

The effect of music on preprocedure anxiety in Hong Kong Chinese day patients

David Lee PhD, RN

Lecturer, School of Business, University of Ballarat, Ballarat, Victoria, Australia

Amanda Henderson PhD, RN, RM

Principal Research Fellow, Research Centre for Innovative Practice, Griffith University, Nathan, and Nursing Director (Education), Princess Alexandra Hospital, Woolloongabba, Queensland, Australia

David Shum PhD

Senior Lecturer, School of Applied Psychology, Griffith University, Nathan, Queensland, Australia

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Correspondence:

Amanda Henderson

Nursing Director (Education)

Princess Alexandra Hospital

Woolloongabba 4102

Queensland

Australia

Telephone: (617) 3240 2780

E-mail: amanda_henderson@health.qld.gov.au

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Aims and objectives. To identify the effect of music on preprocedure anxiety levels of Hong Kong Chinese patients undergoing day procedures in a local community based hospital.

Design. Pre and post-test quasi experimental design with non-random assignment.

Method. A total of 113 participants were assigned to the control group or intervention group depending on the day of their procedure. Participants' anxiety levels were measured objectively by comparing their vital signs and subjectively by the Spielberger State Trait Anxiety Scale. Participants' physiological parameters (blood pressure, pulse and respiration) and State Trait Anxiety Scale were measured at two time periods. The control group undertook the usual relaxing activities provided in the waiting room compared with the intervention group who listened to music of their own choice in reclining chairs while waiting for the procedure.

Results. The physiological parameters for both the control and intervention groups dropped significantly during the waiting period, however, only the intervention group had a significant reduction in reported anxiety levels.

Conclusions. These results suggest that providing self-selected music to day procedure patients in the preprocedure period assists in the reduction of physiological parameters and anxiety, yet, a relaxing environment can assist in the reduction of physiological parameters.

Relevance to clinical practice. The administration of self-selected music to day procedure patients in the preprocedure period can be effective in the reduction of physiological parameters and anxiety.

Key words: anxiety, Chinese, day patients, Hong Kong, music, preprocedure

Introduction

Patients undergoing surgical procedures often experience anxiety (Augustin & Hains, 1996). Even minor surgical

procedures can produce anxiety in patients and affect their postoperative recoveries, in particular, increase their risk of physiological complications. Anticipating surgery can lead to fear and anxiety for people who associate surgery with pain,

possible disfigurement and dependency (Devine & Cook, 1983; Hathaway, 1986).

Considerable research has been undertaken to identify strategies to reduce patient anxiety (Leinonen & Leino-Kilpi, 1999). There is evidence suggesting that adequate preoperative instruction alleviates anxiety, increases patient participation in their care; minimizes development of postoperative complications and, as a result, reduces recovery time (Meeker *et al.*, 1992; Benton & Avery, 1993; Meeker, 1994; Gammon & Mulholland, 1996). Such positive outcomes may be primarily a result of the reduction of anxiety associated with the provision of preoperative information. Given the potential benefits of reduced anxiety, many studies have explored strategies to alleviate anxiety. A brief relaxation session prior to undergoing anaesthesia can have a significant impact on preoperative anxiety. Markland & Hardy (1993) identified a reduction in the level of anxiety as identified by the Spielberger State Trait Anxiety Inventory and also a reduction in intra-operative anaesthetic requirements and difficulty of anaesthesia. Augustin & Hains (1996) suggest that listening to self-selected music can be beneficial in the reduction of preoperative anxiety. In addition to routine practices of providing information to patients and discussing patients' fears with them, music therapy is being explored as a further adjunct that may reduce patient anxiety levels (Evans, 2002). The interest in this study is the contribution of self-selected music to reduce anxiety in day procedure patients during the preprocedure period.

Literature review

The physiological effect of music on anxiety

There are variations in individuals' response to music: human beings respond to music by demonstrating a physical response called 'entrainment' (Hoffman, 1997); by playing music written in a specific tempo, music can alter a patient's heart rate and contribute to the relief of anxiety and reduction in blood pressure, arrhythmias and panic attacks (Hoffman, 1997). Stevens (1990, p. 1045) believes that 'music, as an aesthetic and symbolic medium, has the ability to dispel much of the fear and anxiety associated with facing the unknown alone'. Stevens identified the potential for music to allay patient fears as they prepare for surgery through patient interviews. Similarly, Hartley (2001) suggests music plays a very powerful role in the provision of comfort for patients.

The effect of music during hospitalization in the acute care setting

Research shows that music therapy facilitates a reduction in the stress response, namely: decreased anxiety levels, decreased blood pressure and heart rate and changes in stress hormone levels in plasma (Watkins, 1997); a reduction in heart rate, respiratory rate and self-reported anxiety in non-sedated ventilated patients and ventilator-dependent patients (Chlan, 1998; Wong *et al.*, 2001); and a reduction in anxiety for patients in the coronary care ward (Mynchenberg & Dungan, 1995). These effects have been identifiable with small patient groups. A significant reduction in heart rate, respiratory rate and self-reported anxiety was observed by Wong *et al.* (2001) with just 20 patients, using a crossover repeated measures design with random assignment. Similarly, Chlan (1998) also reported significant reductions in heart rate, respiratory rate and self-reported anxiety with the random assignment of 54 patients into a two group pre and post-test experimental design.

Music can have a positive effect on the reduction of anxiety and stress for hospitalized patients during the pre- and postoperative period (The Joanna Briggs Institute, 2001). It has been reported to be successful in the reduction of anxiety in the surgical holding area of the operating theatre (Winter *et al.*, 1994). This is of particular significance as research utilizing patient self-reports identified high levels of anxiety at this time (Leach *et al.*, 2000). More recently, a quasi-experimental pre and post-test design with 101 subjects prior to cardiac catheterization further supported the potential of music significantly to reduce physiological parameters and anxiety levels during the preprocedure period (Hamel, 2001). Patients in the test group listened to 20 minutes of pre-selected music just prior to departure to the cardiac laboratory. In the early postoperative period, Barnason *et al.* (1995) found that the use of three different modalities: music therapy, music-video therapy and scheduled rest, were all effective in reducing elective heart bypass surgery patients' anxiety and improving mood. However, no significant differences were reported for anxiety ratings between the three groups (Barnason *et al.*, 1995), thereby questioning if music is any more valuable than a scheduled rest period.

There has been conflicting research into the value of music therapy during procedures. The study of the effect of music on vital signs during gastrointestinal examination showed that there was a significant main effect for diastolic blood pressure (Salmore & Nelson, 2000); the effect on anxiety is unknown, as anxiety was not measured in this study.

Alternatively, investigations studying purely anxiety have been undertaken on patients undergoing bronchoscopy. Colt *et al.* (1999) reported that procedure-related state anxiety did not decrease when relaxation music was administered through headphones to patients during flexible bronchoscopy. Recognizing discrepancies in the reported effects of music, Evans (2002) confirms that the value of music during the peri-operative period is variable. However, Evans concludes, through systematic analysis, that greater benefits are associated with music interventions before and after procedures, than during procedures.

The importance of self-selected music

Research focusing on the type of music has also been undertaken. Stevens (1990) analysed the use of music for stress reduction and reported that slow, arrhythmic music, that otherwise meets all criteria of sedative music, may appear foreign or frightening to some listeners, therefore patients' familiarity with the music selections may be important for producing optimal relaxation. Augustin & Hains (1996) and Frandsen (1990) found that patients had lower anxiety levels when they listened to music of their choice preoperatively; they suggest that listening to self-selected music is more beneficial in the reduction of preoperative anxiety. Augustin & Hains (1996, p. 750) comment in their study that, 'patients verbalised the importance of personally choosing their music selections, and 50% of them stated they would have brought their own music selections to the hospital if someone had suggested this intervention'.

The need for further research

Music, as a familiar personal and cultural medium to act as a distraction and to reduce anxiety is, therefore, worthy of further investigation. Leinonen & Leino-Kilpi (1999) identify that, while studies have already been undertaken in relation to anxiety, more detailed and comprehensive facts are needed with respect to the reduction of anxiety. Many questions remain about the value of self-selected music, the appropriate length of time the intervention (listening to music) should be undertaken, and the period of time prior to the surgical procedure that could result in a reduction in anxiety (Markland & Hardy, 1993).

Aim

The purpose of this research was to investigate the hypothesis that self-selected music delivered to day procedure patients in reclining chairs during the immediate preprocedure period is

more effective in reducing patients' physiological parameters and anxiety levels than the usual relaxing environment afforded to them. It also sought to establish whether a significant difference in levels of anxiety could be made in the normally relative short waiting period of day procedure patients.

Method

A pre and post-test quasi experimental design with non-random assignment was used to study whether patients who listen to their choice of music on reclining chairs while waiting for their procedure had significantly lower anxiety levels and physiological parameters than patients who undertake the usual relaxing activities of their choice in the waiting area, such as reading and/or watching television.

Subjects

The subjects for this study were recruited from a 430-bed local community hospital in New Territories, Hong Kong. All patients 18 years and over, undertaking similar non-invasive day procedures with local or regional anaesthesia at the hospital over an 8 week period, were asked to participate in a study on patient anxiety. Patients approached to partake in the study were about to undergo cystoscopy, cauterisation, or endoscopy. The exclusion criteria were: (i) patients with cognitive disabilities; (ii) patients with a hearing impairment; (iii) patients who received preoperative sedatives; (iv) patients who received a colon preparation; (v) patients with pre-existing co-morbid illnesses and (vi) patients who did not have sufficient time to participate in the study. Patients were admitted from and discharged to their own homes where they were living independently, and were not suffering from any chronic or acute illness at the time of the procedure.

Altogether 113 patients fulfilled the above criteria and were assigned to the control or the intervention (music-listening) group. There were 28 females and 27 males in the control group and 27 females and 31 males in the music-listening group. The number of participants in our experimental and control groups were comparable to previous studies in the area that have used between 20 and 51 participants for each group (Augustin & Hains, 1996; Chlan, 1998; Hamel, 2001; Wong *et al.*, 2001). To avoid unnecessary disturbances in the preoperative waiting rooms, patients were grouped together based on the day of the procedure, for example, patients who had their procedure on Wednesday were assigned to the control group and patients who had their procedure on Thursday were assigned to the music-

listening group. This was deemed appropriate as the control and intervention groups were not significantly different in terms of gender ratio [$\chi^2(1, n = 113) = 0.22, P = 0.643$] or age ($t = 0.68, P = 0.495$). The average ages of the control and music-listening groups were 51.9 (SD = 14.4 years) and 50.0 years (SD = 15.5 years), respectively. As the intervention was undertaken on a separate day the possibility of enhancing patient anxiety, because patients may become aware of different preprocedure regimes, was reduced. Similar procedures were performed on both days, therefore there was no difference in the nature or the severity of the procedure for the two groups.

Measures

Anxiety

The State Trait Anxiety Inventory (STAI), a 20-item self-report instrument developed by Spielberger (1983) was used to evaluate an individual's feeling of apprehension, tension, nervousness and worry. For the purpose of this study, the Chinese STAI (Shek, 1993) was used to assess the patients' anxiety state, or how anxious the patients felt at the time of the assessment. Consistent with the English STAI it required the patients to rate on a scale of 1 to 4 the intensity of the feelings being asked about (1 being not at all and 4 being very much so). The STAI has been used extensively in clinical practice and research to evaluate individuals' feelings of apprehension, tension, nervousness and worry with documented reliability and validity. Internal consistency estimates for the STAI range from 0.90 to 0.94. Similarly, The Chinese STAI correlates significantly with other measures of psychological well-being (Shek, 1993). The state anxiety score can range from 20 to 80 with higher scores indicating higher level of anxiety.

Physiological

Standard, non-invasive instruments were used to measure the patients' vital signs (viz. blood pressure, pulse rate and respiration rate).

Equipment

Ten CDs and 10 mini-discs that contained eastern and western style easy listening music and Chinese pop music; two pocket-sized CDs and two mini-disc players and four sets of accompanying headphones.

Procedures

Participants in the control and music-listening groups received the standard preprocedural information, such as explanation of the procedure, what to expect and what was

required of them, several days before presenting to the hospital. Consent to participate in the study was obtained at this time. On the day of the procedure, vital-sign measurements were obtained by a Registered Nurse specifically employed for this purpose, from all the participants when they arrived at the waiting rooms. They were then asked to complete the STAI using standardized instructions. Basically, this involved asking them to respond to each of the 20 statements by indicating how they felt 'right now, that is, at this moment' on a likert scale of 1 to 4. This was followed by the routine admission procedures such as obtaining the participant's history and baseline observations, and after explaining the procedure, responding to any questions or queries. After that, participants in the control group took part in the usual preprocedural relaxing activities (e.g. reading or watching television) in the waiting rooms for 20–40 minutes, depending on the time left before surgery. Participants in the music-listening group were asked to listen to music of their choice on reclining chairs for 20–40 minutes. None of the CDs or tapes contained verbal instructions or exercises for guided relaxation. Approximately 10 minutes before the procedure, the Registered Nurse obtained vital sign measurements from all participants again. After that, both groups of participants were required to complete the STAI a second time.

Ethical Considerations

Approval for the study was granted by the hospital. All patients were provided with a full explanation of the study and invited to participate. Prior to obtaining patient consent, patients were reassured that their decision to participate or not to participate in the study did not affect the care provided to them.

Results

The mean scores of the two groups of patients on the STAI and the vital-sign measurements at times 1 and 2 are summarized in Table 1. All participants selected Chinese style music.

The scores of the two groups on the STAI and the vital sign measurements at time 1 were compared to ensure that the two groups were similar. Results of five independent-group *t*-tests (two tailed) indicate that the two groups were not significantly different on blood pressure, pulse rate and respiration rate but that they were significantly different on the STAI state-anxiety score [$t(111) = 2.23, P = 0.028$]. Participants in the control group were found to report a significantly higher baseline level state anxiety than participants in the music-listening group.

Table 1 Mean (standard deviation) of five measures for the two groups of subjects at time 1 and time 2

Measures	Group			
	Control		Music-listening	
	Time 1	Time 2	Time 1	Time 2
STAI (state anxiety score)	45.9 (7.1)	46.4 (6.5)	43.1 (6.0)	42.5 (5.7)
Systolic pressure	132.2 (25.3)	129.4 (25.6)	127.7 (23.9)	124.2 (21.1)
Diastolic pressure	74.0 (11.2)	72.0 (11.1)	71.0 (12.0)	70.0 (10.8)
Pulse	74.1 (9.0)	70.1 (8.6)	74.3 (11.8)	71.1 (10.4)
Respiration	17.6 (1.5)	16.7 (1.0)	17.7 (1.7)	16.6 (1.0)

Paired-sample *t*-tests (one-tailed) were conducted separately for the control and the music-listening groups to examine changes in the scores on the STAI and vital-sign measurements at time 1 and time 2. For the control group, there were significant decreases in diastolic pressure [$t(54) = 1.93$, $P = 0.030$], pulse rate [$t(54) = 4.70$, $P < 0.01$] and respiration rate [$t(54) = 6.02$, $P < 0.01$]. For the music-listening group, there were significant decreases in systolic pressure [$t(57) = 3.83$, $P < 0.01$], pulse rate [$t(57) = 4.64$, $P < 0.01$], respiration rate [$t(57) = 6.65$, $P < 0.01$] and STAI state anxiety score [$t(57) = 1.78$, $P = 0.040$].

To evaluate if the two groups of patients were significantly different on all the measures at time 2, four *t*-tests were carried out for the vital sign measures and no significant differences were found. Because the two groups of patients were found to be different in their STAI state anxiety score at time 1, a one-way ANCOVA was carried out. As expected the STAI state anxiety score at time 1 was found to be significant as a covariate [$F(1, 110) = 319.8$, $P < 0.01$]. More interestingly, patients in the music-listening group were found to have a significantly lower STAI state anxiety score at time 2 than patients in the control group [$F(1, 110) = 8.18$, $P = 0.005$].

Discussion

The results of the study indicate that participants who listened to self-selected music in a reclining chair, during the time period before their procedure, produced significantly lower self-reported anxiety levels compared with participants who were provided with the space and opportunity to engage in a relaxing activity of their choice. However, there were no significant differences in the measurement of their physiological parameters of blood pressure, pulse or respirations between the two groups. Interestingly, this study does provide evidence that when patients engage in a relaxing activity with either self-selected music or an activity of their choice, there is a reduction in physiological parameters, indicating a calming

effect prior to the procedure. It is important to note that results are limited to a waiting period of time anywhere between 20 and 40 minutes prior to their procedure (shorter and longer periods of time were outside the scope of this study).

The results support previous findings of the value of music in the immediate preprocedure period in the reduction of anxiety (Winter *et al.*, 1994; Hamel, 2001). This period is a 'heightened period of stress and anxiety' (Leach *et al.*, 2000; Hamel, 2001) and for this reason interventions at this time might be timely.

The results indicate that the use of self-selected music is beneficial in reducing physiological parameters. However, it also acknowledges that the opportunity to engage in any number of relaxing activities during this period can be just as beneficial in reducing physiological parameters. This certainly has recommendations and implications for health care professionals in how they structure the environment where patients are required to wait for procedures. According to these findings, an environment conducive to relaxation could be important in reducing physiological parameters, thereby assisting in calming patients. The positive responses brought about by a relaxing environment are consistent with the research by Barnason *et al.* (1995), as their research during the postoperative period showed there was no significant difference between music therapy and a scheduled rest.

When considering any change to practice, a cost benefit analysis should be undertaken. The cost of providing self-selected music during the preprocedure period was as follows: 10 CDs and mini-discs approximately AUS\$30 each; two pocket sized CDs and two mini-disc players and four sets of accompanying headphones approximately AUS\$250 each; AUS\$1300 in total for the music equipment. Four listening devices were sufficient as no more than four participants were waiting at any one time. The reclining chairs for the study were accessed from another part of the hospital, therefore their cost was not part of the study expenses. These expenses need to be considered in relation to the potential benefits to patients.

Recommendations and limitations

In this study the time period the participants were monitored in was based on the normal practices of the day procedure unit, that is, waiting periods of approximately 20–40 minutes. However, the optimal ‘waiting’ length of time to assist in the reduction of physiological parameters requires further investigation: a shorter time period may be insufficient to bring about a reduction in physiological parameters, while an extended waiting period may contribute to further anxiety. Further studies identifying an optimal time would be very helpful in structuring the processes within these units.

The use of a control group who undertook the normal activities of patients waiting to undergo a day procedure in the hospital environment ensures that the value of self-selected music is not assessed in isolation of routine health care practice. Because multiple *t*-tests were carried out in the results section to examine changes in the dependent variables across time, the findings of the present study might be limited by an increase in type I errors.

There is still a need to replicate this study with a larger sample size and a number of different interventions as both environments in this study, that is, resting with self-selected music and providing a quiet space for patients to engage in activities of their choosing, yielded positive effects on participants’ physiological parameters.

Implications for nursing and health care practice

Patient comfort, in particular alleviation of stress and anxiety, is a central component of surgical nursing. It needs to be remembered that the sterile operating room environment can still evoke stress in those who are unfamiliar with it. Of increasing significance is the ‘meaning’ that the surgical procedure may have for the patient. This research into the effect of music on patients’ physiological parameters and state anxiety is important in offering strategies for a possible reduction in anxiety. The findings suggest that the provision of self-selected music to patients relaxing in reclining chairs could enhance patient well-being during the immediate preprocedure period.

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Contributions

Study design: DL, AH; data analysis: DS; manuscript preparation: AH; literature review: AH, DL.

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