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Review article

Non-pharmacological interventions for reducing mental distress in patients undergoing dental procedures: Systematic review and meta-analysis

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ABSTRACT

Objectives: This meta-analysis investigates the efficacy of non-pharmacological interventions in adults undergoing dental procedures under regional or general anesthesia compared to standard care alone or an attention control group on the reduction of mental distress, pain, and analgesic use.

Data sources: To identify relevant papers a comprehensive literature search was carried out in MEDLINE, CENTRAL, Web of Science, and PsycINFO (last search August 2017). Additionally, lists of references of relevant articles and previous reviews were checked. ProQuest Dissertations and Theses Full Text Database was screened to identify any unpublished material.

Study selection: A total of 29 eligible randomized controlled trials were included, comprising a total of 2.886 patients. Included trials investigated the effects of hypnosis, enhanced information, relaxation, music, or cognitive-behavioral approaches including distraction.

Results: Random effects meta-analyses revealed significant positive treatment effects on the reduction of mental distress (g = 0.58, CI 95% [0.39; 0.76]). Effects on pain relief (g = 0.00, CI 95% [−0.28; 0.28]) and the reduction of analgesic use (g = 0.26, CI 95% [−0.22; 0.73]) were not significant. Because effects on mental distress were substantially heterogeneous, subgroup analyses were run yielding significantly larger effects for studies with low risk of bias compared to studies with high or unclear risk of selection and attrition bias. No significant differences appeared between various types of non-pharmacological interventions.

Conclusions: In summary, benefits of non-pharmacological interventions on reducing mental distress were demonstrated with largest effects being shown for hypnosis. However, further high quality trials are needed to strengthen the promising evidence.

Clinical significance: This systematic review and meta-analysis indicated that non-pharmacological interventions may be beneficial for reducing mental distress in patients undergoing dental procedures and could thus be considered as valuable adjunct to standard care.

1. Introduction

Even though dental treatment is largely painless under local or general anesthesia by now, it is commonly perceived as an uncomfortable, threatening, and confusing situation. Hence, many patients experience fear or anxiety not only during invasive procedures. Sights, sounds, and smells associated with the dental clinic, injections, dental instruments, perceived lack of control and predictability, and (anticipated) pain result in patients' mental distress [1].

While many people experience anxiety and fear of going to a dental practitioner ranging from very mild to more severe manifestations, only a relatively small percentage of dental patients will have a clinically diagnosed condition of a specific (dental) phobia (e.g., according to the International Statistical Classification of Diseases and Related Health Problems 10th Revision [ICD-10]). Up to every fourth adult is reporting dental fears, whereas the point prevalence of clinically relevant dental phobia is estimated to be about 4% [2]. Contemporary models hypothesize a continuum of situation-specific fear or anxiety experiences related to dental care, including those being considered as "normal," those that contain only infrequent and insignificant fear/anxiety behaviors, and those that include more frequent or impairing fear/anxiety behaviors with complete avoidance of dental care [1]. The most common way to measure dental anxiety is by using the Dental Anxiety Scale (DAS) [3]. This questionnaire captures the possible continuum of

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dental anxiety also allowing for the identification of highly anxious patients.

Research suggests that the general dental practitioner is capable of treating adults with mild or moderate forms of dental anxiety effectively, while treatment of severe dental anxiety or even dental phobia often requires more specialist interventions, e.g., psychotherapy [4]. In recent years, numerous non-pharmacological approaches have been developed to improve the handling of anxious patients during as well as before dental treatments [4–6]. Primarily, those interventions aim at reducing mental distress in patients before and during dental procedures. Related indirect effects of reduced mental distress might be the reduction of pain and the facilitation of recovery after therapy since mental distress is known to impair post-operative treatment success of surgical, endodontic, or other dental procedures [7–9].

Hence, non-pharmacological interventions could be considered as an adjunct to standard care and to "first-line treatment" such as pharmacological strategies such as pre-medication, sedation, or analgesia. There are several different approaches that can be used in the dental clinic or surgery in order to assist anxious patients. Existing techniques can be categorized into enhanced information, cognitive-behavioral interventions, hypnosis, relaxation procedures or music interventions [5,10]. Enhanced information draws on the patient's cognitive level to transmit sensory and/or procedural information before, during and after dental procedure. Cognitive-behavioral strategies focus on the reduction of dental anxiety through, e.g., distraction, sensory focusing, positive reinforcement, cognitive restructuring, or systematic desensitization. Relaxation techniques are described as teaching or instructing patients in, e.g., progressive muscle relaxation, guided imaginary, breath control, or autogenic training aim to induce relaxation and comfort [11]. Hypnosis has a longstanding tradition in use during medical procedures. It is suggested to work mainly through two mechanisms: reducing distress and targeting patient expectancies with suggestions for positive outcomes [12]. Music interventions have been used in different medical fields to meet patients' psychological, physical, social and spiritual needs. Inherent elements of music are known to influence physiological and psycho-emotional responses in patients, e.g., arousing memory and association, stimulating imagery, evoking emotions, and promoting relaxation and distraction [13].

Existing meta-analyses included only trials conducted before 2001 [14] or focused exclusively on the efficacy of psychological treatments (cognitive-behavioral therapy and behavioral therapy) for severe levels of dental anxiety or dental phobia [15]. Hence, the aim of the present systematic review and meta-analysis is to give a comprehensive overview of non-pharmacological interventions for patients with mild, moderate and severe levels of anxiety (excluding dental phobia) that are implementable in general dental practice before or during dental procedures. Moreover, we aim to quantify the efficacy of these approaches to reduce mental distress in patients undergoing dental procedures in comparison to standard care alone or to attention control groups.

2. Methods

Objectives, inclusion criteria, and methods have been pre-specified in a review protocol (registered in PROSPERO; June 28, 2016; http://www.crd.york.ac.uk/PROSPERO/display_record.asp?ID=CRD42016041661).

2.1. Identification and selection of studies (PICOS)

2.1.1. Patients

Adult patients (18 years and older) undergoing dental procedures usually provided under general and regional anesthesia. Studies with children and adolescents were excluded.

2.1.2. Interventions

Any non-pharmacological intervention which is implemented before or during dental procedures in general dental practice.

2.1.3. Comparators

Eligible control groups were "treatment as usual" (defined as the standard dental care policy of the dental practice) and "attention control" groups (defined as providing the same amount of time and attention to the patients just as in the intervention group but without applying a specific therapeutic technique).

2.1.4. Outcomes

The included trials reported on at least one of the following outcomes measured via self- and/or observer reports: mental distress (i.e., anxiety, mood; primary outcome), pain, and medication (i.e., analgesic use; secondary outcomes).

2.1.5. Study design

We included randomized controlled trials (RCTs) only.

2.2. Search methods

We carried out electronic searches in the databases MEDLINE, CENTRAL, Web of Science, and PsycINFO (last search August 2017). The MEDLINE search strategy is shown in Supplementary Table 1. We adapted the strategy for Web of Science, Central and PsycINFO. Additionally, we checked lists of references of relevant articles and previous reviews. We further screened ProQuest Dissertations and Theses Full Text Database to identify any unpublished material. One author (SB) screened titles and abstracts of database records and retrieved full texts for eligibility assessment.

2.3. Data extraction and management

The following data were extracted from the included studies by using a pilot-tested data extraction form: characteristics of patients, intervention, control group, outcomes, bibliographic information, and effect size related data. Two raters (SB, JR) independently extracted the data; inter-rater disagreement was resolved through consensus. Study authors were contacted in case of missing information. If information on effect sizes was missing and could not be retrieved, data was approximated using different estimation methods (e.g., we estimated statistics from graphs without numerical data, set an effect size to zero if non-significant results were mentioned without reporting statistical parameters).

2.4. Assessing the risk of bias in included studies

We assessed risk of bias in the included studies by common markers of internal validity from the Cochrane Risk of Bias Tool [16]. The risk of selection bias (sequence generation, allocation sequence concealment), the risk of reporting bias (selective outcome reporting), and the risk of performance bias (blinding of dentist and medical personnel) were assessed at study level, and the risk of detection bias (blinding of outcome assessors) as well as attrition bias (handling incomplete outcome data) at outcome level, respectively. Blinding of outcome assessors was assessed only for observer-reported outcomes, not for self-reported. Risk of bias assessment was conducted by two independent, previously trained raters (LH, JR). Disagreements were resolved through consensus with a third author (SK).

2.5. Summary measures

We calculated bias-corrected standardized mean differences (Hedges' g) [17]. An effect size of 0.5 thus indicates that the mean of the intervention group is half a standard deviation larger than the mean