

## Kliiniline küsimus nr 15

Kas postoperatiivses etapis lisaks farmakoloogilisele valuravile mittefarmakoloogiliste meetodite kasutamine vs mittekasutamine parandab ägeda valu ravi tulemust?

**Tulemusnäitajad:** *valu tugevus, valu vähenemine, lisavaluvaigisti vajadus (sh opiaadi vajadus), ärevuse vähenemine, patsiendi (eestkostja) rahulolu valuraviga, postoperatiivsete tüsistuste esinemissagedus*

## Ravijuhendid

### Kokkuvõte

**Psühholoogilised meetodid** (kognitiiv-käitumuslikud meetodid nagu näiteks positiivne visualiseerimine, relaksatsioonimeetodid, muusika, hüpnoos, tähelepanu kõrvalejuhtimine virtuaalreaalsuse abil) – **tuleks võimalusel kaasata** perioperatiivse valu raviskeemidesse lisaks farmakoloogilisele valuravile, kuna need võivad vähendada postoperatiivse valu tugevust ja ärevust. Osaliselt on need meetodid seotud patsiendi preoperatiivse õpetamise / nõustamisega. **Muusika** kuulamine vähendab vähesel määral postoperatiivse valu tugevust ja vajaminevaid opioideid annuseid.

**Füsioteraapia meetodid tuleb lisada** perioperatiivse valu käsitlesele, kuna nad soodustavad üldist taastumist isegi kui mõju postoperatiivsele valule on tagasihoidlik.

**Füüsikalised meetodid** (peamiselt külmaravi) – operatsioonijärgset külmaravi võiks lisaks farmakoloogilisele valuravile kasutada peale teatud tüüpi operatsioone.

**TENS** - võiks lisaks farmakoloogilisele valuravile kasutada peale teatud tüüpi operatsioone.

**Nõelravi** - võiks lisaks farmakoloogilisele valuravile kasutada mõnel näidustusel.

## 1.“Behandlung acuter perioperativer und postraumatischer Schmerzen” 2009 (DE-07)

Under the non-pharmacological methods of acute pain management are described psychological methods, physiotherapy and physical methods (cold therapy), TENS and acupuncture.

**Psychological methods** should be integrated to the preoperative /posttraumatic pain management. Degree of recommendation **B**

**Physiotherapy** should be integrated to the preoperative /posttraumatic pain management. Degree of recommendation **A**

**Physical methods:** postoperative cold therapy can be used after some surgical-orthopaedic procedures. Degree of recommendation **B**

**TENS** can be used as additional application after some surgical interventions. Degree of recommendation **B**

**Acupuncture** can be applied as an addition for certain indications. Degree of recommendation **B**

### Psychological methods:

- **Cognitiv-behavioural methods** – positive visualizing **reduces pain intensity** (Madden et al 1987; Cheung et al 2003, Zimmerman et al 1996, Callaghan and Li 2002). Coping strategies should be used together with the preoperative patient informing (LaMontagne et al 2003).
- **Relaxation methods** – systematic review (Seers and Carroll 1998) found **no effect**, **some studies have found positive effect** on the postoperative pain (Ma et al. 1996; Good et al 1999; Miro and Raich 1999; Good et al 2001; Good et al 2002; Huth et al 2004; Roykulcharoen and Good 2004; Good et al 2005), **or no effect** for the clinical paramethers (Haase et al 2005).
- **Music**- Some studies have found that music **can reduce postoperative pain** intensity (Good et al., 1999; Good et al., 2001; Good et al., 2002; Laurion and Fetzer, 2003; Huth et al., 2004; Good et al., 2005; Nilsson et al., 2001; Manyande et al., 1995; Tusek et al., 1997; Shertzer and Keck, 2001; Sahler et al., 2003), **some studies found no effect** (Heitz et al., 1992; Broschious, 1999; Renzi et al., 2000; Haase et al., 2005)
- **Hypnose** – cannot be routinely used in clinical practice. **Efficacy was shown** in the metaanalyse (Montgomery et al. 2002). Hypnose can reduce preoperative anxiety (Saadat et al., 2006)

**Physiotherapy** (mobilization, exchange of position, coughing exercise, relaxation techniques, active or passive moving excsises, manual therapy, massage etc).

- **Physiotherapy reduces the occurrence of postsurgical complications and is therefore always recommended.**
- Metaanalyse from McDonald et al. (2004) – 9 RCTs (782 patients) found **no effect** of physiotherapy on the postoperative pain.
- Review from Ackermann et al. (2004) shows **moderate effect** on the reduction of perioperative anxiety

### Physical methods

- Metaanalyse showed after arthroscopic cruciate knee ligament surgery (6 RCTs, cool therapy coolpacks) **significant reduction of postop pain** compared to use of no physical methods (Raynor et al., 2005).

### TENS

- Systematic review found **no effect** in 15 studies of 17 RCTs (Carroll et al., 1996)
- Metaanalyse of 21 RCTs found **positive effect for postop analgesic consumption** (Bjordal et al., 2003).

### Accupuncture

Review of 19 RCTs of intraoperative accupunture found no effect (Lee und Ernst, 2005).

## 2. Acute Pain Management: Scientific Evidence 2010 (AU10)

Psychological interventions may be divided into 4 categories:

1. Information provision (discussed elsewhere)
2. Stress / tension reduction (relaxation and hypnotic strategies)
3. Attentional strategies
4. Cognitive-behavioural interventions

These are rarely “stand-alone” interventions.

### Key messages:

- **Listening to music** produces a small reduction in postop pain and opioid requirement (Level I (Cochrane review))
- **Distraction** is effective in procedure related pain in **children** (Level I)
- Training in **coping methods** or behavioural instruction prior to surgery reduces pain, negative affect and analgesic use (Level I)
- Evidence of benefit of **hypnosis** in the management of acute pain is inconsistent
- Immersive **virtual reality distraction** is effective in reducing pain in some clinical situations (Level III-2)
- Evidence for any benefit of **relaxation techniques** in the treatment of acute pain is weak and inconsistent (Level IV)

**Relaxation training** (teaching a patient ways of reducing their feelings of stress / tension by various techniques (recorded audiotape, written / spoken instructions, calming music))

- Systematic review (Seers et al. 1998) concluded: when used alone after / during surgery / procedures – **weak evidence to support the use** (3 of 7 studies reported significant reduction of pain and distress).
- Systematic review by Kwekkeboom et al. 2006 – 8 of 15 studies showed **reduction of pain** (most evidence for systematic relaxation technique for postop pain)
- Review of studies of pain in burn patients (deJong et al 2006) – **insufficient high quality evidence to draw any conclusions**

### Hypnosis

- Information mostly from non-RCT trials.
- 8 of 18 studies indicated, that hypnosis for pain had a moderate to large effect size (Montgomery et al 2000).
- Review of hypnosis in clinical pain setting provided moderate support for the use of hypnosis for acute pain (Patterson and Jensen 2003).

**Attentional techniques** (distraction, from the pain through to attention to imagined scenes, sensations or to external stimuli such as music, scenes or smells)

- These techniques are commonly used in conjunction with relaxation methods.
- Systematic review in children and adolescents concluded that distraction is **effective in needle-related procedure** related pain (Uman et al 2006)
- **No effect was seen in the elderly** patients after colorectal surgery (Haase et al. 2005).
- **Virtual reality distraction** has been shown to be **effective in children** (Hoffman et al 2000, Das et al 2005).
- **Music** – Cochrane review concluded that listening to music **reduced pain intensity and opioid requirement after surgery**, but the magnitude of benefit was small (Cepeda et al 2006).

- Systematic review found that **pain and anxiety in the perioperative period were reduced** in half of the studies (Nilsson et al. 2008).
- There is some evidence that rather than shifting attention away from the pain, instructions to focus attention on the pain site can alter pain perception, but possibly mainly among sub-groups of patients (Haythorntwaite et al. 2001).
- **Meditation** – no reports on the use in the management of acute pain.

**Cognitive-behavioural interventions** (involve the application of a range of behaviour-change principles)

- No reviews of the benefit after surgery.

## Süsteemaatilised ülevaated

### Kokkuvõte

**TENS** – monoteraapia kohta ägeda valu ravis ei ole võimalik kindlaid järeldusi teha, TENS koos farmakoloogilise valuraviga vähendab vähesel ja mõõduka postoperatiivse valu tugevust.

**Muusika** – muusika kuulamine vähendab ärevust ja tõenäoliselt vähesel määral valu tugevust, kuid uuringute tulemused on väga heterogeensed, et teha kindlaid järeldusi.

**Krüoanalgeesia** – torakotoomia ja põlveliigese endoproteesimise järgse valu ravis ei ole tõhus ja ei soovitata kasutada.

**Tähelepanu kõrvalejuhtimine virtuaalse reaalsuse abil** – vähendab tõenäoliselt operatsioonijärgse valu tugevust, uuringutes on kõige selgemalt välja toodud positiivne mõju põletushaavadega seotud valu puhul.

**Relaksatsioonitehnikad** – liiga vähe infot, et teha järeldusi relaksatsioonitehnika mõju kohta ägeda valu ravis

## TENS (Transcutaneous electrical nerve stimulation)

1. Walsh, D. M., et al. "Effectiveness of TENS as a sole treatment for acute pain in adults." (2011).

**Objectives:** To assess the analgesic effectiveness of TENS for acute pain in adults to see if it had any analgesic effect in its own right.

**Selection criteria:** RCTs of adults with acute pain (less than 12 weeks) were included if they examined TENS given as a sole treatment and assessed pain with subjective pain scales. Studies were eligible if they compared TENS to placebo TENS, no treatment controls, pharmacological interventions or non-pharmacological interventions. Studies on experimental pain, case reports, clinical observations, letters, abstracts or reviews were excluded. Studies on TENS and labour pain, pain due to dental procedures and primary dysmenorrhoea were excluded. Studies where TENS was given with another treatment as part of the formal study design were also excluded.

**Main results:** 12 RCTs involving 919 participants at entry were included. The types of acute pain conditions included procedural pain, e.g. cervical laser treatment, venipuncture, screening flexible sigmoidoscopy and non-procedural pain, e.g.

postpartum uterine contractions, rib fractures. It was not possible to perform a meta-analysis due to insufficient data.

**Conclusions:** Due to insufficient extractable data in the studies included in this review, we are unable to make any definitive conclusions about the effectiveness of TENS as an isolated treatment for acute pain in adults.

2. Sbruzzi, G., et al (2012) “Transcutaneous electrical nerve stimulation after thoracic surgery: systematic review and meta-analysis of 11 randomized trials.” Rev Bras Cir Cardiovasc, Jan-Mar;27(1):75-87

**Objectives:** To evaluate the effects of TENS on pain and pulmonary function during the postop period after thoracic surgery by performing a systematic review and meta-analysis of RCTs.

**Methods:** The search strategy included MEDLINE, PEDro, Cochrane CENTRAL, EMBASE and LILACS, besides a manual search, from inception to August, 2011. Randomized trials were included, comparing TENS associated or not with pharmacological analgesia vs. placebo TENS associated or not with pharmacological analgesia or vs. pharmacological analgesia alone to assess pain (visual analog scale - VAS) and/or pulmonary function represented by forced vital capacity (FVC) in postoperative thoracic surgery patients (pulmonary or cardiac with approach by thoracotomy or sternotomy).

**Results:** 11 studies included. In the approach by thoracotomy, TENS associated with pharmacological analgesia reduced pain compared to the placebo TENS associated with pharmacological analgesia (VAS -1.29; CI95%: -1.94 to - 0.65). In the approach by sternotomy, TENS associated with pharmacological analgesia also reduced pain compared to the placebo TENS associated with pharmacological analgesia (VAS -1.33; 95%CI: -1.89 to 0.77) and compared to pharmacological analgesia alone (VAS -1.23; 95%CI: -1.79 to -0.67). There was no significant improvement in FVC (0.12 L; 95%CI: -0.27 to 0.51).

**Conclusion:** TENS associated with pharmacological analgesia provides pain relief compared to the placebo TENS in postoperative thoracic surgery patients both approached by thoracotomy and sternotomy. In the sternotomy it also provides more effective pain relief compared to pharmacological analgesia alone, but has no significant effect on pulmonary function.

3. Freynet, A. et al (2010) „Is transcutaneous electrical nerve stimulation effective in relieving postoperative pain after thoracotomy?“ Interactive Cardiovascular and Thoracic Surgery. Feb;10(2):283-8

**Question:** whether the use of TENS is effective in reducing post-thoracotomy pain.

**Results:** Of the 74 papers found with a report search, 9 prospective RCTs, among which 3 were double-blind, presented the best evidence to answer the clinical question. All investigated the effect of TENS as an adjunct therapy for relieving acute post-thoracotomy pain in patients undergoing thoracic surgery. 7 of the 9 retrieved studies - were in favor of TENS as an adjuvant to narcotic analgesics for improving outcome after thoracic surgery. Indeed, the interest and benefit has been shown not only in the treatment of acute post-thoracotomy pain (pain scores and narcotic requirements were consistently lower in the TENS group as opposed to the Placebo-TENS group), but also when used together with narcotic analgesics to reduce the duration of recovery room

stay and to increase chest physical tolerance (better coughing attempts during chest physiotherapy) with positive effects on pulmonary ventilator function [forced expiratory volume in 1 s (FEV(1)) and/or forced vital capacity (FVC)]. The TENS treatment was shown to be ineffective when used alone in severe post-thoracotomy pain, but useful as an adjunct to other medications in moderate post-thoracotomy pain and very effective as the sole pain-control treatment in patients experiencing mild post-thoracotomy pain (i.e. video-assisted thoracoscopy incision).

**Conclusion:** Current evidence shows TENS associated with postoperative medications to be safe and effective in alleviating postoperative pain and in improving patient recovery, thus enhancing the choice of available medical care and bettering outcome after thoracic surgery.

## MUSIC THERAPY

1. Cepeda, M.S. et al (2013). „Music for pain relief.“ Medsurg Nursing Sep-Oct;22(5):313-8.

**OBJECTIVES:** To evaluate the effect of music on acute, chronic or cancer pain intensity, pain relief, and analgesic requirements.

**SEARCH STRATEGY:** We searched The Cochrane Library, MEDLINE, EMBASE, PsycINFO, LILACS and the references in retrieved manuscripts. There was no language restriction.

**SELECTION CRITERIA:** We included RCTs that evaluated the effect of music on any type of pain in children or adults. We excluded trials that reported results of concurrent non-pharmacological therapies.

**DATA COLLECTION AND ANALYSIS:** Data was extracted by two independent review authors. We calculated the mean difference in pain intensity levels, percentage of patients with at least 50% pain relief, and opioid requirements. We converted opioid consumption to morphine equivalents. To explore heterogeneity, studies that evaluated adults, children, acute, chronic, malignant, labor, procedural, or experimental pain were evaluated separately, as well as those studies in which patients chose the type of music.

**MAIN RESULTS:** 51 studies involving 1867 subjects exposed to music and 1796 controls met inclusion criteria. In the 31 studies evaluating mean pain intensity there was a considerable variation in the effect of music, indicating statistical heterogeneity ( $I^2 = 85.3\%$ ). After grouping the studies according to the pain model, this heterogeneity remained, with the exception of the studies that evaluated acute postoperative pain. In this last group, patients exposed to music had pain intensity that was 0.5 units lower on a zero to ten scale than unexposed subjects (95% CI: -0.9 to -0.2). Studies that permitted patients to select the music did not reveal a benefit from music; the decline in pain intensity was 0.2 units, 95% CI (-0.7 to 0.2). Four studies reported the proportion of subjects with at least 50% pain relief; subjects exposed to music had a 70% higher likelihood of having pain relief than unexposed subjects (95% CI: 1.21 to 2.37). NNT = 5 (95% CI: 4 to 13). Three studies evaluated opioid requirements two hours after surgery: subjects exposed to music required 1.0 mg (18.4%) less morphine (95% CI: -2.0 to -0.2) than unexposed subjects. Five studies assessed requirements 24 hours after surgery: the music group required 5.7 mg (15.4%) less morphine than the unexposed group (95% CI: -8.8 to -2.6). Five studies evaluated



requirements during painful procedures: the difference in requirements showed a trend towards favoring the music group (-0.7 mg, 95% CI: -1.8 to 0.4).

**CONCLUSIONS:** [Listening to music reduces pain intensity levels and opioid requirements, but the magnitude of these benefits is small and, therefore, its clinical importance unclear.](#)

2. [Engwall, M. et al \(2009\).](#) „Music as a nursing intervention for postoperative pain: a systematic review.“*Journal of Perianesthesia Nursing* 24(6):370-83

**Objectives:** To investigate the effect of music on postoperative pain.

**Searching:** PubMed, CINAHL, Blackwell Synergy and Science Direct were searched between 1998 and 2007 for studies published in English.

**Study selection:** Quantitative, RCTs or quasi-experimental studies of adults that included music interventions (with or without other non-pharmacological methods) in patients who had undergone surgery were eligible for inclusion. Eligible studies were required to use postop pain as an outcome measure. Studies that used sounds instead of music were excluded. The included studies were performed in the USA, Sweden, Japan, Hong Kong, China and Taiwan. Participants ranged from 15 to 86 years old (where stated) and were scheduled for different surgical procedures that varied in complexity. The interventions used in addition to music included therapeutic suggestions, guided imagery, scheduled rest, jaw relaxation and decreased noise levels. Most of the control groups received usual care or listened to a blank tape or compact disc. In most of the studies participants could choose music from tapes or compact discs made by the investigators; in other studies the research team selected the music, participants brought their own music, or (in one study) a live harpist played their own selection of music. The timing of the the intervention and the time at which assessments were made varied between studies. The instruments used to assess pain were: the visual analogue scale (VAS), the numeric rating scale (NRS), the verbal rating scale (VRS), the Wong-Baker Faces Scale, and the graphic numeric pain intensity scale. Analgesic consumption was also measured in some studies. One reviewer performed selected studies for inclusion.

**Assessment of study quality:** Methodological quality was assessed in terms of research methods, participant characteristics, inclusion/exclusion criteria, randomisation, statistical analyses, ethics, reliability, validity and generalisability. Six studies were excluded after appraisal (no further details reported). The authors did not state how many reviewers performed the validity assessment.

**Data extraction:** Data for the outcome measures were extracted. The authors did not state how many reviewers performed the data extraction.

**Methods of synthesis:** Studies were presented in a narrative synthesis by outcome (postoperative pain and consumption of analgesics).

**Results of the review:** [18 studies were included in the review](#) (n=1,604 patients; range 17 to 500). 14 studies were RCTs (n=1,372 patients) and 4 studies were quasi-experimental (n=232 patients). The authors stated that the methodological quality of the included studies was high. [Postop pain was significantly reduced in 12 RCTs and three quasi experimental studies.](#) Three RCTs found no significant difference between the intervention and control groups. Analgesic consumption was significantly less in the intervention group (with music) than in the control group in four RCTs and one quasi-experimental study. There was no significant difference between the groups in five RCTs.

**Conclusions:** Music could be used as an adjuvant for the relief of postoperative pain.

## COLD THERAPY

1. [Khanbhai, M., et al \(2014\)](#). “Is cryoanalgesia effective for post-thoracotomy pain?” *Interactive CardioVascular and Thoracic Surgery* 18: 202–210

**Objective:** whether cryoanalgesia improves postthoracotomy pain and recovery.  
**Methods:** 12 articles were identified that provided the best evidence to answer the question. Reported measures were pain scores, additional opiate requirements, incidence of hypoesthesia and change in lung function.

**Results:** Half of the articles reviewed failed to demonstrate superiority of cryoanalgesia over other pain relief methods; however, [additional opiate requirements were reduced in patients receiving cryoanalgesia](#). Change in lung function postoperatively was equivocal. [Cryoanalgesia potentiated the incidence of postoperative neuropathic pain](#). Further analysis of the source of cryoanalgesia, duration, temperature obtained and extent of blockade revealed numerous discrepancies. Three studies utilized CO<sub>2</sub> as the source of cryoanalgesia and four used nitrous oxide, but at differing temperatures and duration. Five studies did not reveal the source of cryoanalgesia. The number of intercostal nerves anaesthetized in each study varied. Seven articles anaesthetized three intercostal nerves, three articles used five intercostal nerves, one article used four intercostal nerves and one used one intercostal nerve at the thoracotomy site. Thoracotomy closure and site of area of chest drain insertion may have a role in postoperative pain; but only one article explained method of closure, and two articles mentioned placement of chest drain through blocked dermatomes. No ausal inferences can be made by the above results as they are not directly comparable due to confounding variables between studies. [Currently, the evidence does not support the use of cryoanalgesia alone as an effective method for relieving post-thoracotomy pain](#).

2. [Adie, S. et al](#) „Cryotherapy following total knee replacement.“ [Cochrane Database Syst Rev](#). 2012 Sep 12;9

**BACKGROUND:** Total knee replacement (TKR) is a common intervention for patients with end-stage osteoarthritis of the knee. Post-surgical management may include cryotherapy. However, the effectiveness of cryotherapy is unclear.

**OBJECTIVES:** To evaluate the acute (within 48h) application of cryotherapy following TKR on pain, blood loss and function.

**SEARCH METHODS:** We searched the Cochrane Database of Systematic Reviews, CENTRAL, DARE, HTA Database, MEDLINE, EMBASE, CINAHL, PEDro and Web of Science on 15th March 2012.

**SELECTION CRITERIA:** RCTs or controlled clinical trials in which the experimental group received any form of cryotherapy, and was compared to any control group following TKR indicated for osteoarthritis.

**DATA COLLECTION AND ANALYSIS:** Two reviewers independently selected trials for inclusion. Disagreements were discussed and resolved involving a third reviewer if required. Data were then extracted and the risk of bias of trials assessed. Main outcomes were blood loss, visual analogue score (VAS) pain, adverse events, knee range of motion, transfusion rate and knee function. Secondary outcomes were



analgesia use, knee swelling, length of hospital stay, quality of life and activity level. Effects of interventions were estimated as mean differences (MD), standardised mean differences (SMD) or given as risk ratios (RR), with 95% confidence intervals (CI). Meta-analyses were performed using the inverse variance method and pooled using random effects.

**MAIN RESULTS:** 11 RCTs and one controlled clinical trial involving 809 participants met the inclusion criteria. There is very low quality evidence from 10 trials (666 participants) that cryotherapy has a small benefit on blood loss (SMD -0.46, 95% CI, -0.84 to -0.08), equivalent to 225mL less blood loss in cryotherapy group (95% CI, 39 to 410mL). This benefit may not be clinically significant. There was very low quality evidence from four trials (322 participants) that cryotherapy improved visual analogue score pain at 48 hours (MD = -1.32 points on a 10 point scale, 95% CI, -2.37 to -0.27), but not at 24 or 72 hours. This benefit may not be clinically significant. There was no difference between groups in adverse events (RR = 0.98, 95% CI, 0.28 to 3.47). There is low quality evidence from two trials (107 participants) for improved range of motion at discharge (MD 11.39 degrees of additional flexion, 95% CI 4.13 to 18.66), but this benefit may not be clinically significant. There was no difference between groups in transfusion rate (RR 2.13, 95% CI 0.04 to 109.63), and knee function was not measured in any trial. No significant benefit were found for analgesia use, swelling or length of stay. **CONCLUSIONS:** Potential benefits of cryotherapy on blood loss, postoperative pain, and range of motion may be too small to justify its use, and the quality of the evidence was very low or low for all main outcomes. This needs to be balanced against potential inconveniences and expenses of using cryotherapy. Well designed randomised trials are required to improve the quality of the evidence.

## VIRTUAL REALITY DISTRACTION

1. **Malloy, Kevin M.**, and Leonard S. Milling. "The effectiveness of virtual reality distraction for pain reduction: a systematic review." *Clinical psychology review* 30.8 (2010): 1011-1018.

**Background:** Virtual reality technology enables people to become immersed in a computer-simulated, three-dimensional environment. This article provides a comprehensive review of controlled research on the effectiveness of virtual reality (VR) distraction for reducing pain.

**Methods:** To be included in the review, studies were required to use between-subjects or mixed model design in which VR distraction was compared with a control condition or an alternative intervention in relieving pain. An exhaustive search identified 11 studies satisfying these criteria.

The studies are organized into the following five groups, according to the type of pain: (a) experimental pain; (b) chronic pruritus; (c) port access and venous punctures; (d) IV placement; and (e) burn injuries.

**Results:** VR distraction was shown to be effective for reducing experimental pain, as well as the discomfort associated with burn injury care. Studies of needle-related pain provided less consistent findings. Use of more sophisticated virtual reality technology capable of fully immersing the individual in a virtual environment was associated with greater relief.

Characteristics of studies of VR distraction for reducing pain.

Study	Sample	Virtual environment	Interventions	Summary of key findings
<b>Experimental pain</b> Hoffman et al. (2006)	77 students 18–23 years	SnowWorld	HT—high tech VR helmet LT—low tech VR helmet C—no VR distraction	HT reduced pain more than LT.
Patterson et al. (2006)	103 students 18–40 years	SnowWorld	VR—VR distraction H—hypnosis VR + H—VR plus hypnosis	VR reduced pain regardless of suggestibility level. Suggestibility moderated effect of H and VR + H.
Dahlquist et al. (2007)	40 children 5–13 years	Finding Nemo “Jellyfish Race”	AC—attention control ID—interactive distraction PD—Passive distraction ND—No distraction	ID increased pain tolerance and threshold more than PD and ND.
Dahlquist et al. (2009)	41 children 6–14 years	Free Dive	VR—VR helmet NVR—no VR helmet C—no intervention	VR increased tolerance more than NVR and C in older children; VR and NVR increased tolerance more than C in younger children.
<b>Chronic pain</b> Leibovici et al. (2009)	24 patients 18–84 years	Air Lock	VR—VR distraction NVR—Non VR distraction	No difference in pain between VR and NVR.
<b>Post access and IV placement</b> Nilsson et al. (2009)	42 cancer patients 5–18 years	The Hunt of the Diamonds	NVR—Nonimmersive VR SC—standard care	No difference in pain between NVR and SC.
Gershon et al. (2004)	59 cancer patients 7–19 years	Virtual Gorilla	VR—VR distraction NVR—Non VR distraction C—no treatment control	VR reduced pulse rate and nurses’ pain ratings more than C. No difference between VR and NVR.
Wolitzky et al. (2005)	20 cancer patients 7–14 years	Virtual Gorilla	VR—VR distraction C—no treatment control	VR reduced pulse rate and observer pain ratings more than C.
Gold et al. (2006)	20 pediatric patients 7–12 years	Street Luge	VR—VR distraction SC—standard care	VR reduced parents’ ratings of how much intervention reduced pain more than SC.
<b>Burn injuries</b> Hoffman et al. (2008)	11 burn patients 4–40 years	SnowWorld	VR—VR distraction C—no VR distraction	VR reduced pain more than C.
Mott et al. (2008)	42 burn patients 3.5–14 years	Hospital Harry	AR—Augmented reality SC—standard care	AR resulted in less pain than SC, especially for long dressing changes.

**Conclusion:** Controlled research suggests that VR distraction may be a useful tool for clinicians who work with a variety of pain problems.

## RELAXATION

1. Kwekkeboom, K.L., et al (2006). “Systematic Review of Relaxation Interventions for Pain” Journal of Nursing Scholarship; 38:3, 269-277.

**Purpose:** To review randomized trials of relaxation interventions used for the treatment of pain in adults and to synthesize evidence regarding the efficacy of specific techniques.

**Design:** Integrative review.

**Methods:** A literature search was conducted using the terms “relaxation” and “pain” in CINAHL, Medline, and PsychInfo from 1996 to March 2005. Studies were reviewed and categorized based on the type of relaxation intervention (progressive muscle relaxation [PMR], autogenic training, jaw relaxation, rhythmic breathing, and other relaxation exercises), and summarized with respect to various study characteristics and results.

**Findings:** Researchers reported support for relaxation interventions in 8 of the 15 studies reviewed. The most frequently supported technique was progressive muscle relaxation, particularly for arthritis pain. Investigators reported support for jaw relaxation and a systematic relaxation intervention for relieving postoperative pain. Little evidence was found for autogenic training, and no support for rhythmic breathing or other relaxation techniques.

**Conclusions:** Most of the studies reviewed had weaknesses in methodology, which limited the ability to draw conclusions about interventions. Further research is needed to confirm positive findings related to PMR, jaw relaxation, and systematic relaxation,

to address questions related to the dose-response relationship and the individual differences that might influence response to relaxation interventions. These and other relaxation techniques require testing in carefully designed and conducted trials.

## **RANDOMISED CONTROLLED TRIALS**

### **MUSIC**

1. Allred, K.D., et al (2010). „The Effect of Music on Postoperative Pain and Anxiety“ Pain Management Nursing, Vol 11, No 1 (March): pp 15-25

**Objective:** to determine if listening to music or having a quiet rest period just before and just after the first ambulation on postop day 1 can reduce pain and/or anxiety or affect mean arterial pressure, heart rate, respiratory rate, and/or oxygen saturation in patients who underwent a total knee arthroplasty.

**Methods:** 56 patients having a total knee arthroplasty were randomly assigned to either a music intervention group or a quiet rest group. VAS was used to measure pain and anxiety. Physiologic measures, including blood pressure, heart rate, oxygen saturation, and respiratory rate, were also obtained.

**Results:** Statistical findings between groups indicated that the music group's decrease in pain and anxiety was not significantly different from the comparison rest group's decrease in pain ( $F_{1/4} 1.120$ ;  $p_{1/4} .337$ ) or anxiety ( $F_{1/4} 1.566$ ;  $p_{1/4} .206$ ) at any measurement point. However, statistical findings within groups indicated that the sample had a statistically significant decrease in pain ( $F_{1/4} 6.699$ ;  $p_{1/4} .001$ ) and anxiety ( $F_{1/4} 4.08$ ;  $p_{1/4} .013$ ) over time.

**Conclusion:** Results of this research provide evidence to support the use of music and/or a quiet rest period to decrease pain and anxiety. The interventions pose no risks and have the benefits of improved pain reports and decreased anxiety. It potentially could be opioid sparing in some individuals, limiting the negative effects from opioids. Nurses can offer music as an intervention to decrease pain and anxiety in this patient population with confidence, knowing there is evidence to support its efficacy.

2. Vaajoki A., et al (2011)“Effects of listening to music on pain intensity and pain distress after surgery: an intervention.“ Gastroenterology Nursing; Jul-Aug;35(4):279-84.

**Aims:** To evaluate the effects of music listening on pain intensity and pain distress on the first and second postoperative days in abdominal surgery patients and the long-term effects of music on the third postoperative day.

**Design:** Prospective clinical study with two parallel groups.

**Methods:** Patients undergoing elective abdominal surgery ( $n = 168$ ) were divided into either a music group ( $n = 83$ ) or a control group ( $n = 85$ ). Patients assessed pain intensity and pain distress in bed rest, during deep breathing and in shifting position once in the evening of the operation day and on the first and second postoperative days in the morning, at noon and in the evening. On the third postoperative day, the patients assessed their pain intensity and pain distress only once.

**Results:** In the music group, the patients' pain intensity and pain distress in bed rest, during deep breathing and in shifting position were significantly lower on the second

postoperative day compared with control group of patients. On the third postoperative day, when long-term effects of music on pain intensity and pain distress were assessed, there were no significant differences between music and control groups.

**Conclusion:** This study demonstrates that the use of music alleviates pain intensity and pain distress in bed rest, during deep breathing and in shifting position after abdominal surgery on the second postoperative day. Music intervention is safe, inexpensive and easily used to improve the healing environment for abdominal surgery patients.

**Relevance to clinical practice:** Music intervention should be offered as an adjunct alternative to pharmacological pain relief after abdominal surgery in nursing practice.

## CRYOTHERAPY

1. Kullenberg, B., et al (2006) „Postoperative Cryotherapy After Total Knee Arthroplasty“ A Prospective Study of 86 Patients. The Journal of Arthroplasty Vol. 21 No. 8: 1175-1179

A study of 86 patients undergoing total knee arthroplasty (TKA) was performed to evaluate the role of cold compression. The patients were treated with cold compression or epidural analgesia for 3 days after TKA. Pain was measured on a VAS scale, and total consumption of analgesics was recorded. Range of movement (ROM) was recorded before TKA until 3 weeks postoperatively. Weight bearing, blood loss, and time in hospital were recorded. VAS scores and analgesic consumption were equal in both groups. Range of movement at discharge was 758 in the cold compression group vs 638 in the control group. By 3 weeks' follow-up, ROM was 998 vs 888. Mean Hb values averaged 120 mmol/L in the cold compression group vs 109 mmol/L in the control group after surgery. Mean time in hospital of patients with cold compression averaged 4.8 days vs 6.2 days in the control group. The study shows that cold compression therapy improves the control of pain and might thus lead to improvement in ROM and shorter hospital stay.

2. Holmström, A. et al (2005) „Cryo/Cuff Compared to Epidural Anesthesia After Knee Unicompartmental Arthroplasty A Prospective, Randomized, and Controlled Study of 60 Patients With a 6-Week Follow-Up“ The Journal of Arthroplasty Vol. 20 No. 3 2005

**Aim** of this prospective, randomized, and controlled study was to evaluate the efficacy of cold compressive dressings (Cryo/Cuff) and epidural anesthesia (EDA) in the postoperative management of primary unicompartmental knee arthroplasty. Sixty patients (61 knees) were randomized into 3 groups. No significant difference between groups was detected with respect to subjective pain, bleeding, swelling, range of motion, and function. The consumption of morphine was, however, significantly higher in the control group the first 24 hours than both the EDA group ( $P < .001$ ) and the Cryo group ( $P = .028$ ). There was no significant difference in morphine consumption between the 2 treatment groups. Based on the results of this study, Cryo/Cuff seems to be a rational, effective, risk-free, and welltolerated alternative to EDA to reduce pain and morphine after unicompartmental knee arthroplasty.

## RELAXATION

1. Good, M., et al (2005). „Relaxation and Music Reduce Pain Following Intestinal Surgery“ ResNursHealth 28:240–251

**Methods:** Three nonpharmacological nursing interventions, [relaxation](#), [chosen music](#), and [their combination](#), were tested for pain relief following intestinal (INT) surgery in a RCT. The [167 patients](#) were randomly assigned to one of three intervention groups or control and were tested during ambulation and rest on postoperative days 1 and 2. Pain sensation and distress were measured with VAS scale.

**Results:** Multivariate analysis of covariance showed [significantly less post-test pain in the intervention groups](#) than in the control group on both days after rest and at three of six ambulation post-tests ( $p = .024-.001$ ), resulting in 16–40% less pain. Mixed effects after ambulation were due to the large variation in pain and difficulty relaxing while returning to bed; but post hoc explorations showed effects for those with high and low pain. These interventions are recommended along with analgesics for greater postoperative relief without additional side effects.

2. Haase, O., et al. "Guided imagery and relaxation in conventional colorectal resections: a randomized, controlled, partially blinded trial." *Diseases of the colon & rectum* 48.10 (2005): 1955-1963.

**PURPOSE:** to investigate whether brief psychologic interventions to reduce perioperative stress may improve the postoperative course of patients undergoing abdominal surgery.

**METHODS:** randomized, controlled, partially blinded trial to [evaluate the differential effectiveness of two brief psychologic interventions](#) (guided imagery and progressive muscle relaxation) on analgesic requirement, pain perception, pulmonary function, duration of postoperative ileus, and fatigue after conventional resection of colorectal carcinoma in elderly cancer patients.

**RESULTS:** 60 patients (20 guided imagery, 22 relaxation, 18 control) were evaluated. Acceptance of the brief psychologic interventions was high and 90 percent of the patients indicated that they would recommend it to other patients. [Analgesic consumption \( \$P = 0.6\$ \) and subjective pain intensity at rest \( \$P = 0.3\$ \) and while coughing \( \$P = 0.3\$ \) were not different between groups](#). Recovery of pulmonary function, duration of postoperative ileus, and subjective postoperative fatigue were also not influenced. When the data from intervention groups were pooled, again no benefits were detected compared with the control group.

**CONCLUSIONS:** Brief psychologic interventions such as guided imagery and relaxation yielded a very positive patient response but [did not show a clinically relevant influence on the postoperative physiologic course](#) of elderly patients undergoing conventional resections of colorectal cancer.

## COGNITIVE-BEHAVIOURAL METHODS

1. [Cheung, Li Ho](#), Patrick Callaghan, and Anne M. Chang. "A controlled trial of psycho-educational interventions in preparing Chinese women for elective hysterectomy." *International Journal of Nursing Studies* 40.2 (2003): 207-216.

**Objective:** to investigate the effect of a cognitive intervention (distraction and reappraisal) with information given pre-operatively on post-operative outcomes of Chinese women having an abdominal hysterectomy.

**Method:** Using a controlled trial, 48 Chinese women having elective hysterectomy received the cognitive intervention with information (experimental group). A control group ( $n=48$ ) received information alone. Outcome measures used in the study were post-operative anxiety and pain, requests for analgesia and patient satisfaction.

**Results:** [women in the experimental group reported lower post-operative anxiety scores, lower pain scores and higher levels of satisfaction](#) than women in the control group. There were [no statistically significant differences in post-operative requests for analgesia between the groups](#).

**Conclusion:** cognitive intervention such as distraction and reappraisal may have significant clinical benefits and improve the care of women having an elective hysterectomy.

3. [Callaghan](#), Patrick, and Ho Cheung Li. "The effect of pre-operative psychological interventions on post-operative outcomes in Chinese women having an elective hysterectomy." *British journal of health psychology* 7.2 (2002): 247-252.

**Objective:** To test the effect of cognitive interventions with information given pre-operatively on post-operative outcomes in Chinese women undergoing elective hysterectomies.

**Design:** An experimental design. The experimental group ( $n=48$ ) received cognitive distraction and cognitive reappraisal with information, the control group ( $n=48$ ) received information only.

**Outcome measures:** Post-operative anxiety (Chinese State-Trait Anxiety Inventory and mean arterial blood pressure), post-operative requests for analgesia (drug record), post-operative pain (VAS scale) and satisfaction.

**Results:** [Cognitive distraction and reappraisal with information produced lower post-operative anxiety and pain scores and higher levels of satisfaction](#) than information only. Post-operative analgesic requests did not differ between groups.

**Conclusions:** Cognitive distraction and reappraisal with information, when used with women undergoing a hysterectomy may have significant clinical benefits.