	..	2m 15s	..	1 min	..

Medical Procedure: Port-A-Cath deaccess

Figure fourteen shows that the OSBD scores and observer ratings of the child's behavioural distress were lower during the intervention session. The observer distress

rating is significantly high during the final baseline session. The child's pain ratings remain constant to the final baseline session where they decreased slightly. Table eighteen depicts the child reached very high levels of attention diversion over the intervention session.

Session Observations

Baseline 1:

The child verbally expressed pain on a few occasions during the procedure. Otherwise he appeared little distressed. There was no communication between the nurse, child or parent throughout the procedure.

Baseline 2:

The child focused a lot of his attention on the preparation materials and closely watched the needle being removed. There were brief periods of facial grimacing by the child.

Intervention 1:

The child was distracted throughout the procedure. There was procedure-related talk between the nurses towards the end of the procedure.

Intervention 2:

There were no overt signs of behavioural distress. The child was totally engrossed in the game.

Baseline 3:

There were several expressions of verbal pain. The child continually grimaced and looked uncomfortable throughout the procedure. However, the child did not show a large number of standardised pain behaviours.

Baseline 4:

The child expressed verbal pain on a few occasions. There were high levels of verbal interaction between the parent, nurse and child throughout the procedure.

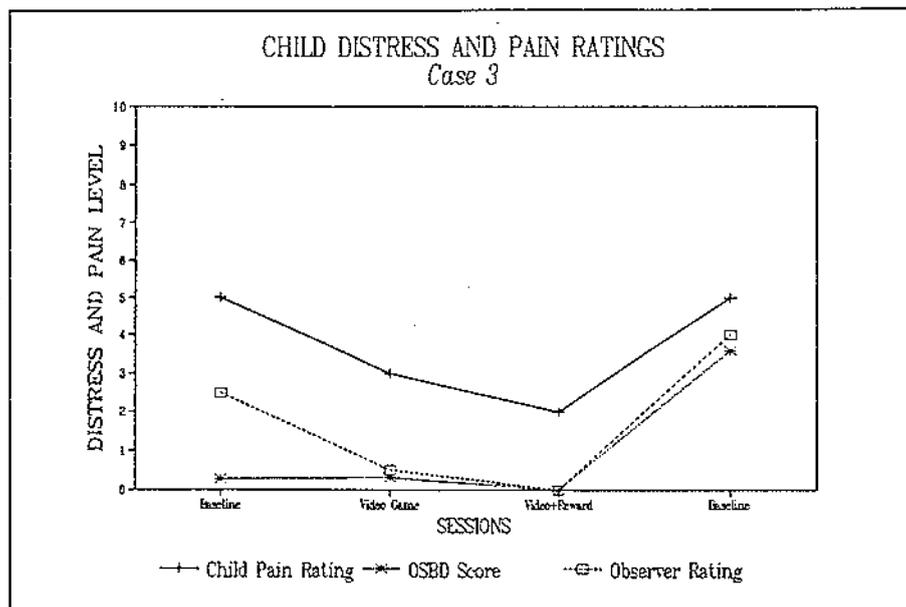


Figure 15. Case three child self reported pain ratings, OSBD scores and observer ratings of child behavioural distress across treatment conditions.

Table 19. Treatment Duration and Level of Distraction

	Phase 1		Phase 2		Phase 3	
	Duration	Distraction	Duration	Distraction	Duration	Distraction
Baselines	13 min	..	4 min	..	3 min	..
	8m 30s	..	3m 45s	..	3 min	..
Video Game	2m 30s	70%	3m 45s	100%	4 min	100%
	30 sec	100%	4 min	100%	2m 30s	100%
Video Game and Reward	7 min	100%	4m 30s	100%	4 min	100%
	30 sec	100%	3m 45s	100%	3 min	100%
Baselines	4 min	..	6 min	..	1m 30s	..
	1m 30s	..	3m 45s	..	3 min	..

Medical Procedure: Port-A-Cath access

Figure fifteen shows a general trend that depicts the child's pain ratings and observed behavioural distress were lower during the intervention sessions in comparison to baseline sessions. Table nineteen depicts that over the duration of the intervention sessions the child maintained high levels of attention diversion.

Session Observations

Baseline 1:

Although not overtly distressed throughout the procedure the child showed signs of discomfort and pain. There were clear indications of body tenseness and facial grimacing.

Baseline 2:

Evidence of discomfort and pain were consistently displayed by the child throughout the procedure. The parent provided comfort through tactile touch.

Intervention 1:

The child showed expressions of excitement in response to the game. There were brief expressions of distress during the medical phases but the child made an observable effort to fully attend to the game.

Intervention 2:

As the child progressed further into the game there were noticeable increases in enthusiastic behaviour (smiling, laughing) possibly as a response to his achievements. The child was totally animated by the video game.

Intervention 3:

The child was totally absorbed in the game throughout the procedure. Although the child was rewarded with sweets during the game this did not seem to impact in any way on his level of attention diversion from pain during the procedure.

Intervention 4:

The child showed no evidence of pain or distress behaviour. Throughout the procedure the child was totally absorbed in the game. Again the reward (sweets) had no visible effect on the child's behaviour. It is possible that a ceiling effect with the distractor was reached.

Baseline 3:

The child was extremely distressed throughout the procedure. Disapproving communications were directed to the child about his pain behaviour.

Baseline 4:

The child timed the procedure with an hour glass. During the medical phases the child clenched his fists and closed his eyes through the final stages. Throughout the procedure the child displayed prominent body rigidity.

PILOT STUDY

This study is presented as a single case. The results are illustrated by table graph and brief qualitative observations. The graph illustrates the level of the child's observed behavioural distress for each condition (*baseline, brief film and short story*) as rated by the observers and OSBD scoring protocol. The graph also includes the child's self reported pain ratings which have been inflated to be comparable to the observer behavioural distress scores. The table for this case shows treatment duration and the level of distraction achieved per phase.

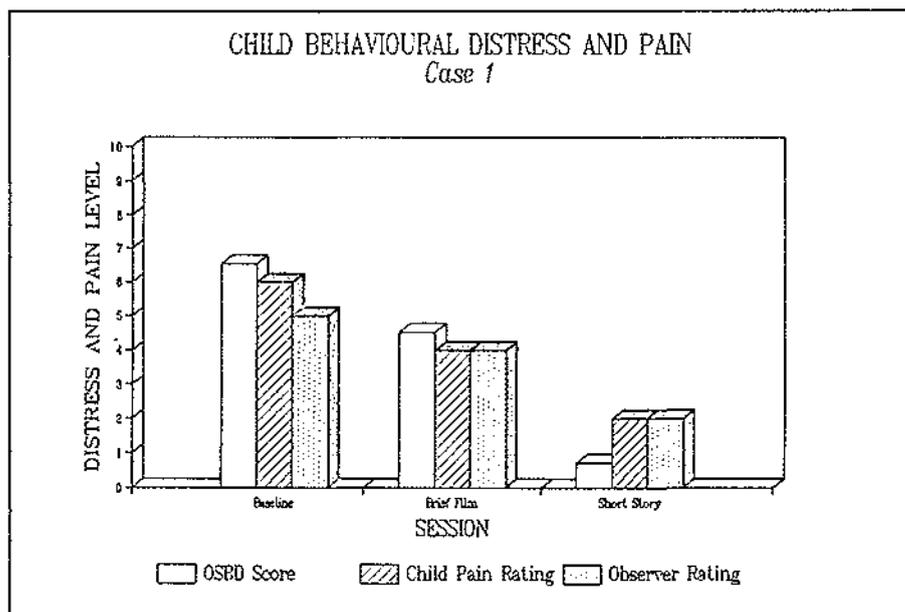


Figure 16. Child self reported pain ratings, OSBD scores and observer ratings of child behavioural distress across treatment conditions.

Table 20. Treatment Duration and Level of Distraction

	Phase 1		Phase 2		Phase 3	
Baseline	2m 45s	..	5 min	..	1m 15s	..
Brief Film	7 min	75%	8m 15s	9%	2m 15s	100%
Short Story	45 sec	100%	7 min	85%	1m 15s	100%

Medical Procedure: Lumbar puncture, (ABC).

Figure sixteen shows that the child's level of pain and observed behavioural distress is lower during the distraction sessions in comparison to the baseline condition. The lowest level of behavioural distress and self rated pain is seen in the short story condition. Table twenty depicts that attention diversion was created with both distractors, the short story creating the highest level.

Session Observations

Baseline:

The child displayed levels of anticipatory distress during the preparation phase of the procedure. The nurse provided comfort in the form of tactile touch. The child was restrained throughout the procedure by the parent and nurse although the child did not flail. The child was very internal in his distress responses only displaying occasional facial wincing throughout the procedure.

Brief Film:

The child was restrained throughout the procedure. The child displayed a very rigid body with fists clenched, and cried quietly throughout the procedure. The child was distracted through some parts of the procedure but his attention was diverted from the film during the invasive parts of the procedure.

Short Story:

No restraint was used with the child throughout the procedure. The parent effectively engaged the child in the story providing comfort to the child through touch at times when the procedure was most invasive. The child illustrated some pain behaviours but was quickly refocused back on the book by the parent. The child did not show any levels of anticipatory behavioural distress. Medical staff talked about the distractor with the child.

Summary of Table and Graph Trends

The tables in experiment two depict that when the children encountered the video game on most occasions they reached maximum levels of attention diversion. The tables also show that the distractor maintained high levels of attention diversion from beginning to end of each procedure.

The graphical data illustrates that the OSBD and observer ratings of behavioural distress in most cases were slightly lower when distraction was in play. The data also illustrates that in most cases OSBD scores and observer ratings of child behavioural distress were low in comparison to the children's self rated pain.

Parent, Nurse and Child Interaction

In both experiments there were noticeable phase specific interactions between medical personnel, parents and children during medical procedures. During the preparation phase of the medical procedure the children were required to wait in the treatment room while procedure materials were prepared. During this time children were most likely to display anxious behaviours (e.g., restless movement, huddled body position, hypervigilance). The children were also most likely to focus their visual attention on the materials being prepared for the procedure.

Furthermore, during the preparation phase for the procedures, parents were most likely to discuss with the medical personnel procedure-related issues *"what chemotherapy is this"*, *"how many more treatments do we have"*, *"are those bloods for a liver function*

test". During this interaction the parent tended to ignore or be less responsive to the child's requests for comfort. When this occurred the children often increased their attempts to gain some form of comforting support or protection.

During the second phase of the medical procedure parents often became intensely interactive with their child. On most occasions this meant the parent comforting the child through talk, tactile touch, holding the child's hand or just being close and watching the child. The parent sitting close and watching the child seemed to provide a form of support for the child (*mums watching nothing bad will happen*). During this phase of the procedure few cues from the child were needed to trigger the parent's comforting gestures.

During the final phase of the procedure, where the lines were flushed or required bloods taken off, these actions tended to prompt a return to procedure-related talk between parent and nurse. However, the child was less likely to require or seek the parent's comfort and support.

The social interaction between the nurse, child and parent often changed when distraction was in play. In most cases when distraction was in use the nurse, parent and child all became involved with the distractor and thus the interaction focused around a shared interest. In contrast, when distraction was not in play the parent and nurse often talked over the child about procedure-related issues. This form of interaction tended to increase the child's visual focus on the procedure and procedural materials. In some cases this redirection of the child's attention to the procedure caused an increase in the child's anxiety.

CHAPTER EIGHT

DISCUSSION

The study was designed to look at the impact of distraction on child behavioural distress during medical procedures. Based on the literature that strongly supports the use of attention diversion strategies in the management of acute pain (Fernandez & Turk, 1989; McCaul & Mallott, 1984), predictions were that distractors would ameliorate distress and pain in children. Furthermore, the effectiveness of different types and methods of distraction presentation were examined.

Experiment One

In experiment one the brief film did not have a significant impact on the children's behavioural distress level when compared to the control condition. There are several plausible reasons for this result. Firstly, it is probable that the distractor did not create the level of attention diversion required to alter behavioural distress. Secondly, sample size or individual variation may have masked a significant effect. Thirdly, rather than a single encounter with this type of distractor young children may require repeated exposures. Finally, it is possible that the assessment tool used to assess behavioural distress was not sufficiently sensitive to detect the impact of the distractors.

Of these reasons the most probable is that the sample size was too small and individual variation masked any effect. The mean ranks show there is a ranked difference between the brief film and baseline. Also the tables depicting treatment duration and distraction level indicate diversion of attention for each case. Therefore, although diversion of attention was achieved creating less behavioural distress, the small number of subjects reduced statistical power and prevented significance.

It is also possible that the brief film was not attention diverting to the level that alters behavioural distress in children. Although attention diversion was achieved it is possible

that it was not to the level required to reduce behavioural distress either through the modulation of the pain pathways or triggering an internal pain suppressing system. The distractor in some cases had to compete with additional input from the parent and nurse interaction e.g., talking over the film.

Furthermore, it was observed that children who demonstrated high distress behaviours across sessions were less likely to attend to the brief film distractor than children who displayed low behavioural distress across sessions. As such, the actual distressing stimuli may have been of greater salience to the child than the distractor task. It is plausible to assume that children who display conditioned distress about the impending procedure are unlikely to achieve significant attention diversion. The reason being that the child's attentional capacity is fully absorbed in the processing of distressing stimuli. In such cases the child's behavioural distress is unlikely to alter.

In this study the design allowed for only a single presentation of the brief film. Encountering a distractor on only one occasion may not be sufficient for young children to utilize it as an attention diverter. The young child may require repeated exposures to adjust to concentrating on the film in order to benefit from its attention diverting potential. Some children may adapt fully on initial presentation of a visual distractor while for other children it may require a process of repeated exposures over time.

In addition to the brief film there are a variety of visually conspicuous stimuli in the treatment room that compete for the child's attention. It is possible that the child's processing of visual stimuli is first directed to the immediate treatment environment. In some cases it was evident that the children found the brief film and the treatment environment both interesting. The children's rapid shifts of attention illustrated attempts to attend to both. However, it was apparent that the brief film could not compete with some aspects of the medical procedure such as needle insertion.

It is also possible that the assessment tool used, Observational Scale of Behavioural Distress (OSBD) may not have been sensitive enough to demonstrate the subtle differences in the children's behaviour when the brief film distractor was used. The

(OSBD) was designed for invasive medical procedures such as, bone marrow aspirations and lumbar punctures which are known to be extremely painful and distressing for children (Jay et al., 1985; Zeltzer & LeBaron, 1982). From informal observations it was evident that when the distractor was available there tended to be an increase in verbal interaction between the child, parent and nurse about the distractor. The children displayed less facial tension and more relaxed body postures. These behavioural changes appeared to demonstrate less behavioural distress but were unable to be quantified using the OSBD.

Analysis of experiment one data shows that the short story created the highest levels of attention diversion and had a significantly greater impact on children's behavioural distress than either the cartoon film or no distraction. There are several plausible reasons for this result. Firstly, the attention diversion created by the distractor decreased the children's behavioural distress directly by modifying perception of pain. Secondly, the parental involvement in the story potentiated the attention diversion effectiveness of the distractor. Thirdly, distractor characteristics (e.g., novelty) assisted in the diversion of attention. Finally, the children's anticipatory distress was altered by the distractor.

Although there is some evidence that distraction works through the modification of pain pathways (Bandura, O'Leary, Taylor, Gauthier & Gossard, 1987). It is also possible that the short story distractor altered the stressfulness of the medical situation for the child and consequently reduced physiological arousal. When the short story was in use it often altered the child's level of anxiety and fear about the impending procedure. McGrath and Craig (1989) argue that the utility of distraction is established when it alters the child's perception of the stressful situation, as this perception may precipitate pain.

The literature suggests that anticipatory distress is most likely to occur with repeated medical procedures. In this study children's anticipatory distress ranged from subtle behaviours (e.g., a look of concern) to very overt behaviours (e.g., crying and screaming) prior to a procedure. The children's level of anticipatory distress may have

been altered when the short story was in play. It is probable that the short story distractor reduce awareness of the stimulus which elicited the anticipatory distress. A decrease in a child's anticipatory distress is likely to alter the child's overall behavioural distress level.

The parent-child interaction created during the short story condition may also have had an impact on child behavioural distress. It is possible that the short story's effect was attributable to the interactions between the parent and the child. For example, while reading the story parents often actively facilitated their child's involvement at times when the child was most likely to attend to pain arousing stimuli (e.g. needle insertion or withdrawal). It was observed that parents verbally reinforced the children to focus their attention on the distractor. This helped create a situation where the child had less attentional capacity to absorb pain eliciting stimuli. In addition there was a change in the nature of the interaction between the parent and child when the short story was in use. The child often became the point of social focus, providing a sense of support for the child, in comparison to the condition where there was no distraction and the interaction often involved the child being 'talked over' and therefore an object in the treatment environment.

Much research has attempted to relate parent anxiety to child distress during medical procedures (Blount et al., 1989; Blount et al., 1990; Jacobsen et al., 1990; Fassler, 1985; Manne et al., 1992; Shaw & Routh, 1982). The literature reports that high levels of child distress during cancer procedures occur when parents engage in behaviours that communicate anxiety (Blount et al., 1989; Blount et al., 1990). In this study, although not overtly distressed, most parents acknowledged that their distress level increased if there were procedural problems or their child was visibly distressed. In this study the parents active involvement in the short story (i.e., reading to the child) may have in fact distracted the parent, reducing parental anxiety and consequently inhibiting communications of anxiety to the child therefore reducing children's behavioural distress.

From informal observations throughout the study it is possible to conclude that there are a variety of factors that determine if a parent's anxiety is communicated to the child. Hospital stay, time since diagnosis, coping by parent and child, physiological condition of the child, are immediate variables that are likely to influence child-parent interaction. These factors are not only likely to determine whether parent anxiety is passed to the child but also the child's behavioural responses during procedures. For example, if the parent and child have endured a long stay in hospital the increased level of distress argues that their tolerance to medical procedures is reduced.

It was evident in the study that parent-medical staff interaction during procedures focused around communications regarding procedure-related issues, "*what chemo is this*", "*are those bloods for a liver function test*". From observations it was evident that procedure-related talk between the parent and health professionals reduced attention to the child. When children were excluded from the social interaction it appeared to increase their attention to procedural activities and medical materials (e.g., needle, syringes, swabs). Furthermore, it was observed that during the parent-nurse interaction the parent was less likely to pick up or respond to the child's comfort seeking gestures. As a result the child's attention to the procedure and materials and exclusion from the social interaction was likely to increase their anxiety and distress.

However, procedural talk between medical staff and parents is understandable. Procedure-related talk may assist in decreasing parent distress by reducing any anxieties they may have about the procedure. For example, the parent finds out exactly what is to happen to their child, what the treatment will do, and why the child requires the procedure. Thus information-seeking possibly assists the parent in coping with the medical situation.

When examining the efficacy of the two distractors it is useful to compare the requirements of each. While the brief film was interesting, the active requirements were minimal involving mainly the child's input perception system. In contrast, the short story facilitated the active involvement of the child, utilising both the input perception system and motor output. This active involvement may have made both the short story more interesting and placed greater demands on the information processing system

allowing less resources for the processing of pain and distress information. With young children it is perhaps the degree of active involvement and facilitated interest in the distractor that determine a distractor's capacity to alter pain perception.

From the observations and analysis we can conclude that the type of distractor is likely to determine the quantity and duration of attention diversion. For example, because the children were required to continually focus their attention on the brief film, the demand of this task was possibly overburdening. In this case the child only makes periodic attempts during the procedure to visually focus attention on the film. This is further affected by factors such as the child's initial level of distress, interest in the actual task, parent-nurse facilitation of the distractor, invasiveness and duration of the procedure. Although these factors are likely to affect the diversionary capacity of any distractor used they become more salient with young children.

In comparison, the short story which encouraged the children to push buttons that emitted sounds, turn pages, and had bright pictures and words to look at, appeared to be more engaging and consequently more salient. In addition, during times where pain eliciting stimuli were most likely to draw the child's attention the parent could direct attention back to the distractor. The distractor also allowed the child a choice of actively participating (e.g., pushing the sounds) or just listening to their parent read. In conclusion, it would seem that those distractors which do not create continuous interest and active involvement will be less effective in diverting a child's attention.

The majority of children in experiment one were very willing to engage in the story condition with their parents. During this intervention all of the children actively pushed the sounds on the book, often helped turn pages and requested another musical book to read when the first was completed. Under these circumstances one might assume that the child had a stronger sense of control in the medical procedure because they were taking an active role. This active role also alters the content of the procedure. For example, reducing the level of procedural talk and the child's focus on medical materials. McGrath (1990a) suggests that all children require a sense of control and this can be provided by allowing them to have as much choice as possible during invasive procedures.

It was observed during the study that the children used a variety of coping strategies during medical procedures when distraction conditions were not in effect. The effectiveness of these strategies was difficult to empirically evaluate. It was evident in the study that children who utilised some form of coping did so more in response to the stressfulness of the procedure than as techniques to relieve pain. For example, the young children in experiment one often engaged in self talk, external attention diversion and requesting comfort, at the very beginning and end of a procedure. This behaviour was less likely to occur during the time of extreme noxious stimulation at which point the children were more likely to display behavioural distress than coping behaviours. It is also possible that the children also engaged in internal forms of coping, (i.e., imagery) that were unquantifiable in this study.

Experiment Two

On the evidence provided by experiment two the video games were excellent age appropriate distractors for the children. From the case observations it is possible to conclude that the video games had a profound effect on the children's behavioural manner during procedures. For example, during the intervention sessions children displayed significantly less muscular rigidity, were more verbally interactive in the treatment room, and clearly showed less interest in the mechanics of the procedure.

The tables depicting treatment duration and level of distraction in experiment two portray very high levels of attention diversion for each case. However, the graphs in most cases illustrate across sessions that the children's self rated pain remained constant between baseline and intervention sessions. On this evidence it appears that even though the video game was attended to, self reported pain was in most cases unaffected. It is possible that the distractor only altered behavioural outputs of pain and not actual pain perception. In addition, the discrepancy in results between the child self reported pain and their observed behaviour is possibly a result of the pain assessment tool used. The 5-point faces scale may not be sufficiently sensitive to detect the subtle effects of the intervention on self reported child pain.

In this experiment it was often observed that children actively participated in procedures by taking off the plaster that held the EMLA cream over the puncture site. Taking the plaster off was clearly quite painful. It was evident that this behaviour was a form of control for the child in the medical situation. The literature suggests that such behaviour by the child can influence their tolerance to the aversiveness of the medical procedure (Thompson, 1981). In comparison, when medical personnel remove the plaster the child has no choice but to endure the experience.

The children in this experiment typically remained rigid, and motionless during the medical procedures. It was evident that the children remained motionless in order to cope with the preceding needle insertion or withdrawal. Branson et al., (1990) suggest that the restricting of movement or activity indicates that the child purposely lays still in order to cope with pain experienced. In contrast, the children were less likely to show the same still and rigid body manner when the video game was in play. It is possible that the video game provided the children with a suitable technique to cope with the invasive experience.

In one case the child was rewarded for his attention to the video game. The prediction was that this reinforcement would increase the salience of the video game to the child in comparison to the condition where there was no reward for attending to the video game. The increase in salience of the video game would exert its impact on behavioural distress by altering pain perception. From the observations it is possible to conclude that there was no effect on the child's level of attention to the video game or any distinctive changes in the child's behaviour between reward conditions and no reward conditions. The video game itself created high levels of attention diversion. Thus, the reward could have little impact on the child's level of attention diversion.

The pilot study in this experiment illustrates the utility of distraction during more distressing and invasive procedures such as lumbar punctures. Both distractors in the pilot study were effective in lowering the child's behavioural distress. With young children pharmacological sedation is often required for invasive procedures such as

lumbar punctures. This prevents any needless suffering or distress, and also reduces the possibility of accidents or child pain behaviours causing procedural interruptions. As there is accompanied risk to sedation local anaesthetics are more often used and are likely to be conducted with restraint to prevent motor movement that could be injurious to the child. However, physical restraint is likely to exacerbate the child's anxiety and pain experience. It is also possible that the anaesthetic effect of the local used for the lumbar puncture is hindered by the child's high level of arousal. In contrast, when restraint is not required, (as found during a lumbar puncture when the short story distractor was used), the child's calm and relaxed manner possibly aids the sedative effect of the local administered and the efficacy with which the procedure can be completed.

GENERAL DISCUSSION

Behavioural interventions that have utilized parents have created favourable outcomes (see Blount et al., 1990; Manne et al., 1990). As found in this study parental anxiety is likely to decrease as their role in the medical setting becomes less ambiguous and as their own attention is demanded by the distraction task. Parent involvement in the treatment setting can also serve to interrupt negative patterns of parent-child interaction which appear to be related to increased child distress. Recognising parent behaviour that affects children's pain perception is essential for optimal pain management.

Over the course of the study it was observed how environmental, familial and behavioural factors influence child behavioural distress. For example, in the hospital in which this study occurred the pretreatment environment is an area where children can play and there is moderate noise. This is a sharp contrast to the treatment environment which is sterile, white, quiet and in which medical staff are gowned and masked. It was noticeable that when the children moved from the pretreatment to treatment environment their demeanour changed appearing more apprehensive and concerned.

The impact of familial cues on the child was demonstrated in a case where the mother only was present with the child during mildly noxious procedures e.g., finger pricks and injections. However, when the child was required to undergo more aversive

procedures such as lumbar punctures both parents were present. In this case the presence of both parents appeared to be a cue to the child of a more aversive procedure. The child became more apprehensive about the procedure which may have enhanced anticipatory distress and experienced pain.

Behavioural factors are evident in cases where the child's response to a procedure is to cry, scream, or resist because of lack of preparation or modes of coping. The child's distress behaviours in this case can often exacerbate the pain they experience. It is also possible that the child generalises the pain experienced. In this case the actual pain is not only experienced at needle insertion but throughout the entire procedure. For example, the application of sterile solution to the Port-A-Cath site becomes as painful as the needle access.

In summary, it is clear that medical procedures evoke significant fear and anxiety in all children who are subject to them repeatedly. The amount of behavioural distress a child may display is dependent on a variety of factors, for example developmental level (Katz et al., 1980; LeBaron and Zeltzer, 1984) time in hospital, the child's environment and family. It would also appear that if a child engages in activities that facilitate diversion of attention during procedures they are less likely to develop anticipatory anxiety and distress and experience pain.

Recommendations to Medical Personnel

The study illustrates that procedures differ in length and protocol. Every procedure requires a set up time (preparation phase) where materials are readied for the actual treatment phase. In this study during the preparation phase the child was usually present awaiting the procedure. The preparation phases in this study varied from 30 seconds up to 13 minutes. When distraction was not in play it was observed that a child waiting in a treatment room is likely to direct their attention to procedure materials. Needles, syringes and other preparation materials can be distress provoking for young children. This distress can be avoided by setting up materials prior to the child's entry into the treatment room.

It was observed in this study that the mechanics of a procedure can be altered. Initially the accessing of a child's Port-A-Cath required a three to four minute rub of the puncture site with a scrub and sterile solution (i.e., phase 2 of the procedure). The data shows that this phase of the Port-A-Cath accessing could be as long as nine minutes. During this time the child is most likely to encounter pain as a consequence of pressure on the Port-A-Cath site when scrubbed and anxiety in response to ensuing needle insertion. Towards the end of the research medical personnel altered this phase from a four minute scrubbing with two solutions to include only one scrub solution applied to the skin area for one minute.

Reducing a procedure to minimal possible time is highly likely to have significant impact on children's behavioural distress since there is less time for the child to focus on distressing stimuli and experience pain. In the medical setting it is important to continually review the protocols for procedures to see how they can be altered to benefit the wellbeing of the child. Altering the mechanics of a procedure not only reduces the trauma for the child but also improves the efficacy of staff operations.

Medical staff play a very significant role in a child's life while they are in hospital. This role is even more important for oncology children who can be in hospital for lengthy periods of time. In this study it was observed that mechanics of the procedure and level of nurse experience were two of the most relevant factors affecting nurse-child interactions. For example, nurses who had extensive experience in the mechanics of a procedure were more likely to be interactive with the child in addition to carrying out the medical procedure. This interaction often took a positive form of facilitating the use of a distractor "*look at the video*", "*what is that sound on the book*" or when the distractor was not present "*what did you do today at school*", "*what are you going to do today*". It is possible to speculate that nurse verbal encouragements assist the child in completing the distractive task or coping with the medical procedure by focusing the child's attention on events other than the procedure.

Research Summary

The study set out to determine whether there was any utility in using distraction with children undergoing medical procedures for cancer treatment. The results obtained suggest there is a need for the use of distraction tasks during medical procedures. It is clear that in addition to decreasing children's behavioural distress there are several other advantages which arise from the use of distraction. For example, in the present study when distractors were in use, treatment room atmosphere was less tense, there was more verbal interchange about the distractor between the parent, nurse and child and less procedure-related talk occurred. In conclusion, this study supports prior research that has incorporated distraction into paediatric behavioural interventions to reduce distress and other negative symptoms (Manne, Bakeman, Jacobsen & Redd, 1993; Manne et al., 1990; Redd et al., 1987).

Carey and Burish (1988) question the utility of externally generated distraction. One of the cautions Carey and Burish (1988) make that is most applicable to this study is, the ability of external distractors (e.g., video games) to maintain novelty over time. It was clearly evident from the observations in experiment two that children were obviously continually challenged by the video games. The children found the video games exciting, motivational, and diversional over long periods of time. Loftus and Loftus (1983) argue that sustained involvement is possible because the level of difficulty (i.e., challenge) of most games increases during extended play.

An additional advantage of external distraction is that little or no therapist input or training for the child is required. This is an asset in settings where therapists are not available to implement psychological interventions. External distractors can also be implemented quickly and show immediate benefits in the control of chemotherapy side effects (Kolko & Rickard-Figueroa, 1985; Redd et al., 1987) and acute pain (Fowler-Kerry & Lander, 1987). For some institutions external distractors are possibly the only financially viable strategy available to assist children during invasive procedures.

Future Research

Children with cancer require repeated procedures, venipunctures, Port-A-Cath accessing, intramuscular injections, lumbar punctures and bone marrow aspirations. Continuous medical procedures create fear, anxiety and distress in children. In this situation children are at risk of experiencing more intense pain from procedures. Clearly psychological interventions are required to assist children to cope with procedural experiences.

In conclusion, utilizing distraction to divert a child's attention away from procedural stimuli and pain is essential for the wellbeing of children undergoing oncology procedures. However, distractors that do not create active involvement for children will hold little of their attention. Awareness of this reinforces the need to look for distraction strategies that are not only age appropriate but interesting and challenging for children. These are essential factors a distractor must incorporate to be effective in pain suppression. The finding that a distractor's efficacy can be partially determined by the extent to which the parent promotes its use suggests that distraction tasks must incorporate parent involvement. This is most relevant to distractors used with young children who respond mostly to their parents in medical situations. Future research needs to examine how children spontaneously cope with aversive medical procedures and how these coping strategies can be potentiated through parental involvement.

The generality of the findings in this study remain to be tested on a larger scale. More work is needed to determine the effectiveness of various distractors with children of different ages undergoing different medical procedures. The increasing realisation that children's pain system is plastic and complex means that children have an ability to reduce their pain with a variety of techniques, such as distraction, hypnosis and imagery. In the paediatric setting pain management should not merely include the choice of drug therapy but also an array of psychological interventions. Optimally a combination of both disciplines will assist in alleviating pain and anxiety in children.

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APPENDIX A

INFORMATION SHEET: EXPERIMENT ONE

PARENT AND CHILD INFORMATION SHEET

THE USE OF DISTRACTION WITH YOUNG CHILDREN DURING CANCER TREATMENT

INTRODUCTIONS

This year I will be completing part of my Master's degree with research into childhood cancer. As I am very interested in childhood psychology I have looked at areas that need research and can benefit children in the process. The area I have chosen to examine is young children with cancer and how the use of distraction can be beneficial to their wellbeing.

WHAT THE INVESTIGATION INVOLVES

The purpose of this study is to provide young children with a distraction that is interesting and will decrease, distress, anxiety and pain that is commonly associated to cancer treatment. Although distraction has been examined in many different situations little research has looked at distraction during cancer treatment.

Often people utilize the methods of distraction without realizing it. When an infant is hurt and cries in pain, parents provide comfort and reassurance after attending to the cause of the pain. They then attempt to distract the infant and divert attention away from the pain. Distraction helps the child to actively alter their perception of pain as this task consumes some degree of the child's attention that would otherwise be devoted to pain perception.

Research has shown that distraction can offer young children, altered perceptions of pain, decreased anxiety and distress during medical procedures, a reduction in

experienced pain, positive adjustment to cancer treatment and entertaining ways of coping with invasive medical procedures.

WHAT WILL HAPPEN IN THIS STUDY

In this study we will look at distraction with your child when they receive treatment for their cancer. When your child receives treatment for their cancer on some occasions we will provide him/her with a video (i.e., play school) or a short story to listen to. The aim is to distract the child's attention away from the treatment and focus it on the distractor (e.g., story/video). During this time the child will be recorded on video. The video recording will be used to assess pain behaviours, anxiety and distress. By providing the child with a story to listen to we hope the child will experience less distress and anxiety which is often associated with cancer treatment. Upon completion of the study the video tapes will be destroyed.

We are not evaluating your child and results are readily available from the researcher. In addition participation is optional; *you and your child have the option to not participate and are free to withdraw at any stage.*

We would like permission for your child to take part in this study. Please complete the attached permission indicating if you would like your child to participate. Thank you for your cooperation.

If you require further information or have any questions concerning the project, please do not hesitate to contact:

Selwyn Mason

WELLINGTON



Malcolm Johnson

PALMERSTON NORTH

Ph. (06) 356-9099

Ext. (8356)

Cheryl Woolley

PALMERSTON NORTH

Ph. (06) 356-9099

Ext. (8332)

INFORMATION SHEET: EXPERIMENT TWO*PARENT AND CHILD INFORMATION SHEET*THE USE OF DISTRACTION WITH YOUNG CHILDREN
DURING CANCER TREATMENTINTRODUCTIONS

My name is Selwyn and this year I will be completing part of my masters in psychology with research in childhood cancer. Through my studies at university I have become very interested in the field of childhood psychology. This year my research will examine how young children with cancer can make use of distraction during their treatment.

WHAT THE INVESTIGATION INVOLVES

During the course of their treatment children with cancer face many challenges, one challenge is coping with medical procedures. The purpose of this study is to provide young children with a distraction that will decrease, distress, anxiety and pain that is commonly associated to cancer treatment. Although distraction has been examined in many different situations little research has looked at distraction during cancer treatment.

Often people utilize the methods of distraction without realizing it. When an infant is hurt and cries in pain, parents provide comfort and reassurance after attending to the cause of the pain. They then attempt to distract the infant and divert attention away from the pain. Distraction helps the child to actively alter their perception of pain as this task consumes some degree of the child's attention that would otherwise be devoted to pain perception.

Research has shown that distraction can offer young children, altered perceptions of pain, decreased anxiety and distress during medical procedures, a reduction in experienced pain, positive adjustment to cancer treatment and entertaining ways of coping with invasive medical procedures.

WHAT WILL HAPPEN IN THIS STUDY

In this study we will look at distraction with your child when they receive treatment for their cancer. Before your child receives treatment we will ask them to indicate on a pain scale how they are feeling. We will do this again after they have had their treatment so we get an idea of any changes and if they are due to the distraction.

The parent(s) will be asked to fill out a small questionnaire. This questionnaire asks if the child has experienced any sickness or ill feeling prior to their cancer treatment and afterwards. When your child receives treatment for their cancer on some occasions we will provide him/her with a video game to play. The aim is to distract the child's attention away from the treatment and focus it on the game. During this time the child will be recorded on video. The video recording will be used to assess pain behaviours, anxiety and distress. By using distraction we hope the child will experience less nausea, distress and anxiety which is often associated to cancer treatment. Upon completion of the study the video recordings of the sessions will be destroyed.

We are not evaluating your child and results are readily available from the researcher. In addition participation is optional; *you and your child have the option to not participate and are free to withdraw at any stage.*

We would like permission for your child to take part in this study. Please complete the attached permission slip indicating if you would like your child to participate. Thank you for your cooperation.

If you require further information or have any questions concerning the project, please do not hesitate to contact:

Selwyn Mason

WELLINGTON



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Ph. (06) 356-9099

Ext. (8356)

Cheryl Woolley

PALMERSTON NORTH

Ph. (06) 356-9099

Ext. (8332)

APPENDIX B

PARENTAL CONSENT FORM: EXPERIMENT ONE

PARENT CONSENT FORM

TITLE

THE USE OF DISTRACTION WITH YOUNG CHILDREN
DURING CANCER TREATMENT

PRINCIPAL INVESTIGATOR

Selwyn Mason



VENUE OF TRIAL

WELLINGTON HOSPITAL CHILDRENS WARD

AIM OF THE INVESTIGATION

This research aims to examine the effectiveness of distraction as a way of decreasing a child's perceived pain, distress and anxiety prior to and during a medical procedure. The main objectives here are to offer children a method of dealing with distressing medical procedures and to illustrate the effectiveness of distraction as a means of decreasing anxiety, distress and pain in children with cancer.

NAME OF CHILD:

TODAY'S DATE

CHILD'S BIRTHDATE

CHILD'S AGE

I HAVE READ THE CONSENT FORM AND HAVE HAD THE OPPORTUNITY FOR DISCUSSION WITH SELWYN MASON. I UNDERSTAND THAT THE PROCEDURES HAVE BEEN APPROVED BY THE WELLINGTON HEALTH ETHICS COMMITTEE OF THE CENTRAL REGIONAL HEALTH AUTHORITY. I HAVE DISCUSSED THIS INVESTIGATION WITH MY CHILD AND AM SATISFIED THAT SHE/HE FULLY UNDERSTANDS IT, AND THAT HIS/HER CONSENT IS FREELY GIVEN. I KNOW THAT I MAY WITHDRAW MY AGREEMENT AT ANY TIME AND THIS WILL IN NO WAY INTERFERE WITH MY CHILD'S TREATMENT IN HOSPITAL.

PLEASE TICK (✓) ONE OF THE SPACES BELOW:

YES, MY CHILD MAY PARTICIPATE

PARENT'S SIGNATURE:

INVESTIGATORS SIGNATURE:

DATE

STATEMENT BY THE WITNESS/PATIENT ADVOCATE.

I HAVE DISCUSSED THIS CONSENT FORM WITH THE PARENT OF THE CHILD PATIENT AND AM SATISFIED THAT SHE/HE FULLY UNDERSTAND IT AND THAT HIS/HER CONSENT IS FREELY GIVEN.

SIGNATURE OF WITNESS/

PATIENT ADVOCATE

DATE



IF YOU HAVE ANY CONCERNS ABOUT THIS PROJECT WHICH YOU WOULD LIKE TO DISCUSS WITH AN INDEPENDENT PERSON YOU MAY WRITE TO THE CHAIRPERSON OF THE WELLINGTON HEALTH ETHICS COMMITTEE, CENTRAL REGIONAL HEALTH AUTHORITY, GROUND FLOOR, SEDDON BLOCK, ROOM 48, WELLINGTON HOSPITAL, PRIVATE BAG, WELLINGTON SOUTH.

PARENTAL CONSENT FORM: EXPERIMENT TWO.

PARENT CONSENT FORM

TITLE

THE USE OF DISTRACTION WITH YOUNG CHILDREN
DURING CANCER TREATMENT

PRINCIPAL INVESTIGATOR

Selwyn Mason



VENUE OF TRIAL

WELLINGTON HOSPITAL CHILDRENS WARD

AIM OF THE INVESTIGATION

This research aims to examine the effectiveness of distraction as a way of decreasing a child's perceived pain, distress and anxiety prior to and during a medical procedure. Distressing symptoms such as nausea, vomiting, anxiety and pain are common to cancer treatment. The main objectives here are to offer children a method of dealing with distressing medical procedures and to illustrate the effectiveness of distraction as a means of decreasing anxiety, distress and pain in children with cancer.

NAME OF CHILD:

TODAY'S DATE

CHILD'S BIRTHDATE

I HAVE READ THE CONSENT FORM AND HAVE HAD THE OPPORTUNITY FOR DISCUSSION WITH SELWYN MASON. I UNDERSTAND THAT THE PROCEDURES HAVE BEEN APPROVED BY THE WELLINGTON AREA HEALTH BOARD ETHICS COMMITTEE. I HAVE DISCUSSED THIS INVESTIGATION WITH MY CHILD AND AM SATISFIED THAT SHE/HE FULLY UNDERSTANDS IT, AND THAT HIS/HER CONSENT IS FREELY GIVEN. I KNOW THAT I MAY WITHDRAW MY AGREEMENT AT ANY TIME AND THIS WILL IN NO WAY INTERFERE WITH MY CHILD'S TREATMENT IN HOSPITAL.

PLEASE TICK (✓) THE SPACE BELOW:

YES, MY CHILD MAY PARTICIPATE

PARENT'S SIGNATURE:

INVESTIGATORS SIGNATURE:

DATE

IF YOU HAVE ANY CONCERNS ABOUT THIS PROJECT WHICH YOU WOULD LIKE TO DISCUSS WITH AN INDEPENDENT PERSON YOU MAY WRITE TO THE CHAIRPERSON OF THE WELLINGTON AREA HEALTH BOARD ETHICS COMMITTEE, GROUND FLOOR, SEDDON BLOCK, ROOM 48, WELLINGTON HOSPITAL, PRIVATE BAG, WELLINGTON SOUTH.



STATEMENT BY THE WITNESS/PATIENT ADVOCATE.

I HAVE DISCUSSED THIS CONSENT FORM WITH THE PARENT OF THE CHILD PATIENT AND AM SATISFIED THAT SHE/HE FULLY UNDERSTAND IT AND THAT HIS/HER CONSENT IS FREELY GIVEN.

SIGNATURE OF WITNESS/

PATIENT ADVOCATE

DATE

APPENDIX C

CHILD CONSENT FORM: EXPERIMENT TWO*CHILD CONSENT FORM*THE USE OF DISTRACTION WITH YOUNG CHILDREN
DURING CANCER TREATMENT

Selwyn is doing a study in childhood cancer, as a part of your treatment programme sometimes you can play video games. The game you will play will be chosen by you.

Selwyn will ask you some questions before your treatment and video what is happening in the room. As a part of this study there will be times during your treatment when the video game will not be used.

I have read this and talked with Selwyn and my parent(s)/guardian about it and I am pleased to take part in this study.

I know that I don't have to take part in this study if I don't want to.

SIGNATURE OF CHILD

SIGNATURE OF INVESTIGATOR

DATE

STATEMENT BY THE WITNESS

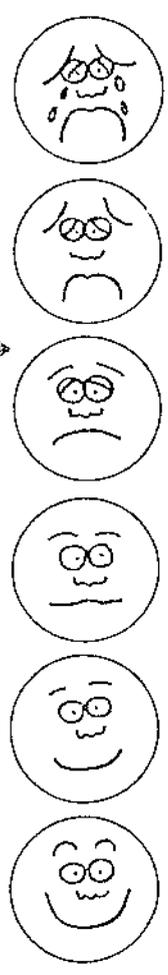
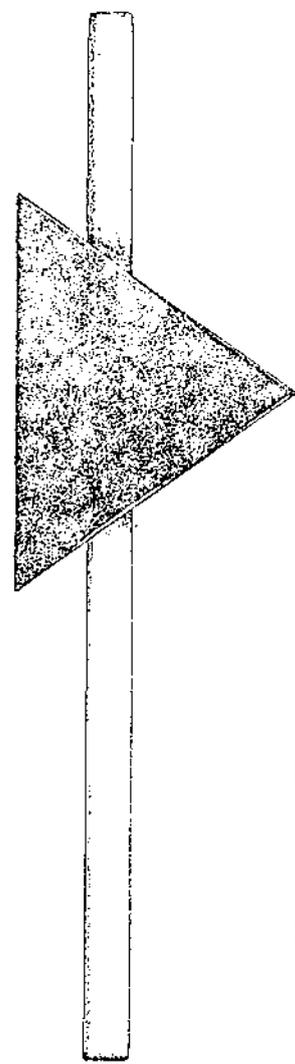
I have discussed this consent form with the child patient and I am satisfied that she/he fully understands it and that her/his consent is freely given.

SIGNATURE OF WITNESS

DATE

APPENDIX D

THE PAIN THERMOMETER



The most pain you have ever felt.

5

4

3

2

1

0

No Pain at all.



The Children's Pain Trust

APPENDIX E

Observational Scale of Behavioural Distress - Revised

Information
Scoring Procedures
Definitions of Behaviours
OSBD Interval Coding Form

Developed by Susan M. Jay, Ph.D
and Charles Elliott, Ph.D.

Revised 1986

This Scale is to be used only with permission of the authors.

write to:

Susan M. Jay, Ph.D.
Psychosocial Program
Division of Hematology-Oncology
Childrens Hospital of Los Angeles
4650 Sunset Boulevard
Los Angeles, California 90027
(213) 669-2392

Observation Scale of Behavioral Distress - Revised

Introduction

The Observation Scale of Behavioral Distress (OSBD) constitutes an objective measure of behavioral distress in children undergoing bone marrow aspirations (BMA's) and lumbar punctures (spinal taps) procedures and can be modified for use with other medical procedures. The OSBD consists of operationally-defined behaviors indicative of anxiety and/or pain in children. The original OSBD consisted of 11 behaviors and was developed with the following features which included the following modifications of the Procedure Behavior Rating Scale (PBRS) developed by Katz, Kellerman, and Siegel (1980): a) the continuous recording of behaviors in 15-second intervals rather than one gross recording over an entire phase; and b) each behavioral category in the OSBD was weighted according to intensity (e.g. screaming and flailing are perceived as more intense indicators of distress than crying and verbal resistance). Intensity scores were generated by averaging independent ratings of three experienced clinic personnel. Rating scores between these three clinicians were highly similar and none differed more than one point on a 4-point scale for any behavioral category.

Item Analysis of Original OSBD

The original OSBD contained 11 behavioral categories: Nervous Behavior, Information Seeking, Cry, Scream, Restraint, Verbal Resistance, Requests Emotional Support, Muscular Rigidity, Verbal Fear, Verbal Pain, and Flail. These 11 behavioral categories were subjected to an item analysis in which individual category scores were scored for frequency of occurrence, were intercorrelated, and were correlated with total OSBD scores. Item analyses were conducted for the total sample and for each age

group separately. The purpose of the item analysis was to eliminate any categories which were of extremely low frequency and those which were not correlated with other behavioral categories or to total OSBD scores.

The criterion for eliminating any behavioral category was as follows:

a) category scores had to occur for at least 10 percent of the subjects, and
b) category scores had to have an item-total correlation coefficient of $+ .3$ or more for the total sample and/or for at least one age group. An exception to this criteria was made for one category "Emotional Support" because it correlated $.28$ for the young age group and it was a high frequency item, that is, it occurred in over half the sample.

Results indicated that eight of the eleven OSBD categories met the criterion and three were eliminated. Verbal Fear was eliminated because it occurred in only 5 percent of the total subjects. Furthermore, it never occurred in children above the age of 6 years. Nervous Behavior was eliminated because it correlated $.07$ with the total score for the total sample, $-.28$ for children aged 4 to 6 years, and $-.11$ for children aged 7 to 14 years. Muscular Rigidity was eliminated because it correlated $-.20$ with the total score for the total sample, $-.17$ for children aged 4 to 6 years, and $-.37$ for children aged 7 to 14 years. Thus, Muscular Rigidity appeared to be a behavior which occurred when other distress behaviors were not occurring. In other words, more stoic children and/or children who coped well were more likely to react to the painful stimulus by tensing their muscles, rather than by crying, screaming, flailing, expressing verbal pain, etc. Given the nature of the OSBD, this item does not contribute to the scale since it does not appear to be measuring behavioral distress per se.

Cronbach's Alpha Test of Internal Consistency was conducted before and after elimination of Nervous Behavior, Verbal Fear, and Muscular Rigidity. Results before the categories were eliminated indicated an alpha internal

consistency coefficient of .68. The alpha internal consistency coefficient after the behaviors were eliminated was .72.

Observation Procedures

Observers record behaviors using the OSBD in continuous 15-second intervals during four phases of the medical procedures. The 15-second intervals are indicated on an audiotape which the observer listens to through an earphone while observing the procedures. The time period encompassing the procedures are divided into four phases for the purpose of observation. Phase 1 consists of the first 3 minutes (12 intervals) in the treatment room (measurement of anticipatory anxiety). Phase 2 begins with the first cleansing and the "numbing gun" and ends with Phase 3. Phase 3 begins with the second cleansing of the aspiration site and includes the actual procedure. Phase 4 begins with the removal of the needle and lasts for one and one-half minutes (measurement of post-procedure recovery).

NOTE: Phases of medical procedures may differ at different institutions due to different techniques and methods of conducting procedures. Also, Phase 1a may be added to include the child's distress behaviors occurring from the time the child is instructed to lay down to the time of the first cleansing (onset of Phase 2).

Reliability

The reliability of the OSBD has been documented in a number of studies (Jay, Ozolins, Elliott, & Caldwell, 1983; Jay & Elliott, 1984; Jay & Elliott, 1986). Reliability was calculated by dividing the number of agreements within each 15-second interval by the total number of agreements plus disagreements.

In these studies, independent reliability checks were conducted during 10-20 percent of the medical procedures. The results of percent agreement in

these studies ranged from 80 to 84 percent. Pearson correlation coefficients calculated between total OSBD scores ranged from 97 to 99 percent.

Validity

The validity of the OSBD has been demonstrated in several studies. The validity of the OSBD was first demonstrated in a study which yielded significant correlations between OSBD Total Distress scores and a number of variables including patient self-report measures and parental report measures (Jay et al., 1983). OSBD scores were significantly correlated with children's trait anxiety scores ($\underline{r} = .63, p < .001$), children's self-ratings of anticipated pain levels prior to the procedures ($\underline{r} = .76, p < .001$), children's self-rated experienced pain during procedures ($\underline{r} = .62, p < .05$), parental ratings of child's anxiety ($\underline{r} = .38, p < .05$) and the number of anxiety symptoms in the child 24 hours prior to clinic visit ($\underline{r} = .38, p < .05$).

A second study indicated additional evidence for the validity of the OSBD (Jay & Elliott, 1984). OSBD scores were significantly related to the following measures: Nurse ratings of children's anxiety ($\underline{r} = .73, p < .001$), pulse rate of child upon arrival at clinic ($\underline{r} = .45, p < .05$), pulse rate of child when he/she entered treatment room ($\underline{r} = .61, p < .001$), pulse rate of child 3 minutes after procedure was over ($\underline{r} = .50, p < .01$), children's self-ratings of anticipated pain levels prior to procedure ($\underline{r} = .47, p < .01$) and children's self-rated experienced pain levels during procedure ($\underline{r} = .52, p < .05$).

A third study conducted between August 1982 and August 1985 (Jay & Elliott, 1986) indicated that OSBD scores were significantly correlated with the following measures: Nurse ratings of children's distress ($\underline{r} = .69, p < .0001$), fear ratings of children ($\underline{r} = .38, p < .01$), pulse rates of children

upon arrival at clinic ($\underline{r}=.38$, $p<.01$), pulse rates just before BMA ($\underline{r}=.55$, $p<.0001$), pulse rates after the BMA ($\underline{r}=.33$, $p<.01$), diastolic and systolic blood pressure upon arrival at clinic ($\underline{r}=.32$, $p<.01$ and $\underline{r}=.32$, $p<.01$, respectively), and diastolic and systolic blood pressure just before BMA ($\underline{r}=.38$, $p<.01$ and $\underline{r}=.38$, $p<.01$, respectively). Pain self-ratings were significantly correlated with OSBD scores for children above the age of 7 years, ($\underline{r}=.61$, $p<.01$ for anticipated pain, and $\underline{r}=.51$, $p<.05$ for experienced pain).

Scoring Information

The following scoring system is designed to score either BMA's or LPs separately. However, since BMA's and LPs are sometimes conducted one after the other, one could revise the scoring system and have Phase 3A include one procedure and Phase 3B include the second procedure.

The OSBD is scored to yield 4 weighted mean interval Phase scores and a Total Distress Score. Unweighted mean category scores (across phases) can also be generated if one is interested in individual behaviors of subjects.

If medical procedures vary considerably in length between children (or between persons conducting the procedure), this can distort OSBD scores. Therefore, at Childrens Hospital of Los Angeles, a pre-specified number of intervals for each phase are scored from the coding sheet since we have found wide variance in the length of procedures for different children. This variance applies only to Phases 3 and 4 since these are the procedure-related phases. Phases 1 and 4 already consist of a predetermined number of intervals (12 and 6 intervals, respectively).

The number of interval scored for each phase is as follows:

Phase 1 = First 12 intervals. If Phase 2 begins before 3 minutes or 12 intervals have passed, score whatever number of intervals occurred.

Phase 2 = First 3 intervals. If Phase 2 consists of less than 3 intervals, score whatever number of intervals occurred.

Phase 3 = Last 8 intervals (this is done so that actual aspiration is always scored). If Phase 3 consists of less than 8 intervals, score whatever number of intervals occurred.

Phase 4 = 6 Intervals after end of Phase 3.

Note: These scoring procedures were developed for scoring bone marrow aspirations only. LP procedures are generally longer than BMA's and might require a different interval-scoring procedure.

Scoring Procedures (Need Interval Coding Sheet and Scoring Sheet)

1. Frequencies (F) of each behavior category are added for specified number of intervals within each phase.
2. Number of intervals scored (I) are noted for each phase.
3. Each behavioral category frequency score is then divided by the number of intervals scored in each phase, yielding unweighted mean interval category scores (F/I).
4. Each mean interval category score is multiplied by its assigned intensity weight, yielding a weighted mean interval category score (F/I X weight).
5. The weighted mean interval category scores are summed across categories, within each phase, yielding four weighted phase scores.
6. The four weighted phase scores are summed, yielding one Total Distress Score.

Note: Unweighted mean category scores can be generated, if needed, by adding the unweighted mean interval category scores across phases. These scores can yield information about individual behaviors which constitute distress and can be used for item analyses.

References

Elliott, C.M. & Jay, S.M. (1986) Multimodal assessment of children's distress during painful medical procedures. Poster session at Society of Behavioral Medicine Annual Convention, San Francisco, March.

Jay, S.M. & Elliott, C. (1984) Behavioral observation scales for measuring children's distress: The effects of increased methodological rigor. Journal of Consulting and Clinical Psychology, 52(6), 1106-1107.

Jay, S.M., Ozolins, M., Elliott, C., & Caldwell, S. (1983) Assessment of children distress during painful medical procedures. Health Psychology, 2(2):133-147.

Katz, E.R., Kellerman, J. & Siegel, S. (1980) Behavioral distress in children undergoing medical procedures: Developmental considerations. Journal of Consulting and Clinical Psychology, 48(3):355-369.

Behavioral Definitions

Information Seeking (IS)

Definition: Any questions regarding medical procedures
 Examples: "When will you stop?"
 "Is the needle in?"
 "Is the drip coming?"
 Nonexamples: "Will I get a toy?"

Cry (C)

Definition: Crying sounds and/or onset of tears--usually non-intelligible but can be double coded with verbal categories.
 Examples: Sobbing
 Screaming up face--obvious onset of tears
 Booohooohoo
 Crying sounds
 Tears (code as long as still flowing and/or sounds)
 Nonexamples: Sniffing
 Heavy breathing

Scream (S)

Definition: Loud vocal expression at high pitch/intensity, usually nonintelligible, but can be double coded with verbal categories. High pitch distinguishes this category from "Cry."
 Examples: Sharp, shrill, harsh, high tones
 Shrieks
 Nonexamples: Loud yelling but at low pitch

Restraint (R)

Definition: Child must be physically held down by staff member or parent with noticeable pressure and/or child must be exerting force, resistance in response to restraint attempts by staff. Sometimes it is not clear if the child is exercising pressure back due to tightness of restraint (i.e., child cannot move). In such cases where restraint is obvious and child's resistance is not clear, code Restraint.

Verbal Resistance (VR)

Definition: Any verbal expression of delay, termination, or resistance.
 Rule: Must be intelligible.
 Examples: "I want to go ..."
 "I want to go to the bathroom."
 "No, No, No"
 "I don't like this."
 "Let me loose."
 "Take me home."
 "Don't hurt me"
 "Stop"
 "No More"
 "Don't"
 "Let me rest"
 "Take needle out"
 "I don't want it"

Emotional Support (ES)

Definition: Verbal or nonverbal solicitation of hugs, hand holding, physical or verbal comfort by child.

Rules: Code initiation only for physical behaviors.

Examples: "Hold me"
 "I love you"
 "Momma" & "Daddy"
 "Momma please"
 "Help me"
 Grabbing at others.
 Reaching out to be held
 (Do not code "Mommy" if part of statement is appropriate for another code, e.g., "Mommy, get me out of here"=Verbal Resistance, not Emotional Support.)

Verbal Pain (P)

Definition: Any words, phrases, or statements which refer to pain, damage or being hurt, or discomfort.

Rule: Must be intelligible. May be in any tense. Can be anticipatory as well as actual. Has to be a statement, not a question. This category is distinguished from "Cry" by coding discrete intelligible words as pain (Owh, ouch) and non-word crying sounds as "Cry." Only exception is that groans without crying are coded as Verbal Pain (Ahhh).

Examples: "That hurt"
 "It stings"
 "Owww"
 "Owwhee"
 "You are killing me"
 "You are pinching me"
 "Oh!"

Nonexamples: "Will it hurt?" (=IS)

Flail (F)

Definition: Random gross movements of arms and legs or whole body. Flail often occurs in response to restraint. (Out-of-control behavior)

Rule: Must be random.

Examples: Pounding fists
 Kicking legs repeatedly and randomly
 Throwing arms out repeatedly and randomly
 Flapping arms on self or otherwise
 Child's back moving back and forth repeatedly during procedure.

CODE SHEET

Observer _____

Name _____

Date _____

Time _____

Info. Seeking	Cry	Scream	Re-Strain	Verbal Resist	Emot. Supp.	Verbal Pain	Flail
1 IS	1 C	1 S	1 R	1 VR	1 ES	1 P	1 F
2 IS	2 C	2 S	2 R	2 VR	2 ES	2 P	2 F
3 IS	3 C	3 S	3 R	3 VR	3 ES	3 P	3 F
4 IS	4 C	4 S	4 R	4 VR	4 ES	4 P	4 F
5 IS	5 C	5 S	5 R	5 VR	5 ES	5 P	5 F
6 IS	6 C	6 S	6 R	6 VR	6 ES	6 P	6 F
7 IS	7 C	7 S	7 R	7 VR	7 ES	7 P	7 F
8 IS	8 C	8 S	8 R	8 VR	8 ES	8 P	8 F
9 IS	9 C	9 S	9 R	9 VR	9 ES	9 P	9 F
10 IS	10 C	10 S	10 R	10 VR	10 ES	10 P	10 F
11 IS	11 C	11 S	11 R	11 VR	11 ES	11 P	11 F
12 IS	12 C	12 S	12 R	12 VR	12 ES	12 P	12 F
13 IS	13 C	13 S	13 R	13 VR	13 ES	13 P	13 F
14 IS	14 C	14 S	14 R	14 VR	14 ES	14 P	14 F
15 IS	15 C	15 S	15 R	15 VR	15 ES	15 P	15 F
16 IS	16 C	16 S	16 R	16 VR	16 ES	16 P	16 F
17 IS	17 C	17 S	17 R	17 VR	17 ES	17 P	17 F
18 IS	18 C	18 S	18 R	18 VR	18 ES	18 P	18 F
19 IS	19 C	19 S	19 R	19 VR	19 ES	19 P	19 F
20 IS	20 C	20 S	20 R	20 VR	20 ES	20 P	20 F
21 IS	21 C	21 S	21 R	21 VR	21 ES	21 P	21 F
22 IS	22 C	22 S	22 R	22 VR	22 ES	22 P	22 F
23 IS	23 C	23 S	23 R	23 VR	23 ES	23 P	23 F
24 IS	24 C	24 S	24 R	24 VR	24 ES	24 P	24 F
25 IS	25 C	25 S	25 R	25 VR	25 ES	25 P	25 F

CODE SHEET

Observer _____

Name _____

Date _____

Time _____

Pre Post BT
BT + Val

Info. Seeking	Cry	Scream	Re- Strain	Verbal Resist	Emot. Supp.	Verbal Pain	Flail
26 _{IS}	26 _C	26 _S	26 _R	26 _{VR}	26 _{ES}	26 _P	26 _F
27 _{IS}	27 _C	27 _S	27 _R	27 _{VR}	27 _{ES}	27 _P	27 _F
28 _{IS}	28 _C	28 _S	28 _R	28 _{VR}	28 _{ES}	28 _P	28 _F
29 _{IS}	29 _C	29 _S	29 _R	29 _{VR}	29 _{ES}	29 _P	29 _F
30 _{IS}	30 _C	30 _S	30 _R	30 _{VR}	30 _{ES}	30 _P	30 _F
31 _{IS}	31 _C	31 _S	31 _R	31 _{VR}	31 _{ES}	31 _P	31 _F
32 _{IS}	32 _C	32 _S	32 _R	32 _{VR}	32 _{ES}	32 _P	32 _F
33 _{IS}	33 _C	33 _S	33 _R	33 _{VR}	33 _{ES}	33 _P	33 _F
34 _{IS}	34 _C	34 _S	34 _R	34 _{VR}	34 _{ES}	34 _P	34 _F
35 _{IS}	35 _C	35 _S	35 _R	35 _{VR}	35 _{ES}	35 _P	35 _F
36 _{IS}	36 _C	36 _S	36 _R	36 _{VR}	36 _{ES}	36 _P	36 _F
37 _{IS}	37 _C	37 _S	37 _R	37 _{VR}	37 _{ES}	37 _P	37 _F
38 _{IS}	38 _C	38 _S	38 _R	38 _{VR}	38 _{ES}	38 _P	38 _F
39 _{IS}	39 _C	39 _S	39 _R	39 _{VR}	39 _{ES}	39 _P	39 _F
40 _{IS}	40 _C	40 _S	40 _R	40 _{VR}	40 _{ES}	40 _P	40 _F
41 _{IS}	41 _C	41 _S	41 _R	41 _{VR}	41 _{ES}	41 _P	41 _F
42 _{IS}	42 _C	42 _S	42 _R	42 _{VR}	42 _{ES}	42 _P	42 _F
43 _{IS}	43 _C	43 _S	43 _R	43 _{VR}	43 _{ES}	43 _P	43 _F
44 _{IS}	44 _C	44 _S	44 _R	44 _{VR}	44 _{ES}	44 _P	44 _F
45 _{IS}	45 _C	45 _S	45 _R	45 _{VR}	45 _{ES}	45 _P	45 _F
46 _{IS}	46 _C	46 _S	46 _R	46 _{VR}	46 _{ES}	46 _P	46 _F
47 _{IS}	47 _C	47 _S	47 _R	47 _{VR}	47 _{ES}	47 _P	47 _F
48 _{IS}	48 _C	48 _S	48 _R	48 _{VR}	48 _{ES}	48 _P	48 _F
49 _{IS}	49 _C	49 _S	49 _R	49 _{VR}	49 _{ES}	49 _P	49 _F
50 _{IS}	50 _C	50 _S	50 _R	50 _{VR}	50 _{ES}	50 _P	50 _F

CODE SHEET

Observer _____

Name _____

Date _____

Time _____

Pre Post BT
BT + Val

Info. Seeking	Cry	Scream	Re-Strain	Verbal Resist	Emot. Supp.	Verbal Pain	Flail
51 _{IS}	51 _C	51 _S	51 _R	51 _{VR}	51 _{ES}	51 _P	51 _F
52 _{IS}	52 _C	52 _S	52 _R	52 _{VR}	52 _{ES}	52 _P	52 _F
53 _{IS}	53 _C	53 _S	53 _R	53 _{VR}	53 _{ES}	53 _P	53 _F
54 _{IS}	54 _C	54 _S	54 _R	54 _{VR}	54 _{ES}	54 _P	54 _F
55 _{IS}	55 _C	55 _S	55 _R	55 _{VR}	55 _{ES}	55 _P	55 _F
56 _{IS}	56 _C	56 _S	56 _R	56 _{VR}	56 _{ES}	56 _P	56 _F
57 _{IS}	57 _C	57 _S	57 _R	57 _{VR}	57 _{ES}	57 _P	57 _F
58 _{IS}	58 _C	58 _S	58 _R	58 _{VR}	58 _{ES}	58 _P	58 _F
59 _{IS}	59 _C	59 _S	59 _R	59 _{VR}	59 _{ES}	59 _P	59 _F
60 _{IS}	60 _C	60 _S	60 _R	60 _{VR}	60 _{ES}	60 _P	60 _F
61 _{IS}	61 _C	61 _S	61 _R	61 _{VR}	61 _{ES}	61 _P	61 _F
62 _{IS}	62 _C	62 _S	62 _R	62 _{VR}	62 _{ES}	62 _P	62 _F
63 _{IS}	63 _C	63 _S	63 _R	63 _{VR}	63 _{ES}	63 _P	63 _F
64 _{IS}	64 _C	64 _S	64 _R	64 _{VR}	64 _{ES}	64 _P	64 _F
65 _{IS}	65 _C	65 _S	65 _R	65 _{VR}	65 _{ES}	65 _P	65 _F
66 _{IS}	66 _C	66 _S	66 _R	66 _{VR}	66 _{ES}	66 _P	66 _F
67 _{IS}	67 _C	67 _S	67 _R	67 _{VR}	67 _{ES}	67 _P	67 _F
68 _{IS}	68 _C	68 _S	68 _R	68 _{VR}	68 _{ES}	68 _P	68 _F
69 _{IS}	69 _C	69 _S	69 _R	69 _{VR}	69 _{ES}	69 _P	69 _F
70 _{IS}	70 _C	70 _S	70 _R	70 _{VR}	70 _{ES}	70 _P	70 _F
71 _{IS}	71 _C	71 _S	71 _R	71 _{VR}	71 _{ES}	71 _P	71 _F
72 _{IS}	72 _C	72 _S	72 _R	72 _{VR}	72 _{ES}	72 _P	72 _F
73 _{IS}	73 _C	73 _S	73 _R	73 _{VR}	73 _{ES}	73 _P	73 _F
74 _{IS}	74 _C	74 _S	74 _R	74 _{VR}	74 _{ES}	74 _P	74 _F
75 _{IS}	75 _C	75 _S	75 _R	75 _{VR}	75 _{ES}	75 _P	75 _F

CODE SHEET

Observer _____

Name _____

Date _____

Time _____

Pre Post 8T
BT + Val

Info. Seeking	Cry	Scream	Re-Strain	Verbal Resist	Emot. Supp.	Verbal Pain	Flail
76 _{IS}	76 _C	76 _S	76 _R	76 _{VR}	76 _{ES}	76 _P	76 _F
77 _{IS}	77 _C	77 _S	77 _R	77 _{VR}	77 _{ES}	77 _P	77 _F
78 _{IS}	78 _C	78 _S	78 _R	78 _{VR}	78 _{ES}	78 _P	78 _F
79 _{IS}	79 _C	79 _S	79 _R	79 _{VR}	79 _{ES}	79 _P	79 _F
80 _{IS}	80 _C	80 _S	80 _R	80 _{VR}	80 _{ES}	80 _P	80 _F
81 _{IS}	81 _C	81 _S	81 _R	81 _{VR}	81 _{ES}	81 _P	81 _F
82 _{IS}	82 _C	82 _S	82 _R	82 _{VR}	82 _{ES}	82 _P	82 _F
83 _{IS}	83 _C	83 _S	83 _R	83 _{VR}	83 _{ES}	83 _P	83 _F
84 _{IS}	84 _C	84 _S	84 _R	84 _{VR}	84 _{ES}	84 _P	84 _F
85 _{IS}	85 _C	85 _S	85 _R	85 _{VR}	85 _{ES}	85 _P	85 _F
86 _{IS}	86 _C	86 _S	86 _R	86 _{VR}	86 _{ES}	86 _P	86 _F
87 _{IS}	87 _C	87 _S	87 _R	87 _{VR}	87 _{ES}	87 _P	87 _F
88 _{IS}	88 _C	88 _S	88 _R	88 _{VR}	88 _{ES}	88 _P	88 _F
89 _{IS}	89 _C	89 _S	89 _R	89 _{VR}	89 _{ES}	89 _P	89 _F
90 _{IS}	90 _C	90 _S	90 _R	90 _{VR}	90 _{ES}	90 _P	90 _F
91 _{IS}	91 _C	91 _S	91 _R	91 _{VR}	91 _{ES}	91 _P	91 _F
92 _{IS}	92 _C	92 _S	92 _R	92 _{VR}	92 _{ES}	92 _P	92 _F
93 _{IS}	93 _C	93 _S	93 _R	93 _{VR}	93 _{ES}	93 _P	93 _F
94 _{IS}	94 _C	94 _S	94 _R	94 _{VR}	94 _{ES}	94 _P	94 _F
95 _{IS}	95 _C	95 _S	95 _R	95 _{VR}	95 _{ES}	95 _P	95 _F
96 _{IS}	96 _C	96 _S	96 _R	96 _{VR}	96 _{ES}	96 _P	96 _F
97 _{IS}	97 _C	97 _S	97 _R	97 _{VR}	97 _{ES}	97 _P	97 _F
98 _{IS}	98 _C	98 _S	98 _R	98 _{VR}	98 _{ES}	98 _P	98 _F
99 _{IS}	99 _C	99 _S	99 _R	99 _{VR}	99 _{ES}	99 _P	99 _F
100 _{IS}	100 _C	100 _S	100 _R	100 _{VR}	100 _{ES}	100 _P	100 _F

SCORING SHEET

SCORED BY _____

NAME _____

SUBJ # _____

PRE POST BT
BT + VAL

BEHAVIORAL CATEGORY
WEIGHT

IS	CRY	SCR	R	VR	ES	VP	F
1.5	2.5	4.0	4.0	2.5	2.0	3.0	4.0

PHASE 1

FREQUENCY (F)

OF INTERVALS SCORED (I)

MEAN INTERVAL SCORE=F/I

WEIGHTED MEAN INTERVAL
SCORE (X WEIGHT)

PHASE 1 TOTAL

PHASE 2

FREQUENCY (F)

OF INTERVALS SCORED (I)

MEAN INTERVAL SCORE=F/I

WEIGHTED MEAN INTERVAL
SCORE (X WEIGHT)

PHASE 2 TOTAL

PHASE 3

FREQUENCY (F)

OF INTERVALS SCORED (I)

MEAN INTERVAL SCORE=F/I

WEIGHTED MEAN INTERVAL
SCORE (X WEIGHT)

PHASE 3 TOTAL

PHASE 4

FREQUENCY (F)

OF INTERVALS SCORED (I)

MEAN INTERVAL SCORE=F/I

WEIGHTED MEAN INTERVAL
SCORE (X WEIGHT)

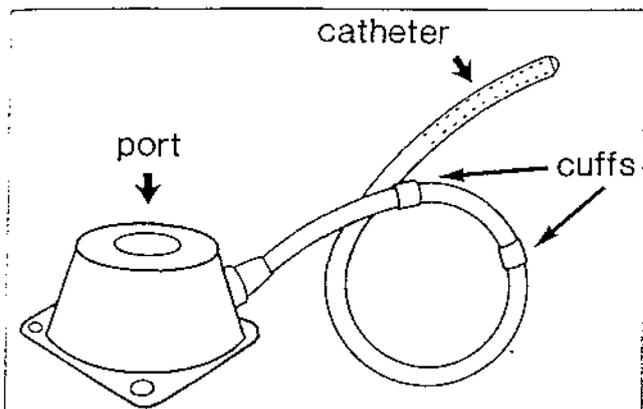
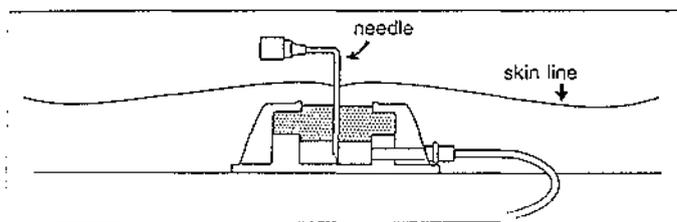
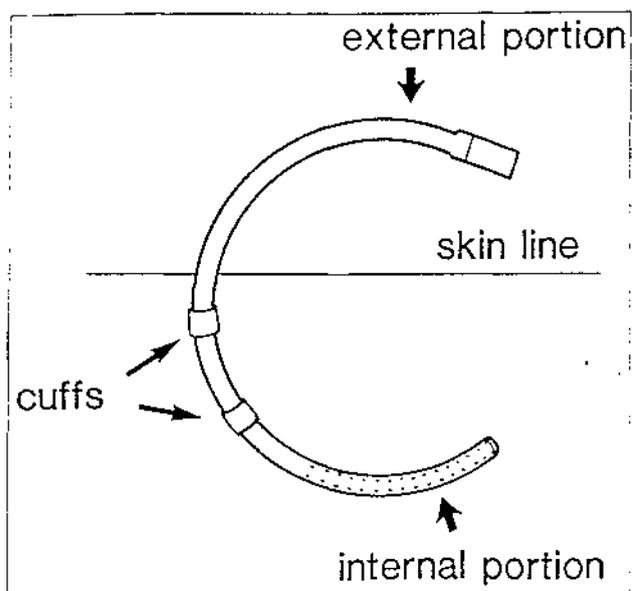
PHASE 4 TOTAL

TOTAL UNWEIGHTED MEAN
CATEGORY SCORES
(ACROSS PHASES)

IS	CRY	SCR	PR	VR	ES	VP	KI

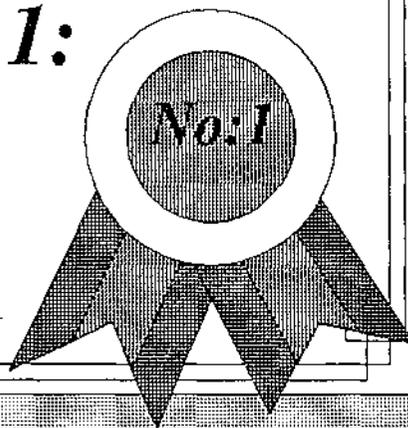
TOTAL DISTRESS
(ADD PHASE 1-4)

APPENDIX F

Figure A: Implantable Drug Delivery System (*Port-A-Cath*).Figure B: Cross section of implanted *Port-A-Cath*.Figure C: External Semi-Permanent Catheter (*Hickman line*).

*This is a SPECIAL AWARD
for (name) who played the sega
game to beat the pain. He
played so well and we are proud
for he is our Number 1:
well done.*

Health Researcher _____



APPENDIX I

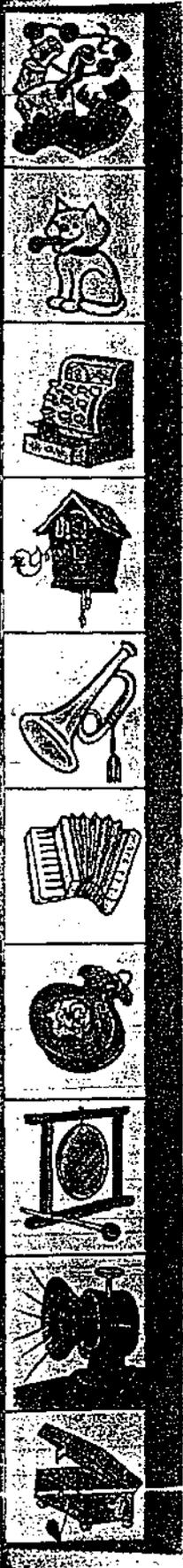


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← 'N'
LISTEN



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BOOK

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BATTERIES

