

USING GUIDED IMAGERY AS A DISTRACTION METHOD DURING DENTAL PROCEDURES

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ABSTRACT

Dental procedures usually need pharmacological analgesia as a painkiller. Guided imagery has been introduced recently as a pain therapy based on distraction. This technique reduces pain and anxiety of dental patients without the side-effects of the pharmacological analgesics. These types of therapies have become popular in medical fields and proved their efficacy as an alternative painkiller, especially in dental procedures. Computer graphics and computer games as well as virtual reality have influenced the medical treatment with outstanding psychological impacts on patients. The advantages of imagery therapy have encouraged researchers to explore this field and consequently publish some astonishing results. In this paper, we provide a brief historical review of developments in imagery therapy related to dentistry and then we present our system, which is entirely devoted to cancer victims, then we show how we modified it to relief pain and relax children under dental procedure. This system is under development for dental patients.

KEY WORDS

Dental pain, guided imagery, pain/anxiety distraction, virtual reality.

1. Introduction

Most patients who visit dentists for treatment need pharmacological analgesia such as nitrous oxide and narcotic drugs. Because of their side-effects, dental researchers introduced new methods to replace pharmacological analgesics. There are various alternative methods such as hypnotherapy, music therapy, art therapy, imagery therapy, etc.

In this study, we address an important pain relief technique called imagery therapy. With this non-pharmacological analgesia, patients can lose sensation and

dive into muscle relaxation. This phenomenon is called distraction from reality, where patients dive into illusions without the use of any medical or chemical intervention. The mechanism of imagery therapy is based on imagination before/during and after procedures.

2. Related Studies

Peretz and Bimstein [1] used imagination for pain distraction before/during local anaesthesia injection. More than eighty children aged 3-16 years participated in the experiment. They were asked to choose their own lovely memory or image before the injection and to concentrate on the chosen image during the procedure. The result is that the children were relaxed and did not feel pain during the injection procedure, as the authors reported. Frere and others [2] used audio-visual (A/V) eyeglasses as a distraction technique in their study and divided twenty-seven dental patients in the experiment into two groups. The first group used the A/V eyeglasses during dental procedure whereas the second one did not use it. The group who used the A/V eyeglasses felt less anxiety and pain than the other one. The use of the A/V eyeglasses during treatment decreases treatment time for dental medications. Hoffman and others [3] and Wismeijer and Vingerhoets [4] have proved that virtual reality can be used as an alternative effective non-pharmacologic analgesia to reduce dental pain and discomfort. Thus it allows patients to tolerate painful dental procedures safely, as shown in Figure 1. The authors selected two patients and examined their reactions and feelings under three treatment conditions:

- (1) Virtual Reality distraction.
- (2) Film distraction.
- (3) No distraction.

According to 0 —10 pain ratings (where 0 = 'none', 1 — 4 = 'mild', 5 — 6 = 'moderate' and 7 — 10 = 'severe'), the first patient reported that the pain rating was in the mild range (1.2) during the VR distraction, but it was in the severe range (7.2) during a film or when the patient was under no distraction, as shown in Figure 2. For the second patient, the pain ratings were in the mild to moderate range (mean = 4.4) with (no distraction) and mild range (3.3) during the film, but no pain at all (0.6) during VR distraction, as shown in Figure 3.

Hoffman et al. [3] reported that VR reduces the amount of time patients spend in thinking of their pain during medications and it distracts their attention from the procedures. This was proved when burns patients went into VR during physical therapy and they spent only 25% of the time in thinking of their pain, whereas they spent 75% of the time thinking of the perceived pain in the non-distractive control case. Furthermore, Sullivan and others [5] proved that VR has a huge effect on reducing heart pulse rates during dental procedures, especially in children. VR is more distractive and effective in reducing pain [3] during various medications than video games, as skin-burn victims reported after they had completed their wound care sessions.

Tusek and others [6] have provided evidence to show the high efficiency of guided imagery as a painkiller and an anxiety reducer after medication. The authors divided 130 patients undergoing surgical procedures into two groups. The first one received routine perioperative care whereas the second one listened to guided imagery tapes for three days:

- (1) before their surgical procedures.
- (2) during anaesthesia induction, in the post-anaesthesia care unit.
- (3) for six days after surgery.

The second group felt less post-operative anxiety and pain, and they required almost 50% fewer drugs after their surgical procedures than patients in the first group.

3. Beating Cancer

From previous studies we found that VR is the most effective distraction tool. It transfers the patient's inner feelings into a totally different environment. The new environment enhances patients' feelings and enriches their imagination. Earlier studies reported that VR is an effective method in medical treatment for many diseases such as arthritis, dental conditions, cancer and diabetes. The environment has, however, to suit the disease, patient background and culture.

In the study, we found that children are the most suitable patients for VR and pain intervention. Children respond quickly to the system. They are more involved and more impacted by the VR system. Some of the VR systems provide instructions which a child may easily believe and

follow. These instructions make the child feel less anxious and his or her reaction with the disease becomes more positive, which is a definite psychological advantage. Cancer is one of the many diseases addressed in the VR researches. There are many symptoms associated with this notorious disease. The medication for the disease, such as chemotherapy, has a lot of side-effects. At this stage VR is introduced to alleviate or eliminate side-effects and help patients continue their medication course.

Our system 'Beating Cancer' (Figure 4) is designed to help children diagnosed with acute lymphoblastic leukemia (ALL). The system is under development and is being tested. It can easily be modified to suit dental patients as well. Beating Cancer is a wonderful experience for patients suffering from ALL. We modified the environment to suit dental patients and to be used as a pain distraction tool. The modification introduced was in the concept and story as well as in the characters who play the game. We expect a final test within six months.

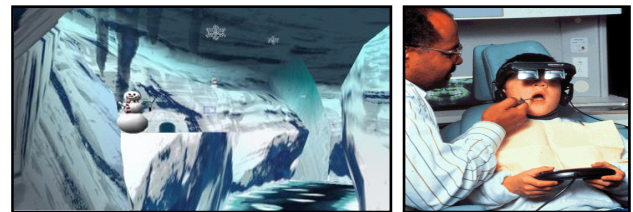


Fig.1: SnowWorld Virtual Reality Hoffman used to distract patients from their pain during dental procedures. The patients see SnowWorld path through VR goggle, they can shoot snow balls at snow men and change the view direction by using a keyboard and a mouse.

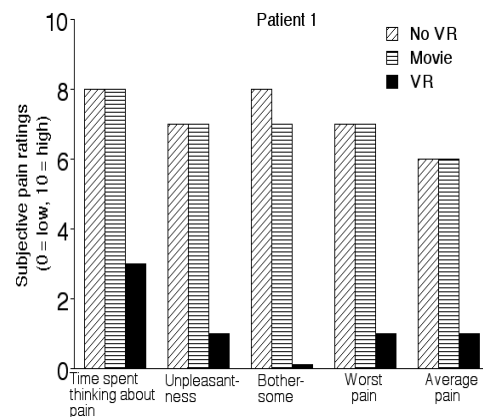


Fig.2: Patient1 results.

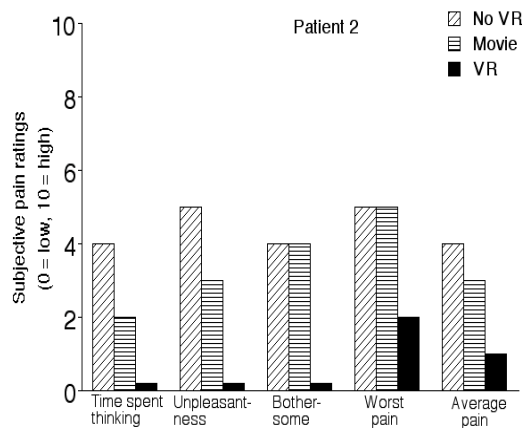


Fig.3: Patient 2 results.

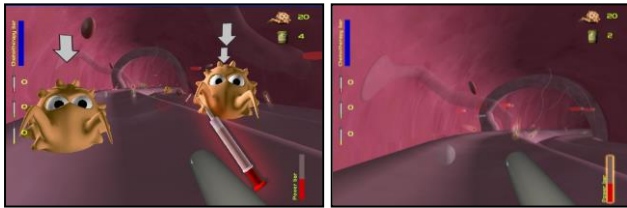


Fig.4: Beating Cancer Virtual reality. patients see Beating Cancer through a head-mounted display and interact with it by using joystick or mouse and keyboard .

4. Imagery Way

Previous literature proofed the effectiveness of imagery therapy and computer games using virtual reality in distracting patients attention and concentration in dentist surgery and little operations. This causes dentists to reduce the amount of chemical analgesia during little operations such as cavity filling. Patient in particular children gaining control of the game are easily affected. The system attracts their attention and concentration which leads them to lose sensation and dive into deep feeling of the new environment where their control is in effect.

We designed the Imagery Way system consisting of the human body environment. A child may have the opportunity to fight enemy and viruses within his or her body using the input devices connected to the computer. This will strongly attract the patient attention. Many shields and weapons were designed to help patient concentrate on the game and try to use those weapons in order to win the game and demolish the enemy [7].

The game was designed to have some gages and indicators to inform the child about the status and how much power still in effect [7]. These weapons and status

indicators help to attract patients attention toward the environment. Figure 4 shows some screenshots of the system.

5. Conclusion

In summary, we have discussed imagery therapy effects on dental patients with techniques such as A/V eyeglasses, VR and guided imagery. VR plays an important role in distracting patients from their pain, making them more relaxed and comfortable. VR directs patients' attention away from treatment and reduces uncomfortable sensations. VR systems make patients think positively during dental treatments. They alleviate pain and anxiety without pharmacological analgesia during/after dental procedures and also decrease dental treatment time and the time that patients spend thinking of their pain.

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