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RESEARCH PAPER

Effect of systematic relaxation techniques on anxiety and pain in older patients undergoing abdominal surgery

Nahid Rejeh PhD MScN BScN

Assistant Professor, Department of Nursing, Faculty of Nursing and Midwifery, Shahed University, Health of the Elderly Research Group, Tehran, Iran

Majideh Heravi-Karimooi PhD MScN BScN

Assistant Professor, Department of Nursing, Faculty of Nursing and Midwifery, Shahed University, Health of the Elderly Research Group, Tehran, Iran

Mojtaba Vaismoradi MScN PhD BScN

Researcher, Faculty of Professional Studies, University of Nordland, Bodø, Norway

Melanie Jasper PhD MSc BNurs BA RN RM RHV PGCEA

Professor, Head of College, College of Human and Health Sciences, Swansea University, Swansea, UK

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Effect of systematic relaxation techniques on anxiety and pain in older patients undergoing abdominal surgery

Inadequate pain control in older patients who have undergone abdominal surgery can lead to many complications. This study investigates the effect of systematic relaxation techniques on pain and anxiety in older patients undergoing abdominal surgery. One hundred twenty-four patients were randomly assigned into the experimental and control groups. The systematic relaxation techniques consisted of older patients in the experimental group slowly reading relaxing sentences during recovery in ambulation after the surgery.

Patients' satisfaction with pain and anxiety relief was recorded, as was their use of opioid analgesia. Statistically significant differences in pain and anxiety, and in analgesic use, were reported between the patients in experimental and control groups after the intervention. These relaxation techniques can be incorporated into the care plan to reduce pain and anxiety after surgery as well as offering a measure for increasing the patients' independence in pain management control.

Key words: anxiety, older patients, pain management, relaxation technique.

INTRODUCTION

Abdominal surgery is recognized as a painful procedure,[1] caused by ischaemia and release of neuropeptides at the trauma site and throughout the nervous system and due to the site's proximity to the diaphragm and

Correspondence: Nahid Rejeh, Faculty of Nursing and Midwifery, Shahed University (opposite Holy Shrine of Imam Khomeini-Khalij Fars Expressway), Tehran, Postal/zip code: 3319118651, Iran. Email: reje@shahed.ac.ir

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cross-innervations in the abdominal area.[2–4] Inadequate pain management following abdominal surgery leads to complications such as delayed recovery[5] and ambulation[6]; lack participation in the therapeutic plan; disturbed sleep and appetite loss; prolonged hospitalization; and dissatisfaction with, and increased costs of, health-care services.[7–9]

Pain after surgery is intensely uncomfortable, which exacerbates the anxiety response and might contribute to psychological complications.[5] Moreover, increased anxiety activates tension and pain, possibly leading to delay or cessation of therapeutic procedures.[10] Anxiety in postoperative patients can significantly affect the intensity of pain and surgical outcomes, and could adversely affect patient recovery. For instance, it might increase the intubation time, impair the inflammatory response, increase cardiovascular workload and change the normal degradation processes in wound healing.[11,12] From the psychological aspect, postoperative anxiety can cause an increased sensitivity to noise. It can result in an exaggerated autonomic response, sensory overload and sleep deprivation leading to physiological problems, and therefore delayed self-care after surgery.[11] A higher level of pain intensity in postoperative older patients, longer hospitalization and poorer ambulation after discharge from the hospital have all been linked to increased anxiety.[13] Hospitalization and surgery are among the most important causes of anxiety in older patients.[2] Therefore, designing strategies to reduce pain and anxiety after surgery and provide an environment conducive to smooth healing and recovery is needed. Anxiety and pain levels in postsurgical patients should be assessed so that proactive nursing interventions are implemented.[14]

Diverse interventions to promote relaxation, such as drug therapy, patient education, massage, aromatherapy and reflexology, have been designed.[15,16] Although there is no standard intervention to be applied to all older patients in order to manage their pain and reduce their anxiety, preventive approaches using both pharmacologic and non-pharmacologic approaches should be considered to gain optimal pain and anxiety control during hospitalization.[7] Specifically, non-pharmacological methods have been recommended as adjuvant to analgesics for reducing the intensity of pain after surgery.[5] Older patients generally suffer from moderate to severe postoperative pain.[13] Furthermore, the side effects of opioid drugs are experienced in these patients more frequently.[17,18]

Non-pharmacologic nursing measures after surgery could help the patients both reduce their anxiety and diminish the intensity of their pain.[14,19] Non-pharmacologic pain management includes a series of effective interventions such as relaxation.[13] Relaxation exercises reduce the intensity of pain after surgery and the level of anxiety, and thereby prevent the occurrence of complications after surgery. The use of relaxation exercises in postsurgical pain prevention can increase patient satisfaction with nursing care.[1] For instance, it has been shown that techniques such as deep breathing and jaw relaxation reduce patients' pain after abdominal surgery.[5,6] Relaxing muscles as a relaxation technique reduced patients' anxiety by preventing the transmission of pain messages to the spinal cord.[20] Furthermore, relaxation techniques are often the preferred methods for pain management by patients.[21]

The systematic relaxation technique as a therapeutic intervention has been utilized across patient ages ranging from 21 to 65 years.[6] However, few studies have explored whether systematic relaxation techniques can reduce anxiety and pain in older patients undergoing abdominal surgery.

BACKGROUND IN IRAN

In the Iranian health-care system, there are no pain management teams, and there is no algorithm or protocol to address the problems of postoperative pain. Pharmacological interventions, especially the prescription of opioid drugs, are the main methods of controlling postoperative pain, and are only prescribed by physicians. In addition, nurses have no direct collaboration in the management of pain in the health-care team.[22] Therefore, systematic relaxation techniques as an adjuvant to the traditional methods for pain management can empower Iranian nurses to take a central role in the delivery of high-quality care to patients.

The majority of studies conducted in Iran on pain management have addressed the barriers to pain management and its ethical consequences.[23,24] Previous Iranian studies focused on the effect of non-pharmacologic measures on moderate to severe essential hypertension,[25] anxiety of primigravid women[26] and anxiety of female dormitory students.[27] However, no Iranian studies have been conducted to investigate the effect of relaxation techniques on postoperative pain in older patients.

The basis for conducting this study, concentrating on relaxation in patients during hospitalization and improving patients' self-care, emanates from two theories:

1. Florence Nightingale's focus on environment, health and wellbeing: Nightingale proposed that nurses provide a therapeutic environment to nurse the person rather than the disease.[28] A therapeutic environment provides an integrative network of physical, spiritual and psychological factors, which contributes to the creation of a healing or a healthy place for hospitalization.[29,30] Florence Nightingale advised using relaxation techniques such as encouraging rest, pleasurable sounds, and limiting disturbances and unnecessary noises.[31,32]
2. Dorothea Orem's focus on self-care: suggests that helping people to maintain a balance between activity and rest (a universal self-care requisite), is a legitimate concern of nursing. The meaning of activity and rest, the requirements and potential measures for meeting this self-care requisite, and the factors that might influence the process are explored. Orem proposed that self-care action regulates human functioning and that self-care can be learned for health-related purposes.[33,34]

AIM

The purpose of this study was to investigate the effect of systematic relaxation techniques on the pain and anxiety of older patients undergoing abdominal surgery. The answers to the following questions were sought: (i) Do patients in the experimental group experience less pain than patients in the control group?; and (ii) Do patients in the experimental group experience lower anxiety levels than the patients in the control group?

METHODS

Study design and samples

A convenience sample of 124 older patients undergoing elective abdominal surgery between April 2011 and December 2011 were recruited from general surgical wards of a university teaching hospital in Tehran and enrolled in a randomized controlled trial (RCT). The RCT is a classic and precise method for examining the effects of an independent variable on a dependent one by comparing them in experimental and control groups.[28] The sample size of 62 participants per group was achieved based on a power analysis for the covariance using a moderate effect size, power of 0.90 and $\alpha = 0.05$. Two patients dropped out of each group due to transfer of ward or surgery cancellation.

The following inclusion criteria were used to select the sample:

- Aged $\leq$ 65 years;
- Being orientated to time, time and place;
- Having no cognitive, affective, verbal or aural impairments;
- Not using a relaxation therapy technique before and during the conduct of the study;
- Having no substance abuse and opium addiction;
- Being hospitalized for at least one night before the surgical procedure; and
- Being able to communicate in Persian and having the willingness to participate in this study.

Measurements

The following instruments were used to gather data:

- Demographic information questionnaire including age, gender, educational level, economic status, religion, occupation, marriage, health insurance, health histories, treatment period, surgical incision (length, location, direction),and any existing diseases—gathered from the patients' medical records; and
- Visual analogue scales (VAS) to assess the patients' intensity of pain and the level of anxiety. The VAS pain and the VAS anxiety scales each consist of a 10 cm unmarked line on which the patient places a slash to represent a rating of the level of pain or anxiety experienced at the time.[35] The VAS has been considered appropriate for use in studies with older adults because it has the least number of questions and is less tedious to complete than other complicated instruments.[18,20]

The VAS pain scale had labels of 'no pain' and 'worst possible pain' as its anchors. Correspondingly, the VAS anxiety was labelled with 'no anxiety or worry' and 'worst possible anxiety or worry' at either end of the 10 cm line. The VAS anxiety scale has been demonstrated to be significantly associated with standard psychological tools for the assessment of anxiety.[36] These scales were applied in other studies to assess the short-term efficacy and safety of two kinds of traditional Chinese herbal patches,[37] assess the efficacy of pain management regimens in patients with acute postoperative pain, but its usefulness has not been confirmed in postoperative pain studies.[38] In addition, the scale has been used to assess the performance of four self-report measures of anxiety in an older adult population[39] to investigate the impact of self-administration of midazolam for postoperative anxiety.[35]

Relaxation techniques

The relaxation techniques included patients reading relaxing sentences, slowly without music, using an introductory tape and earphones while they rested in bed concentrating on relaxing successive muscle groups for 10–20 min without any muscle contraction.[5,6] The implementation of the technique took 5 min, repeated three times.

Two bilingual linguists, who were fluent in both languages, translated the content of the audiotape from English (the original language) to Persian separately. Another expert reviewed the translations to identify inconsistencies. Minor revisions were suggested, resulting in one Persian version of the scale. This was translated back from Persian to English by two bilingual language experts. The back-translated version and the original were compared and found to be highly similar in meaning and content. An expert panel, consisting of eight health-care providers (a physician, two faculty members of a nursing school, two nurse managers, a psychologist and two clinical nurses), was asked to listen to the audiotape and rate the content of the Persian version based on its clarity and simplicity. Further minor changes resulted and were pilot-tested with five patients. This final version was used for the data collection.

Intervention

The surgical ward head nurses were asked to identify older patients who met the inclusion criteria. Participants were randomly assigned to experimental and control groups according to file numbers (even numbers to the experiment group and odd to the control group), balancing for sex, age and chronic pain.[40]

All participants were provided with information about their surgery and the current ward protocols regarding ambulation afterwards. The systematic relaxation techniques were applied based on previously published protocols.[5,41,42] The experimental group patients were given an audio tape containing the technique's instructions, whereas patients in the control group received normal care. The audio tape included information about the relaxation techniques, their benefits and importance—these were repeated during their use. The participants listened to the tape until they were confident that they had mastered the techniques and could apply them correctly. They used fixed earphones to prevent distraction and improve concentration.

The participants were asked to report the intensity of their pain and anxiety using the VAS scales at four times (before the intervention, following the 15-min recovery period from initial ambulation, and 6 and 12 h after the intervention).

To assess and compare levels of analgesics used, the intake of opioid drugs during the first 12 h after initial ambulation was converted as the number of milligrams of morphine administered by staff nurses and recorded in the patient's file.

Data analysis

The data were analysed using descriptive and inferential statistics via SPSS software version 15. The Student's *t*-test and repeated measurements were used to examine the differences in pain and anxiety between the groups, and during the study period. P value < 0.05 was denoted as statistically significant.

Ethical considerations

The ethical approval for this study was obtained from the Ethics Committee affiliated to Shahed University, and participants were reassured that information would be considered confidential and their identity would not be revealed. Permission to conduct the study was granted by hospital directors. All participants were provided with information about the study's method; their informed consent was obtained; and they were told that they could withdraw from the study at any time without being penalized. The control group patients did not witness the interventions applied to the patients in the intervention group.

RESULTS

Demographic characteristics of the sample

This study involved 124 patients (92 females, 32 males), age range between 65 and 92 years (Mean = 76.26 years, SD = 7.67 years). The mean age of the participants was 72.72 years (SD = 7.60 years) in the experimental group and 75.06 years (SD = 0.59 years) in the control group. Each group comprised 62 patients. There were no significant differences between the two groups regarding demographic and clinical characteristics ($P < 0.05$). Gender was matched in the groups so that 45/47 (72.58% and 75.47%) were female and 15/17 (27.42% and 24.20%) were male (Table 1).

Table 1 Demographic and clinical characteristics of the participants (n = 124)

Characteristics	Experiment group (n = 62)	Control group (n = 62)	P value
Gender	n (%)	n (%)	
Female	45 (72.58)	47 (75.47)	$\chi^2 = 0.419$
Male	17 (27.42)	15 (24.20)	df = 1
			$P = 0.618$
Age/mean (± SD) (range)	75.22 (7.72) (65–92)	77.30 (7.54) (65–92)	$t = 0.248$
			$P = 0.804$
Chronic pain	n (%)	n (%)	
Yes	51 (82.26)	52 (83.87)	$\chi^2 = 0.811$
No	11 (17.74)	10 (16.13)	df = 1
			$P = 0.500$
Marital status	n (%)	n (%)	
Widowed	18 (17.1)	12 (19.4)	$\chi^2 = 1.310$
Divorced	2 (68.6)	0 (0.00)	df = 2
			$P = 0.51$
Married	42 (14.3)	50 (80.6)	
Educational status	n (%)	n (%)	
Illiterate	32 (51.61)	27 (43.54)	$\chi^2 = 5.313$
Literate	15 (24.19)	21 (33.87)	df = 5
Primary school	11 (17.74)	7 (11.29)	$P = 0.379$
High school	4 (6.46)	5 (8.07)	
College graduate	0 (00.0)	4 (3.23)	

Comparisons

There was a significant and positive relationship between the intensity of pain and the level of anxiety before the intervention ($r = 0.387$, $P < 0.001$). The same pattern was reported after the intervention at end of the 15-min recovery period from initial ambulation, T_1 ($r = 0.616$, $P < 0.001$); 6 h after the intervention; T_2 ($r = 0.512$, $P < 0.001$); and 12 h after the intervention, T_3 (r = 0.565, $P < 0.001$) (Figs 1,2).

The intensity of pain and level of anxiety before the intervention in both groups ranged from 5 to 10, and from 3 to 7, respectively. The groups were not significantly different regarding pain and anxiety levels before the intervention (Table 2). The intensity of pain in both groups was severe before the intervention because the patients experienced pain resulting from returning to bed after ambulation.

Therefore, the pain score in both groups prior to the intervention was the same. The intensity of pain remained severe in the control group after 15 min of recovery from ambulation, but became mild in the experimental group.

At the end of the 15-min recovery period, the severity of pain and the level of anxiety in the experimental group were lower, ranging from 2 to 7 (Mean = 4.12, SD = 1.83) and 3 to 7 (Mean = 5.77, SD = 0.94), respectively. After the intervention, the participants in the experimental group had less pain and anxiety at the end of the recovery period than those in the control group ($t = -4.68$, P value = 0.004) (Table 3).

The experimental group patients experienced less pain and anxiety in comparison with the patients in the control group after the intervention. The difference of pain score between the groups was statistically significant T_1 ($t = -4.68$, $P = 0.004$); T_2 ($t = -9.56$, $P = 0.001$); T_3 ($t = -14.14$, $P = 0.001$). The difference of anxiety score between the groups was significant statistically T_1 ($t = -6.33$, $P = 0.001$); T_2 ($t = -9.04$, $P = 0.044$); T_3 ($t = -12.40$, $P = 0.000$).

The majority of the patients (89%) were satisfied with the impact of the techniques in reducing the level of pain and anxiety after surgery. They stated that they would apply them during future surgery and would recommend

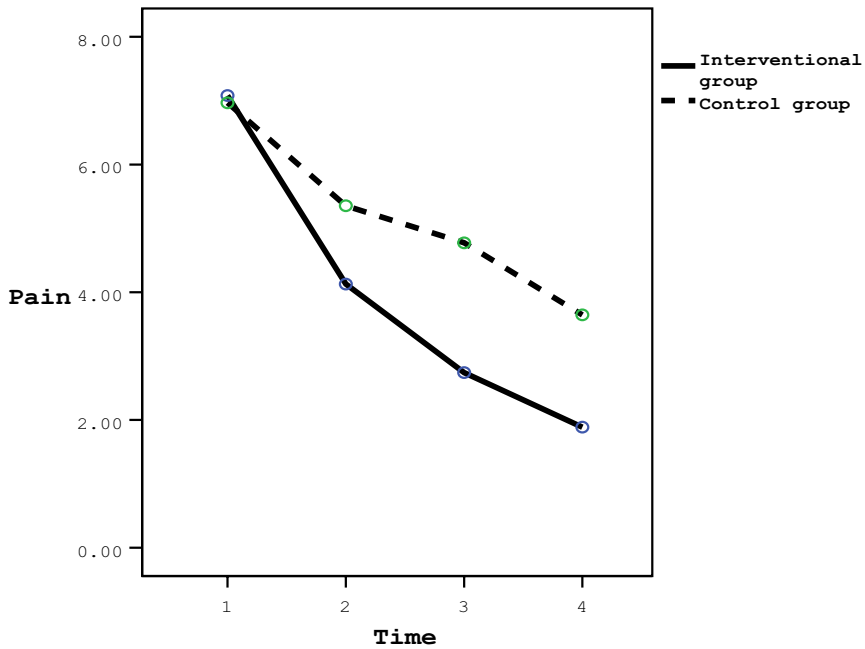

Figure 1. The intensity of pain in the experiment and control groups before and after the intervention.

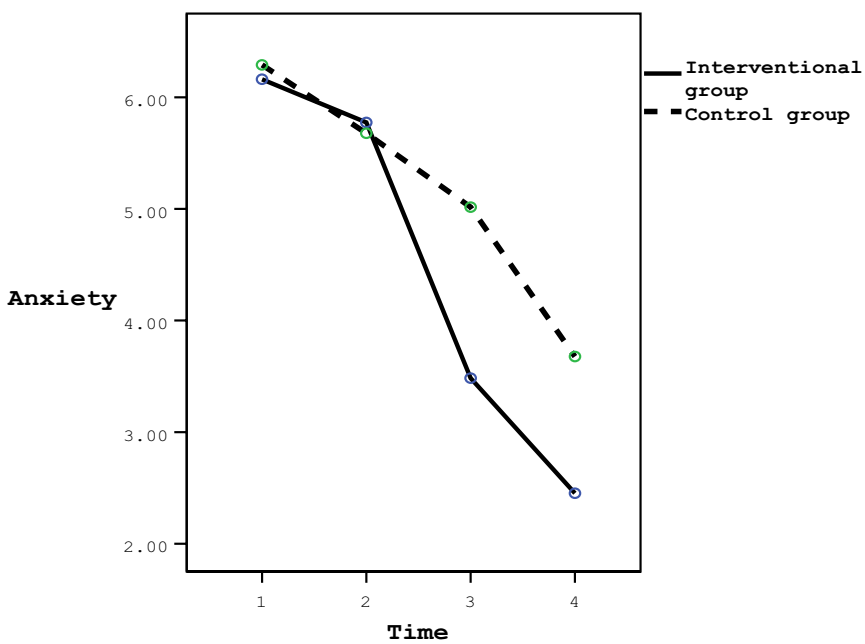

Figure 2. The level of anxiety in the interventional and control groups before and after the intervention.

the techniques to other family members having similar surgery.

In addition, there was a significant difference in milligrams of morphine equivalent received during the 6 h after the intervention and in the number of patients who received opioid drugs between the groups ($t = 0.389$, $P = 0.0425$).

DISCUSSION

Our findings parallel the findings of other studies[5,6] in supporting relaxation as a complementary method that contributes to decreasing patients' pain and level of anxiety, but also report pioneering work in testing these strategies with older patients. The study determined the effectiveness of systematic relaxation techniques on the

Table 2 Comparison of the intensity of pain and level of anxiety between groups before the intervention

Characteristics	Experiment group (n = 62) Mean ± SD	Control group (n = 62) Mean ± SD	Statistical test and P value
Pain	7.08 ± 1.59	6.96 ± 1.62	$t = 0.39$ $P = 0.95$
Anxiety	6.16 ± 1.17	6.29 ± 1.09	$t = 0.633$ $P = 0.302$

Table 3 Comparison of the intensity of pain and level of anxiety between groups after the intervention

Characteristics	Experiment group (n = 62) Mean ± SD	Control group (n = 62) Mean ± SD	Statistical test and P value
Pain			
T_1	4.12 ± 1.83	5.35 ± 0.94	f = 41.81
T_2	2.74 ± 1.50	4.77 ± 0.73	$P = 0.000$
T_3	1.88 ± 0.85	3.64 ± 0.48	
Anxiety			
T_1	5.77 ± 1.41	5.67 ± 1.35	f = 17.05
T_2	3.48 ± 0.80	5.01 ± 1.06	$P = 0.000$
T_3	2.45 ± 0.61	3.67 ± 0.47	

intensity of pain and the level of anxiety in patients undergoing abdominal surgery. Although other authors present evidence demonstrating the effects of relaxation techniques on the experience of pain[6,41,42] this study considers efficacy with a previously underexplored subject group. Additionally, the instrument used in this study is different to that previously used[18,20] in that it has been adapted to reflect cultural differences specific to this group of participants.[6]

Greater effect of the systematic relaxation techniques may be achieved when they are administered long term; practised in a quiet place in order to increase concentration; there is greater body involvement; and cultural differences are incorporated.

Use of the techniques resulted in the reduced need for opioid analgesics. This is significant in elderly patients because of the known side effects of opioid administration, such as constipation and respiratory depression which might complicate recovery. Any technique that is patient controlled, reduces the need for pharmacological intervention and is effective in managing pain is a useful addition to the nursing contribution to patient recovery.

The relaxation techniques were easily practised by older patients while resting in bed. This is consistent with the results of other studies showing that relaxation resulted in less pain at rest,[43] and after minutes of recovery.[44] Additionally, in our study, a significant change was seen in the level of anxiety between the groups after the intervention, but not reported in Roykulcharoen and Good's[6] work. The main difference between this study and the latter was in the selection of older people as this study's sample.[6]

CONCLUSION

The findings of this study offer insights into systematic relaxation techniques as a self-care strategy to help older patients undergoing abdominal surgery control their pain and anxiety. The techniques can contribute to effective and supplementary non-pharmacologic methods of pain management in patients undergoing abdominal surgery, and also result in reduced use of opioid analgesia. They can be incorporated into nursing care plans to relieve pain during procedures such as bandaging, dressing changes, physical therapy, positional change, and transferring to

the bed or chair. The techniques are easily learnt and implemented by individual patients. Research to investigate the use of systematic relaxation techniques for other age category patients undergoing surgery in the upper abdominal area, at different points in care and also in other parts of the body, could provide evidence to support their usefulness for reducing anxiety and pain.

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CONFLICT OF INTEREST

No conflict of interest has been declared by the authors.

AUTHORS' CONTRIBUTIONS

Nahid Rejeh: study design, data collection and analysis, and manuscript writing.

Majideh Heravi-Karimooi: study design, data collection and analysis, and manuscript writing.

Mojtaba Vaismoradi: manuscript writing, and technical and material support.

Melanie Jasper: manuscript writing, and technical and material support.

REFERENCES

1 Topcu SY, Findik UY. Effect of relaxation exercises on controlling postoperative after surgery. *Pain Management Nursing* 2012; **13**: 11–17.

2 Black JM, Hawks JH, Keene AM. *Medical-Surgical Nursing. Clinical Management for Positive Outcome*, 6th edn. Philadelphia, PA, USA: W.B. Saunders, 2010.

3 Wentz J. Pain management. In: Potter PA, Perry AG (eds). *Fundamental of Nursing*, 6th edn. St. Louis, MO, USA: Mosby Elsevier, 2009; 1051–1085.

4 Jurf JB, Nirschl A. Acute postoperative pain management: a comprehensive review and update. *Critical Care Nursing Quarterly* 1993; **16**: 8–25.

5 Good M, Anderson GC, Ahn S, Cong X, Stanton-Hicks M. Relaxation and music reduce pain following intestinal surgery. *Research in Nursing and Health* 2005; **28**: 240–251.

6 Roykulcharoen V, Good M. Systematic relaxation to relieve postoperative pain. *Journal of Advanced Nursing* 2004; **48**: 140–148.

7 Allred KD, Byers JF, Sole ML. The effect of music on postoperative pain and anxiety. *Pain Management Nursing* 2010; **11**: 15–25.

8 Shang AB, Gan TJ. Optimising postoperative pain management in the ambulatory patient. *Drugs* 2003; **63**: 855–867.

9 Valente SM. Hypnosis for pain management. *Journal of Psychosocial Nursing* 2006; **44**: 23–30.

10 Park KS, Na MJ. The effect of music therapy on reduction of anxiety before gastroscopy. *Journal of Korean Academy of Adult Nursing* 2003; **15**: 247–255.

11 Caumo W, Ferreira M, Cardoso B. Perioperative anxiety: psychobiology and effects in postoperative recovery. *The Pain Clinic* 2003; **15**: 87–101.

12 Broadbent E, Petrie KJ, Alley PG, Booth RJ. Psychological stress impairs early wound repair following surgery. *Psychosomatic Medicine* 2003; **65**: 865–869.

13 McDonald DD. Postoperative pain management for the aging patient. *Geriatrics Aging term hospital care and after cardiac surgery* (Dissertation). Faculty of Medicine, Institute of Clinical Medicine University of Helsinki, Finland, 2006.

14 Gregory J. Pain management and orthopaedic care. In: Kneale JD, Davis PS. *Orthopaedic & Trauma Nursing*, 2th edn. Edinburgh: Churchill Livingstone, 2005.

15 Shi HS, Kim H. Music therapy on anxiety, stress and maternal-fetal attachment in pregnant women during transvaginal ultrasound. *Asian Nursing Research* 2011; **5**: 19–27.

16 Bagheri-Nesami M, Mohseni-Bandpei MA, Azar MS. The effect of Benson Relaxation Technique on rheumatoid arthritis patients: extended report. *International Journal of Nursing Practice* 2006; **12**: 214–219.

17 Vila H Jr, Smith RA, Augustyniak MJ *et al*. The efficacy and safety of pain management before and after implementation of hospital-wide pain management standards: is patient safety compromised by treatment based solely on numerical pain ratings? *Anesthesia and Analgesia* 2005; **101**: 474–480.

18 Pesonen A. Pain measurement and management in elderly patients: clinical studies in long term hospital care and after cardiac surgery (Dissertaion). Faculty of Medicine, Institute of Clinical Medicine University of Helsinki, Finland. 2011.

19 Mann EM, Carr ECJ. *Pain Management: Essential Clinical Skills for Nurses*. Oxford, UK: Blackwell Publishing, 2006.

20 Heye ML, Foster L, Bartlett MK, Adkins S. A preoperative intervention for pain reduction, improved mobility, and self-efficacy. *Applied Nursing Research* 2002; **15**: 174–183.

21 Titler MG, Herr K, Schiling ML *et al*. Acute pain treatment for older adults hospitalized with hip fracture: current nursing practices and perceived barriers. *Applied Nursing Research* 2003; **16**: 211–227.

22 Rejeh N, Ahmadi F, Mohammadi E, Anoosheh M, Kazemnejad A. Barriers to, and facilitators of postoperative pain management in Iranian nursing: a qualitative research study. *International Nursing Review* 2008; **55**: 468–475.

23 Rejeh N, Ahmadi F, Mohamadi E, Anoosheh M, Kazemnejad A. Ethical challenges in pain management post-surgery. *Nursing Ethics* 2009; **16**: 161–172.
24 Rejeh N, Vaismoradi M. Perspectives and experiences of elective surgery patients on pain management. *Nursing & Health Sciences* 2010; **12**: 67–73.
25 Ranjbar F, Akbarzadeh F, Kazemi B, Safaeiyan A. Relaxation therapy in the background of standard antihypertensive drug treatment is effective in management of moderate to severe essential hypertension. *Saudi Medical Journal* 2007; **28**: 1353–1356.
26 Bastani F, Hidarnia A, Montgomery KS, Aguilar-Vafaei ME, Kazemnejad A. Does relaxation education in anxious primigravid Iranian women influence adverse pregnancy outcomes?: a randomized controlled trial. *Journal of Perinatal and Neonatal Nursing* 2006; **20**: 138–146.
27 Dehghan-Nayeri N, Adib-Hajbaghery M. Effects of progressive relaxation on anxiety and quality of life in female students: a non-randomized controlled trial. *Complementary Therapies in Medicine* 2011; **19**: 194–200.
28 Twiss E, Seaver J, McCaffrey R. The effect of music listening on older adults undergoing cardiovascular surgery. *Nursing in Critical Care* 2006; **11**: 224–231.
29 Cmiel CA, Karr DM, Gasser DM, Oliphant LM, Neveau AJ. Noise control: a nursing team's approach to sleep promotion. *The American Journal of Nursing* 2004; **104**: 48–55.
30 Felgen J. Caring and healing environment: restoring caring back into nursing. *Nursing Administration Quarterly* 2004; **28**: 288–301.
31 Engwall M, Duppils G. Music as a nursing intervention for postoperative pain: a systematic review. *Journal of Perianesthesia Nursing* 2009; **24**: 370–383.
32 Malpas P. Florence Nightingale: appreciating our legacy, envisioning our future. *Gastroenterology Nursing* 2006; **29**: 447–452.
33 Brunner L, Sudarth D. *Textbook of Medical Surgical Nursing*, 10th edn. Philadelphia, PA, USA: Lippincott, Williams & Wilkins, 2004.
34 Benson H. Forward: *twenty-fifth anniversary update*. In: Benson H (ed.). *The Relaxation Response*. New York: Harpertorch, 2000.
35 Egan KJ, Ready LB, Nessly M, Greer BE. Self-administration of midazolam for postoperative anxiety: a double blinded study. *Pain* 1992; **49**: 3–8.
36 Badner NH, Nielson WR, Munk S, Kwiatkowska C, Gelb AW. Preoperative anxiety: detection and contributing factors. *Canadian Journal of Anesthesia/Journal Canadien D'anesthésie* 1990; **37**: 444–447.
37 Wang X, Cao Y, Pang J *et al*. Traditional chinese herbal patch for short-term management of knee osteoarthritis: a randomized, double-blind, placebo-controlled trial. *Evidence-Based Complementary and Alternative Medicine* 2012; **2012**: 171706. doi: 10.1155/2012/171706. Epub 2012 Feb 12.
38 DeLoach LJ, Higgins MS, Caplan AB, Stiff JL. The visual analog scale in the immediate postoperative period: intrasubject variability and correlation with a numeric scale. *Anesthia & Analgsia* 1998; **86**: 102–106.
39 Dennis RE, Boddington SJ, Funnell NJ. Self-report measures of anxiety: are they suitable for older adults? *Aging & Mental Health* 2007; **11**: 668–677.
40 Zeller R, Good M, Anderson GC, Zeller DL. Strengthening experimental design by balancing potentially confounding variables across treatment groups. *Nursing Research* 1997; **46**: 45–349.
41 Good M. A comparison of the effects of jaw relaxation and music on postoperative pain. *Nursing Research* 1995; **44**: 52–57.
42 Good M. Relaxation techniques for surgical patients. *The American Journal of Nursing* 1995; **5**: 39–43.
43 Good M, Stanton-Hicks M, Grass JA, Anderson GC, Salman A, Duber C. Pain outcomes after intestinal surgery. *Outcomes Management for Nursing Practice* 2001; **5**: 41–46.
44 Good M, Stanton-Hicks M, Grass JA *et al*. Relief of postoperative pain with jaw relaxation, music, and their combination. *Pain* 1999; **81**: 163–172.