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Can relaxation interventions reduce anxiety in patients receiving radiotherapy? Outcomes and study validity

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ABSTRACT

Purpose: This study piloted the use of three relaxation interventions in an attempt to reduce levels of anxiety in patients who are immobilised for radiotherapy treatment of head and neck cancers, as well as trying to validate the study methodology.

Methods: In addition to receiving normal radiation therapy treatment, 14 patients were assigned to either a control group not receiving the relaxation intervention or one of three validated relaxation intervention techniques; music therapy, aromatherapy or guided imagery. Patients in the intervention groups underwent the relaxation technique daily for the first seven days of treatment. On days 1, 3, 5 and 7 of treatment patients were required to complete the State Anxiety Inventory survey.

Results: i/ While caution should be taken in accepting the results due to the small numbers of patients involved in the study and the non-randomised assignment of patients within the study, the results of the study demonstrate a clinically significant reduction in anxiety levels in each of the three relaxation interventions compared to the control group. ii/ The study demonstrated good study validity due to the ease of implementation, the unambiguous results generated, and the use of already validated anxiety interventions and measurement tools.

INTRODUCTION

The aim of radiation therapy treatment is to deliver a prescribed radiation dose to a nominated target volume while administering a minimal dose to surrounding tissue and vital organs. For treatment of pathologies in the head and neck region, this aim is achieved with the assistance of immobilisation techniques. Immobilising the patient enables treatment and treatment planning to be carried out with greater accuracy (Bomford et al., 1993).

The most common immobilisation device used in head and neck treatment is the mask. Masks are produced separately for each individual patient using either PVC plastic or thermoplastic material. They act to secure the patient to the treatment couch, therefore restricting patient movement during treatment.

While such an immobilisation device is effective in its purpose, observations made in the clinical setting indicate the use of masks for immobilisation purposes can impart varying levels of stress and anxiety onto the patient. Such stress and anxiety may have serious short and long term implications to the patient in both the effects it has on their treatment and ultimately their outcome. A less stressful period of immobilisation should lead to improved compliance with treatment, increasing both the immediate quality of life of the patient during the course of treatment and possible survival advantages offered by immobilisation.

This study will investigate if the implementation of relaxation techniques including music therapy, aromatherapy and guided imagery, will reduce anxiety levels in patients immobilised for treatment of head and neck cancers. If these relaxation techniques are shown to reduce patient anxiety levels, an improvement in compliance with treatment, treatment outcome and patient quality of life may also be expected. Additionally,

this study will attempt to validate the methodology used to conduct the study.

ANXIETY REDUCTION TECHNIQUES

Music Therapy

Throughout history music has been used for its beneficial influence on people. For example, ancient Greeks and Romans believed that music had the power to aid the body and soul in healing (Watkins, 1997). However, it has not been until more recent years that music was introduced into the health care setting as a form of therapy. Today music therapy may be defined as a behavioural science in which music is used to effect an individual's physical, emotional and behavioural well-being which leads to healing (Dossey, 1990).

Watkins (1997) provides a review of 13 separate music therapy trials in the clinical setting. While these studies incorporate different patient cohorts, including patients from intensive care, coronary care units, surgery and dental practices, each study reveals beneficial implementations for music therapy. Some benefits associated with music therapy include: reduced stress, improved emotional state, increased comfort levels, reduced heart rate, mood shift toward well being and anxiety reduction (Watkins, 1997).

A study by Sabo et al (1996) describes the influence of personal message combined with music on anxiety and side effects associated with chemotherapy. The trial consisted of 97 patients who were receiving first time chemotherapy. This cohort included 50 patients in the control group that received no auditory intervention and 47 patients who received message and music stimulus. All patients completed a Spielberger State Anxiety Inventory (STAI) questionnaire prior to their first treatment and again after their fourth treatment. The authors found a significant difference between pre and post intervention scores on the state anxiety scale for those patients that experienced the auditory stimuli. It was concluded, "These preliminary findings indicate that a simple and cost effective intervention can decrease a patient's anxiety when receiving chemotherapy."

Aromatherapy

Aromatherapy is the therapeutic use of essential or aromatic oils to aid relaxation and provide relief of certain symptoms (Kite et

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al, 1998). It is noted that lavender is the oil to stimulate relaxation and reduce ones levels of anxiety and fear. In the case of lavender oil, physiologically the patient's heart rate, blood pressure and respiration rate drop from their increased levels (due to anxiety and stress) to those which are normal. Psychologically the patient begins to relax as soon as the aroma is inhaled (Cerrato, 1998).

A study by Kite et al (1998) showed that the levels of stress, tension, anxiety and fear experienced by a patient were significantly reduced when aromatherapy was administered in conjunction with radiation therapy treatment. The study included 63 patients who were referred to the program either by their practitioner or by self referral. During the course of radiation treatment, six cycles of aromatherapy were administered by a qualified aromatherapist. Evaluation was carried out using questionnaires from the Hospital and Anxiety and Depression Scale which were completed by each patient before and after their aromatherapy sessions. Over 50 per cent of patients reported significant improvement in the eight most commonly assessed symptoms (Kite et al, 1998).

Guided Imagery

Guided imagery entails deliberately using the imagination to create a setting or a story that engages the senses. Imagery is not confined to visual notions but encompasses the formation or recollection of smells and tastes, as well as remembered internal feelings. Imagining oneself in a grove of trees, lying on soft grass, listening to the breeze, smelling wildflowers and feeling contented involves a number of senses to create a richer, more engaging scene than created with visual images alone. This state of concentration allows a temporary escape providing relaxation together with a sense of physical and emotional well being (Hatler, 1998).

Guided imagery involves the use of a script to create a scenario. The scripts are intended to be read in a soothing manner that encourages the patient to create a personal reflection. The contents of the guided imagery scripts or tapes may be tailored to the patients situation or generic scenes may be created. An important component of the imagery script is that of creating a special place in the mind. The place may be at the beach, in the mountains, or at a shady spot by a river or creek. The language used for the guided imagery needs to focus on bringing out the vivid details of the place which includes not only how the place looks, but the sounds, smells and feeling of this special place. The words used to enhance the imagination need to convey the idea that the place is safe, protected and relaxed. Repetition of phrases can be useful to reinforce the relaxing images and to allow time for the listener to truly imagine the setting. The final portions of the script bring the individual back to the present circumstances but with a reminder to continue in the pleasant and helpful aspects of the imagined place (Hatler, 1998).

The use of guided imagery in the health profession is wide spread. Some of its applications so far include; reducing pain, enhancement of immune function, improvement of athletic performance, facilitation of wound healing and decreasing anxiety (Hatler, 1998).

Guided imagery has been adapted into caring for cancer patients. Walker et al (1999) describe the use of guided imagery in 96 breast cancer patients being treated with chemotherapy. Patients were randomised following diagnosis to a control group (standard care) or to the experimental condition (standard care plus relaxation training and imagery). As hypothesised, patients

in the experimental group were more relaxed during the study. Quality of life was better in the experimental group while the intervention also reduced emotional suppression.

Kolcaba and Fox (1999) described the effects of guided imagery on the comfort of 53 women with early stage breast cancer undergoing radiation therapy. Patients in the experimental group were required to listen to a guided imagery tape once a day for the duration of their treatment. Pooled data indicated a significant overall increase in differences in comfort between the treatment and control group, with the treatment group having higher comfort over time.

METHODS

14 patients who presented to the Radiotherapy Department at the Newcastle Mater Misericordiae Hospital between May and July 2000 were non-randomly, consecutively assigned to either the control group or to undertake one of the three anxiety reduction techniques. Patients selected for the study were being treated for varying malignant and benign head and neck diagnosis including; larynx cancer, macular degeneration and brain metastases. An essential enrolment criteria required each patient to be immobilised during their treatment using a customised mask.

At the time of simulation, patients were given an information letter outlining in detail the purpose of the study and their role as a patient in the study. They were reminded that the study was entirely voluntary and that their normal radiation therapy treatment would not be altered. The patient was then left to make a decision as to whether or not they would like to participate, and if so, they were asked to sign a consent form. Permission to undertake the study was granted by both the University of Newcastle Medicine and Health Sciences Research Ethics Committee, and the Chief of the Radiotherapy Department.

For the first seven days of treatment the intervention groups received radiation therapy treatment with the relaxation intervention applied. For the same period of time the control group received normal treatment. Three relaxation interventions were trailed in this study; music therapy, aromatherapy and guided imagery.

Four patients received the music therapy intervention. These patients were required to listen to background music during their treatment. The music was playing at all times of their treatment from when the patient first entered the treatment suite, until they left the room. Patients were encouraged to bring in a personal selection of music if they so desired. This is important as it is assumed that this familiar music is pleasing to the patient. A concern associated with the use of unfamiliar music is that the patient may feel a greater loss of control promoting further distress instead of increasing relaxation levels. It was important for patients in this study group to have good hearing skills for this intervention technique to be successful.

Three patients received the aromatherapy intervention. These patients were required to wear an aromatherapy patch during treatment. The patch contained 2-3 drops of concentrated lavender aromatherapy oil. The patch was positioned close to the patient's face, but outside the treatment field, so that the lavender fragrance could stimulate the olfactory senses without interfering on the treatment field. It was important to ensure that patients in this study group did not suffer any allergies to the lavender oil being used.

For the guided imagery intervention, a script was developed in collaboration with professional psychologist. The script was recorded onto audiocassette by a female narrator. The three patients in this study group were required to listen to the record-

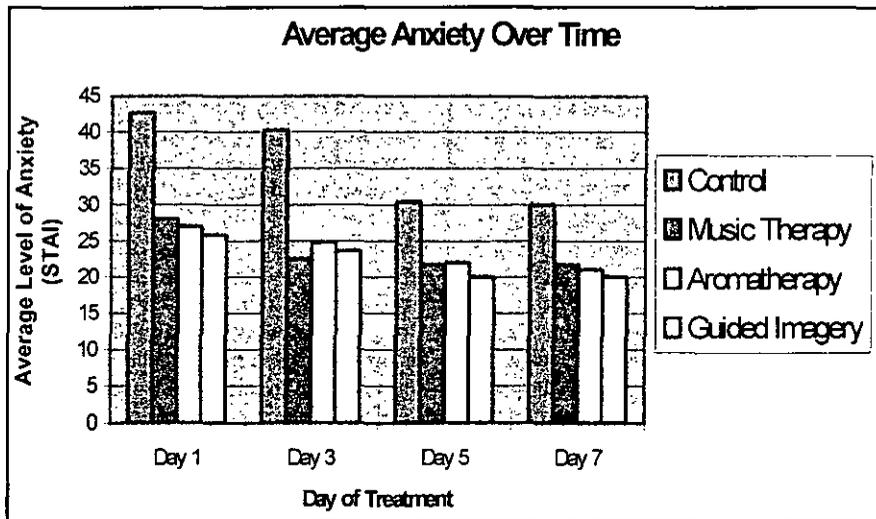


Figure 1: Histogram: The average anxiety levels in patients on days 1, 3, 5 and 7 of treatment.

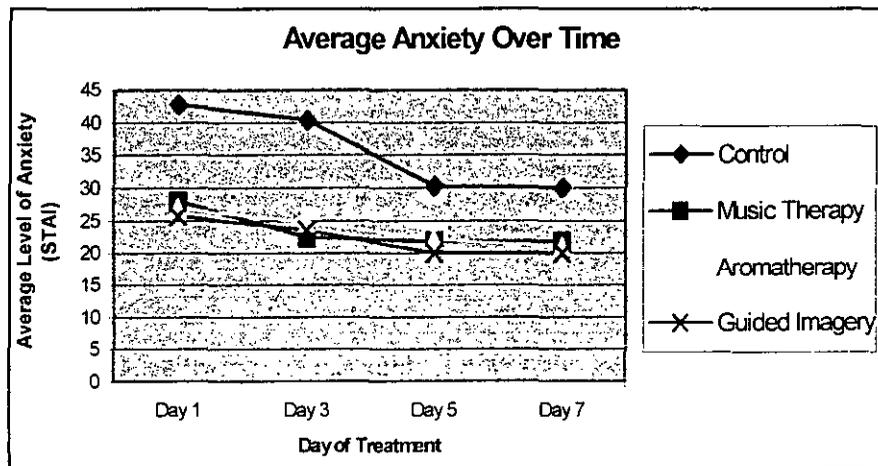


Figure 2: Line Graph: The average anxiety levels in patients during treatment.

ing immediately prior to their treatment. Each patient was set aside in a consultation room to listen to the guided imagery tape on headphones. By doing this, the patient received minimal distractions. As for the music therapy intervention, it was necessary for the patients in this study group to have good hearing for the intervention to be successful.

The control group consisted of four patients.

Patient anxiety levels were determined using the 20-item State Anxiety Inventory (STAI) (Spielberger, 1983). This questionnaire was completed by each patient on the 1st, 3rd, 5th and 7th day at the completion of their daily treatment. The STAI survey has a four-response Likert-type format ranging from not at all to very much so for each of the 20 items. Higher summated scores indicate higher anxiety (Spielberger, 1983).

RESULTS

During the course of this pilot study two patients voluntarily withdrew their participation. The first patient to withdraw was a member of the control group. This patient was emotionally

distressed and simply no longer wanted to be included in the study. The second patient to withdraw was receiving the guided imagery relaxation intervention. This patient stated extended treatment time as the reason for leaving the study. Consequently, the results of these two patients are excluded from the results presented here.

The results of the remaining 12 patients in this pilot study are depicted in Figures 1 and 2. Both figures show the average level of anxiety, as measured using the State Anxiety Inventory (STAI), for patients in the control group together with those receiving music therapy, aromatherapy and guided imagery interventions, at days 1, 3, 5 and 7 of treatment.

Due to the small number of patients within the study, and also the issue that a measurement of the statistical significance of the impact of the three interventions on the patients is not a particularly useful biological or clinical outcome measure, all results have been assessed as to their clinical significance, i.e. do they make a realistic clinical difference to the patient.

The first observation that can be made from figure 1 is that on each day anxiety was measured, the patients in the relaxation

intervention groups clearly demonstrate less anxiety than those in the control group. The reduction of anxiety levels observed in each of the three relaxation interventions compared to the control group is clinically significant. There is no observable clinically significant differences in the levels of anxiety measured between the intervention techniques themselves.

It may also be observed from figure 1, and more markedly in figure 2, that the average anxiety level for each study group is reduced from one treatment to the next. This reduction in anxiety between treatments is seen to plateau by day 7 (figure 2).

DISCUSSION

During the course of this pilot study a methodology intended to reduce anxiety in patients who are immobilised for radiotherapy treatment of head and neck cancers was designed and implemented. Experimental results, as measured by the State Anxiety Inventory (STAI), demonstrate that patients receiving either music therapy, aromatherapy or guided imagery, display markedly less anxiety than patients in the control group.

While the physiological response to each of these anxiety reducing techniques was not investigated in this study, sufficient literature is available which may explain the mechanisms of their anxiety reducing capabilities.

One of the causes of patient anxiety while undergoing any procedure is a loss of control over what is happening to them. Manning (1997) describes how patients involvement with music while undergoing a procedure focuses on exercising a degree of control. The communicative power of music as a non-verbal language, the degree of security gained from involvement with music and the possible reflection of the patients own personality in the music chosen, are all factors achieving some degree of control. Hoffman (1997) argues that the physical response to music is the most important from a therapeutic point of view. Hoffman attributes this to a phenomenon called "entrainment" which is the body's ability to synchronise its rhythms with the rhythms of vibrating bodies around it. Researchers have been able to document this phenomenon too. When volunteers were subjected to a situation that made them extremely tense, their heart rates went up, as expected. When they were allowed to listen to a simulated slow heartbeat, their tension levels decreased and their heart rates slowed down as well (Brown, 1990).

The precise biological mechanism in response to aromatherapy has not yet been elucidated. However, one theory asserts that odours coming from essential oils exert a physiological effect by sending chemical messages through the olfactory nerve to the brains limbic system, which controls functions like heart rate, blood pressure and respiration. Others believe that the oils are absorbed through the skin to exert their physical effects (Cerrato 1998).

As is the case for aromatherapy, the precise physiological response to guided imagery is not known. However, it is known that one reaction to stress involves an endocrine response whereby corticotrophin releasing hormone (CRH) secreted from the hypothalamus stimulates ACTH release from the anterior pituitary promoting elevated plasma cortisol levels. Research by McKinney et al (1997) demonstrates that the use of guided imagery is associated with a decrease in blood cortisol levels. Such a reduction in blood cortisol levels is associated with decreased blood pressure, heart rate and anxiety.

Like music therapy, it may be argued that guided imagery can offer a source of empowerment, independence, self-confidence and control (Tusek et al, 1997).

A secondary finding of this pilot study is that the average

anxiety level observed within each study group declined over time. It is believed, and it certainly follows, that patients become less anxious as they become familiar with their treatment procedure. Essentially the patients become desensitised to the source of anxiety, in this case the mask (Kolcaba and Fox, 1999). In some cases the anxiety levels of patients plateaued before day seven of treatment.

EASE OF IMPLEMENTATION

Of the three previously validated anxiety reduction interventions used in this study, music therapy and aromatherapy were very easy to implement in the clinical environment. Music therapy simply involved playing the patient's preferred music at an appropriate audible level, while aromatherapy involved fixing a pad with aromatic oils close to the patient's treatment mask. The guided imagery technique was the most difficult to implement. The methodology for guided imagery involved the patient listening to the prepared cassette ten minutes prior to treatment. On occasions it was discovered that some efficiency problems could be encountered such as patients being minimally late for treatment. This problem could be overcome with improved forethought and organisation.

The previously validated STAI survey was easily read and answered by control patients and patients undergoing the intervention. Analysis of the results was easily displayed and unambiguously interpreted. Overall the study methodology was easily implemented and proved valid for the research question.

CONCLUSION

The introduction of immobilisation devices into the radiation therapy department has brought many clinical advantages. As therapist's, we should not ignore the impact that the implementation of these devices has on the patient in terms of increased anxiety. It was the aim of this pilot study to both investigate the effects of introducing alternative relaxation therapies to aid in reducing the anxiety levels of the patient receiving head and neck radiotherapy using immobilisation, as well as validating the study design.

As observed in our results, regardless of the intervention technique used, the levels of anxiety were greatly reduced in comparison to the control group. Further study including a larger sample size of patients, reliability of the methods across various centres, therapist acceptance of the relaxation implementation techniques within clinical practice, and ease of implementation, is now required to see these techniques introduced in to practice. Also, relaxation interventions may be combined to produce possible synergistic effects. For example, listening to music while using a guided imagery technique has been demonstrated to increase the effectiveness of the imagery (Tusek et al, 1997).

The choice of which intervention technique is best suited for implementation is dependant on the resources, time and needs of the treating radiotherapy department, and more importantly the intervention should address the requirements of the individual patient. It is felt that future considerations should seek to further reduce anxiety, but to also take into account the effect these interventions have on the surrounding environment.

This study demonstrated that the three relaxation interventions music therapy, aromatherapy and guided imagery, reduced the anxiety of patients receiving radiotherapy who are immobilised during their course of treatment. This study also demonstrated that the study methodology can be implemented with relative ease and can reduce the anxiety of patients

receiving radiotherapy who are immobilised during their course of treatment.

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REFERENCES

- Bomford, D.R., Kunkler, I.H. and Sheriff, S.B. (Eds) (1993) *Walter and Miller's Textbook of Radiotherapy, Radiation Physics, Therapy and Oncology* (5th Edn), Churchill Livingstone, London.
- Brown, B.B. (1990) *Supermind*, Harper and Row, New York.
- Cerrato, P.L. (1998) 'Aromatherapy: Is it for real?', *RN*, 61(6): 51-52.
- Dossey, B.M. (1990) Psychophysiological self-regulation interventions. In B. Dossey (Ed.) *Essentials of critical care nursing: Body, mind, spirit*. Lippincott, Philadelphia.
- Hatler, C. (1998) 'Using guided imagery in the emergency department', *Journal of Emergency Nursing*, 24(6): 518-522.
- Hoffman, J. (1997) 'Complementary Therapies: Tuning into the power of music', *RN*, 60(6): 52-54.
- Kite, S.M., Maher, E.J., Anderson, K., Young, J., Wood, J., Howells, N., Bradburn, J. (1998) 'Development of an aromatherapy service at a cancer centre', *Journal of Palliative Medicine*, 12: 171-180.
- Kolcaba, K. and Fox, C. (1999) 'The effects of guided imagery on comfort of women with early stage breast cancer undergoing radiation therapy', *Oncology Nursing Forum*, 26(1): 67-72.

- McKinney, C. H., Antoni, M. H., Kumar, M., Tims, F. C. and McCabe, P. M. (1997) 'Effects of Guided Imagery and Music (GIM) Therapy on Mood and Cortisol in Healthy Adults', *Health Psychology*, 16(4): 390-400.
- Manning, J. (1997) 'Music Therapy', *British Journal of Theatre Nursing*, 7(3): 33-34.
- Sabo, C. E. and Michael, S. R. (1996) 'The influence of personal message with music on anxiety and side effects associated with chemotherapy', *Cancer Nursing*, 19(4), 283-289.
- Spielberger, C.D. (1983) 'Manual for the State-Trait Anxiety Inventory for Adults', Palo Alto, Calif: Mind Garden.
- Tusek, D., Church, J. and Fazio, V. W. (1997) 'Guided imagery as a coping strategy for perioperative patients', *AORN Journal*, 66(4): 644-649.
- Walker, L.G., Walker, M.B., Ogston, K., Heys, S.D., Ah-See, A.K., Miller, I.D., Hutcheon, A.W., Sarkar, T.K. and Eremin, O. (1999) 'Psychological, clinical and pathological effects of relaxation training and guided imagery during primary chemotherapy', *British Journal of Cancer*, 80(1-2): 262-268.
- Watkins, G. R. (1997) 'Music Therapy: Proposed Physiological Mechanisms and Clinical Implications', *Clinical Nurse Specialist*, 11(2): 43-50.

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