SHORT THESIS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY (PHD)

Possible use of psychotherapeutic methods at orthopaedic surgeries

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The online Examination will be held at 12:00, on February 15, 2021.

Head of the **Defense Committee**:	Árpád Illés, MD, PhD, DSc.
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The online PhD Defense will be held at 1 pm, on February 15, 2021.

Live online access will be provided. If you wish to take part in the defense, please send an e-mail to szcsenge@med.unideb.hu, not later than 12:00 p.m. on the day before the defense (February 14, 2021).

1. Abbreviations

BMI: Body Mass Index

CINAHL: Cumulative Index to Nursing and Allied Health Literature

CRP: C-reactive protein

GRADE: Grading of Recommendations Assessment, Development and Evaluation

We: sedimentation rate (Westergren)

2. Introduction, literature review

In the developed countries due to the growing number of obesities, the sedentary lifestyle and the increase of average age, musculoskeletal diseases are becoming the most common diseases. Thus, the number of orthopaedic surgeries, especially the number of great joint replacements performed each year is growing rapidly. Optimal patient care in this field has become highly important from personal, social and financial point of view. Severe postoperative pain is commonly reported among those undergoing orthopaedic surgery, which is linked to decreased postoperative activity, an increased risk of thromboembolism, and longer hospitalization. Postoperative pain also increases psychological stress, decreases the patients' satisfaction and leads to higher incidence of chronic pain.

No matter what kind of surgery is performed, some level of anxiety is always present. This is highly true at acute, unexpected traumatological surgeries and at great joint replacement surgeries. Perioperative anxiety has a negative effect on patients' postoperative wellbeing and their mental health. It also deteriorates the functional outcomes and has a positive correlation with the time back to work and also with the level of postoperative pain.

During major orthopaedic surgeries, like joint replacement surgeries the amount of blood loss might reach such a level, that giving red blood cell transfusion becomes necessary. Studies showed that after receiving red blood cell transfusion the frequency of complications increased at hip replacement surgeries, while it had a positive correlation with the length of hospitalization at knee replacement surgeries.

2.1. Treatment possibilities of pain, anxiety and bleeding and their limitations

Nowadays multimodal analgesia is the most accepted treatment for postoperative pain, where methods acting at different sites and with different mechanisms are combined at the same time. Adjuvants used as painkillers have anxiolytic effects as well. However, studies show that pharmaceutical treatments due to their side effects, their dosing limits or due to the patients' attitude towards medication intake are not satisfying.

The amount of blood loss can be decreased by optimal infusion therapy and by medications (e.g. tranexamic acid) as well. In case bleeding reached a certain level, red-blood cell transfusion can be used. Though nowadays administration of red blood cell transfusion is considered safe, it is not without any risk. Furthermore, their preparation and administration put a load on the medical personnel, and they also have a high financial cost for the institute.

2.2. Other treatment possibilities

As the outcomes of orthopaedic surgeries are highly influenced by the perceived pain, the level of anxiety and the perioperative blood loss, it is important to assess if psychoeducational interventions are effective in their treatment beside pharmaceutical methods. Such technique might be patient education, relaxation, cognitive and behavioural therapy, emotion focused therapy, hypnosis and suggestive communication.

2.3. Aims of the studies

During my research, I had the following aims:

1. To perform a randomized, controlled clinical study examining the effects of therapeutic suggestions at adults undergoing hip- and knee replacement surgeries. The primary outcome was the patients' need of red blood cell transfusion. Secondary outcomes were the following: patients' wellbeing, requirement of pain killers and adjuvant drugs, patients' recovery.
2. To perform a systematic review and meta-analysis assessing the effectiveness of psychoeducational methods at orthopaedic and traumatological surgeries on decreasing the postoperative pain and perioperative anxiety, and on increasing the quality of life and recovery. We also aimed to evaluate the moderating effect of the type and timing of the psychological intervention, the moderating effect of the surgical type (acute vs. elective) and severity (major vs. minor) and the moderating effect of the type of anaesthesia.

3. Materials and methods

3.1. Effectiveness of therapeutic suggestions in patients undergoing hip- and knee replacement surgery

Our prospective, randomized, controlled clinical trial was performed between April 2011 and January 2013. Eligible patients were to undergo a total hip or knee replacement surgery with spinal anaesthesia. Upon enrolment, patients were randomized into two groups. Patients in the suggestion group received therapeutic suggestions twice. Patients in the control group received care as usual.

3.1.1. Interventions

On the day before the surgery, patients in the suggestion group participated in a personal verbal discussion, during which they received direct suggestions concerning their heeling. This session was a semi-standardized procedure following a previously set protocol, therefore each patient in the suggestion group received the same suggestions either as a response to their questions or without that.

Then, during the surgery, patients in the intervention group listened to a 90-minute audiotape, where a 7-minute-long text with therapeutic suggestions were repeated seven times.

3.1.2. Data collection, outcomes, statistical methods

During the study, we collected the demographics (e.g. age, gender, BMI) and other baseline characteristics (e.g. laboratory values prior to surgery), type of surgery and the experience level of the surgeon (these latter two were stratification factors). Demographics and baseline characteristics were compared between treatment groups using Pearson chi-square test or t-test.

We recorded the number of units of red blood cell transfusions during and after the surgery. Throughout the statistical analysis (ordinal logistic regression) patients were categorized into three groups: those, who received 0, those, who received 2 and those, who received 4 or more units of red blood cell transfusion.

To assess the change of the patients' subjective mood, we used a facial scale. To compare change from baseline between the two groups, we used repeated measures mixed model.

We also recorded the painkillers and adjuvant pain medications received during and after surgery. To be able to compare the medication consumption in the two groups, we assigned standardized units to them based on their potency. For the statistical comparison we used Wilcoxon-test.

We also checked the ratio of those who had fever or any complications during the hospitalization. The difference between treatment groups was tested using the Pearson chi-square test. The mean length of hospitalization was compared with paired sample t-test. Inflammatory laboratory parameters (We, CRP) which partly mirror the recovery were analysed using repeated measures mixed model.

3.2. The effectiveness of psychoeducational interventions as adjuncts to orthopaedic surgeries (systematic review and meta-analysis)

Prospective controlled clinical trials conducted with an adult sample, testing the effectiveness of a psychoeducational intervention (patient education, relaxation technique, cognitive and behavioural therapy, hypnosis, therapeutic suggestions, emotion-focused interventions) as an adjunct to orthopaedic or traumatological surgery were included in the systematic literature review. We analysed the following outcomes: postoperative pain and analgesic requirement until 1-month post-surgery, perioperative anxiety until 1-1 month pre- and post-surgery, quality of life and recovery until 6 months post-surgery. Quantitative analysis was run on randomized controlled trials only. PubMed, PsycINFO, CINAHL, and ProQuest Dissertations & Theses were searched for studies published between January 1980 and September 2016. Full text screening and data extraction was performed independently by two review authors. A third author was consulted to resolve any disagreements between the other authors.

We extracted the following data:

Study design, demographical data of the participants. Type and severity of surgery, whether the surgery was acute or elective. Type of anaesthesia. Type, method and timing of the psychological intervention, number of study groups, sample sizes by study groups. Type of outcomes, measurement tools, measurement time points. For effect size calculation the most appropriate of the following data was extracted: means and standard deviations for all groups;

test statistics for studies in which mean and standard deviation are not available: t-value, F-value, r, R^2, etc.; if none of the previous data are available: p-values.

Methodological quality of the publications was assessed using the Cochrane Risk of Bias Assessment Tool. Publication bias was assessed by inspecting the funnel plot, calculating Begg and Mazumdar rank correlation and performing the random-effect variant of the Egger test. To evaluate the effect of possible missing studies on the results, a supplementary analysis using the Duval and Tweedie trim-and-fill method was used. Quality of evidence was assessed using the Cochrane Collaboration's GRADE system.

All statistical analysis was conducted in R v3.3.1. using the 'metafor' package.

The aim was to power our present study so that the analyses were able to detect at least a medium effect size (g=0.5) with 80% likelihood. Based on the statistical power analysis and to avoid bias, meta-analyses and sensitivity analyses were performed if at least four studies contributed to the pooled effect size and total pooled samples ≥ 300.

Corrected Hedges' g (g) was used as a measure of effect size.

Meta-regressions were conducted to assess the moderating effect of the type and timing of the psychological intervention, of the electivity and severity of the surgeries and of the type of anaesthesia. Meta-regression was also used to assess the risk of bias for all outcomes separately, with all categories of the Cochrane Risk of Bias Assessment Tool. Meta-regressions help to assess the quality of evidence.

Sensitivity analyses were performed to strengthen the stability of the results of the main analyses. We performed sensitivity analyses at different follow-up time windows and on studies involving only joint replacement surgeries.

4. Results

4.1. Effectiveness of therapeutic suggestions in patients undergoing hip- and knee replacement surgery

During the study, 116 patients were randomized. Based on the exclusion criteria 21 patients were excluded from the research. Of the remaining 95 patients, 45 belonged to the suggestion group and 50 to the control group. There was no significant difference between treatment groups in demographical data, BMI, in the surgical type, in the mean duration of the surgical intervention, in the baseline laboratory parameters and in the baseline facial scale.

The vast majority of the patients received 2 units of red blood cell transfusions (51% and 54%). However, the proportion of patients who did not need red blood cell transfusion is higher for the suggestion group (42.2%) than for the control group (26%). Consistently, the proportion of patients in the 4-units category is lower for the suggestion group (6.7%) than for the control group (20%). The results of the ordinal logistic regression indicate that less transfusion was needed in the suggestion group: odds ratio (suggestion group vs. control group) of 2.369 ($p=0.0036$). There was no difference between treatment groups in haemoglobin and in haematocrit at different timepoints. In other words, the same haemoglobin and haematocrit level could be achieved with less transfusion in the suggestion group.

The mean change from baseline in the well-being of the patients was significantly better in the suggestion group compared to the control group on the 2^{nd} ($p<0.001$) and 4^{th} ($p=0.011$) postoperative day.

During the surgery, the suggestion group consumed significantly less painkiller and adjuvant pain medication ($p=0.037$). Consistently, the ratio of those who did not receive any pain medication during surgery was also notably higher (with 7-16%) in the suggestion group.

After the surgery, the mean medication consumption of the suggestion group was also consistently lower than the control group at every timepoint and in both medication categories, but this difference was statistically not significant.

However, there was no difference between the two groups in the inflammatory laboratory parameters (We: 2^{nd} day: p=0.81, 6^{th} day: p=0.82; CRP: 2^{nd} day: p=0.39, 6^{th} day: p=0.22), in the frequency of fever (p=0.72) and other complications (p=0.51), and in the length of hospitalisation (p=0.89).

4.2. The effectiveness of psychoeducational interventions as adjuncts to orthopaedic surgeries (systematic review and meta-analysis)

From the 410 relevant records identified during the abstract screening 178 were subjected to full-text review. Eighty-nine research reports fit the inclusion criteria, from which 62 randomized controlled trials could be included into the meta-analysis. Of those studies fitting the inclusion criteria, 19 assessed cognitive behavioural interventions, 1 hypnosis, 40 patient education, 15 relaxation techniques, 3 therapeutic suggestions, and 13 assessed interventions that involved elements from more than one of these techniques. The psychological intervention was delivered before surgery in 35, and after surgery in 31 reports. In most remaining studies the intervention was delivered both pre- and post-procedure, and pre- and intra procedure in one case. Postoperative recovery was the most commonly investigated outcome (58 studies), followed by postoperative pain (39 studies) and anxiety (37 studies). Analgesic use, preoperative anxiety and quality of life was reported in less publications, in 28, 17 and 16 studies respectively, while in 4 studies there was no relevant outcome reported in the time period of interest. Most of the studies were performed with elective surgeries (67 reports), but 15 studies were done with solely acute procedures, while 3 studies involved both. The majority of studies included patients undergoing joint replacement procedures (57

studies) while in 26 studies no joint replacement patients were involved. Almost none of the reports disclosed information about the type of anaesthesia used for the surgical procedure, preventing inclusion of this variable in the meta-regression models.

4.2.1. Main effects and moderating factors

Postoperative pain

Psychoeducational interventions significantly reduced postoperative pain in the main analysis (g=0.31 [0.14, 0.48], and also in the subset of studies involving joint replacement surgery patients (g=0.23 [0.07, 0.38]). Significantly larger pain reductions were reported in studies involving acute surgeries (β=0.58, p<0.026), than those involving only elective ones. Subset analyses for intervention type provided further support for the effectiveness of patient education (g=0.21 [0.02, 0.39] and relaxation techniques (g=0.45 [0.11, 0.79] in reducing postoperative pain.

Analgesic use

Psychosocial interventions did not show statistically significant effects for analgesic use in the main meta-analysis (g=0.16 [-0.01, 0.32]) nor in the joint replacement surgery subgroup (g=0.17 [-0.04; 0.39]). The only significant moderating factor was the electiveness of surgery (acute surgery) (β=0.98; p=0.009).

Preoperative anxiety

Overall, psychosocial interventions reduced preoperative anxiety (g=0.26 [0.11, 0.42]), which effect was affirmed also in the joint replacement surgeries subgroup (g=0.27 [0.04, 0.50]). In addition, subset analyses showed preoperative anxiety was significantly reduced on the day of the operation time-point (g=0.40 [0.21, 0.58], but not on earlier measurement points. The only intervention, where the effect on preoperative anxiety was significant is patient education (g=0.27 [0.10, 0.44].

Postoperative anxiety

Psychosocial interventions significantly reduced postoperative anxiety (g=0.40 [0.21, 0.59]. However, these reductions were not significant when assessed in joint replacement surgeries only (g=0.17 [-0.02, 0.35]). Anxiety reduction was higher in acute surgery patients compared to elective surgeries (β=0.89, p<0.001). When analysed separately, patient education (g=0.26 [0.08, 0.43]) and relaxation techniques (g=0,69 [0.23, 1.15]) significantly reduced postoperative anxiety.

Quality of life

No evidence was found for significant improvements in quality of life either in the full dataset (g=0.14 [-0.05, 0.33], or in the joint replacement subgroup (g=0.02 [-0.19; 0.23]) analyses. Cognitive and behavioural therapy showed the highest effect size in quality of life reduction, but even in this subset, evidence was not conclusive to show significant effect (g=0.42 [-0.02, 0.86]).

Recovery

Patients receiving psychosocial interventions showed significantly better recovery compared to controls overall (g=0.38 [0.22, 0.54], and in joint replacement surgeries only (g=0.18 [0.06, 0.31]. The effectiveness of cognitive or behavioural interventions (g=0.47 [0.25, 0.69] and relaxation techniques (g=0.59 [0.11, 1.08]) were supported.

4.2.2. Risk of bias

As expected, significantly less risk of bias was identified in randomized controlled trials compared to other eligible non-randomized controlled trials in all Cochrane risk of bias categories except for selective reporting ($\chi s^2 > 4.76$, ps < 0.029). The highest risk was identified in blinding of personnel and outcome assessors, while risk for incomplete outcome data and selective reporting was rated relatively low overall.

High or unclear risk of inadequate blinding of outcome assessors had a significant positive influence on postoperative analgesic requirement (β=0.53, p=0.024). Unexpectedly, a negative influence was found of inadequate blinding of outcome assessors on recovery (β=-0.4, p=0.005), and inadequate randomization and selective reporting on postoperative anxiety (β=-0.53, p=0.010, and β=-0.50, p=0.002 respectively).

Reporting bias

We detected a statistically significant risk for publication bias and a slight asymmetry in funnel plots in the outcomes of analgesic use, postoperative anxiety, quality of life and recovery. However, the trim and fill estimates match uncorrected estimates for all outcomes, estimating no missing studies, indicating that the effect of publication bias is minimal.

4.2.3. Summary and quality of evidence

We found that psychological interventions probably decrease preoperative anxiety. The quality of evidence for this outcome is rated as 'moderate' because a significant number of studies assessing preoperative anxiety, had a high or unclear risk of bias. Our results also suggest that psychological techniques might decrease postoperative pain, and improve recovery, but the quality of evidence was rated as 'low' due to risk of bias in study designs and substantial heterogeneity of effects (pain), and risk of reporting bias (recovery). The largest positive effect of psychological interventions was found on postoperative anxiety, but our effect estimates are very uncertain because of significant risk of bias in study designs, possible publication bias and heterogeneity of effects across studies, thus, quality of evidence in the case of this outcome was rated as 'very low'. There is not enough evidence to support the use of psychological interventions to improve quality of life or decrease analgesic use. However, substantial evidence supports the use of patient education to decrease pre- and postoperative anxiety and pain; relaxation techniques to ameliorate postsurgical anxiety and pain and improve recovery; and cognitive behavioural techniques to improve recovery.

5. Discussion

5.1. Effectiveness of therapeutic suggestions in patients undergoing hip- and knee replacement surgery

5.1.1. Summary

Our prospective, randomized, controlled clinical trial showed that therapeutic suggestions applied at joint replacement surgeries are effective in decreasing the need of red blood cell transfusions, in decreasing the medication consumption during the surgeries and in ameliorating the patients' wellbeing. However, the intervention had no effect on the postoperative pain killer and adjuvant pain medication request, on the frequency of postoperative complications and fever, on the We and CRP levels and on the length of hospitalization.

In the literature we did not find any research where suggestions aiming to decrease blood loss were not given under hypnosis. Though our result is consistent with that of other studies which used hypnotic suggestions to decrease the blood loss in the perioperative period.

Most of the time the first two days are the most difficult for patients after hip and knee replacement surgeries. During the personal discussion, patients in the interventional group received suggestions concerning this period. The effect of this suggestion is straightforwardly mirrored on the results of the facial scale. The change in the wellbeing in our study showed similar course to that of Jakubovits' study, but in other researches no increase in the wellbeing was found due to applied therapeutic suggestions.

The mean medication consumption was consistently lower in the suggestion group compared to the control group at all timepoints in both medication groups and this was statistically significant during the surgery. However, in the postoperative period this difference was not

statistically significant. The most probable reason behind it is that in the first two postoperative days patients receive the pain killers not on demand but rather based on an institutional protocol. In the later days, it is also possible that the nurses leave the pain killers at the patients' hand in case they need it, even if the patient did not ask for it. Thereupon patients may take the medication despite not having such a big pain to otherwise request a pain killer. Of course, it is also possible that the suggestions applied before and during the surgery might have a lower effect 3-6 days after the surgery.

In our study, there was no difference between the two groups in the frequency of complications and fever, therefore neither in the length of hospitalisation, which is similar to the findings of Jakubovits' research. This is probably due to the fact, that the complication rate is low anyway at these surgeries.

The greatest strength of our study is its prospective, randomized setting. The circumstances and the interventions are substantially standardized. The conclusions are also reinforced by the fact that most of the outcomes are objective parameters.

5.1.2. Limitations

One limitation of the study is that the patients had the possibility to ask questions during the verbal discussion, which may act as a confounding variable due to personalization. This might increase the patients' satisfaction and the effectiveness of the suggestions but is against the standardization.

Another limitation of the study was the impossibility to blind the study (including the data collection) due to the nature of the intervention, which raises the possibility that the patients' and the medical personnel's expectations influence the results. Though we did not aim to have a double-blind setting, since we wanted to have a "care as usual" group, where the patients do not have additional discussion, and who hear the noises of the surgery.

Also note that we cannot be sure whether the significant effects were due to the suggestions given during the interview or on the audiotaped material. Another question around the audiotaped material is whether the effects were really due to the suggestions or more due to the achieved more relaxed state. A further dilemma is whether the effects are simply due to the extra care the suggestion group received compared to the control group. Further research possibilities are to check the effects of the intervention with excluding the above factors.

5.1.3. Conclusions

With our research we would like to draw attention to the fact that the skill of using positive suggestions can be easily acquired without psychological qualification, and it can be effectively applied during the daily routine. Furthermore, if the suggestions are applied by the patients' physician, it does not require any extra time, it does not cost anything, but the patients wellbeing will be better, and the financial costs of the surgeries might decrease.

5.2. The effectiveness of psychoeducational interventions as adjuncts to orthopaedic surgeries (systematic review and meta-analysis)

5.2.1. Summary of evidence

The meta-analysis of 62 randomized, controlled trials demonstrated that psychosocial interventions decreased postoperative pain and both pre- and postoperative anxiety, and enhanced recovery, but had no significant effect on analgesic use and quality of life, but the quality of evidence is low mainly because of poor study design and high heterogeneity of effects. Electiveness of surgery was a statistically significant moderator of effectiveness. Type of surgery (major vs minor) and timing of interventions did not moderate effects.

Postoperative pain was significantly reduced, yet decrease in analgesic use was not statistically significant. There are several possible explanations for these seemingly contradictory results. Subjective pain reports and analgesic consumption are not perfectly

related and are influenced by different predictors to a different extent. For example, psychosocial interventions may decrease pain intensity by alleviating anxiety, but not pain anticipation. High pain anticipation may lead to more analgesic use. In addition, subjective reports of pain may be influenced by demand characteristics that lead to under-reporting, while external factors, such as nurse availability or protocol-based medication therapy, may influence analgesic consumption. In contrast, Johnston and Vögele found that psychosocial interventions reduced analgesic use. Our study pool for analgesic use was also considerably smaller resulting in lower statistical power.

We found evidence for the decrease of preoperative anxiety on the day of the operation, but not on earlier measurement points. This might be because of a floor effect in earlier measurement points, when anxiety might not be that expressed yet.

Electiveness of surgery was a statistically significant predictor in three outcomes: postoperative pain, analgesic use, and postoperative anxiety. In all cases, effectiveness was higher in acute surgeries. One possible explanation for this effect is that patients with unexpected surgeries have higher baseline anxiety and pain scores, therefore the interventions have a greater impact.

Results of the joint replacement subset mirrored those of the total dataset, with statistically significant reductions in pain and preoperative anxiety, and improvement in recovery. However, postoperative anxiety reduction was only nearly significant in this data subset. Severe postoperative pain, possible late surgical complications, like infections, implantation luxation, or loosening may result in patients' anxiety levels remaining high for months post-surgery.

Though previous reviews on joint replacement surgeries implied that patient education only decreases preoperative anxiety, this meta-analysis found a statistically significant effect for

postoperative pain and anxiety. Prior studies might have been unsuccessful in detecting these effects because they were restricted to hip and knee replacement surgeries only. For total hip and knee replacement there is a lot of easily accessible information for the patients, (e.g. Internet), therefore high baseline knowledge might have masked the effects of the intervention.

In line with previous non-orthopaedic studies, relaxation techniques reduced postsurgical pain and anxiety, and improved recovery. Cognitive or behavioural interventions were effective in improving recovery and showed strong yet non-significant effects on quality of life. This may indicate that cognitive or behavioural interventions are more effective in improving long-term outcomes. Further evidence is needed to support this observation.

5.2.2. Limitations

The low number of studies available for each intervention subtype resulted in an underpowered moderator analysis, preventing the ranking of interventions for comparison. The overall conclusions are limited by the low quality of evidence of the published studies. Though only randomized controlled trials were included into the meta-analysis, the risk of bias was still significant, especially due to methodological bias. However, for several outcomes we found that low quality studies actually had lower effect sizes. A further limitation was that anaesthesia type could not be evaluated due to the lack of reported information.

5.2.3. Conclusions

The results of our study support the fact that it is possible, it is worth to follow the biopsychosocial approach while treating a patient. Since patients' bodily and mental functions can not be separated, interventions on the mental level influences not only the patients' attitude towards their disease but

their healing as well. In the clinical practice it would be desirable to use the psychoeducational, psychotherapeutic methods more often.

6. Summary of new results and their clinical relevance

6.1. Effectiveness of therapeutic suggestions in patients undergoing hip- and knee replacement surgery

After reviewing the available literature our research group was the first, who examined the effects of therapeutic suggestions on the need of red blood cell transfusion at orthopaedic surgeries. Based on our results we can state that therapeutic suggestions applied personally before the surgery and via audiotape during the surgery at hip and knee replacement surgeries are effective in:

- decreasing the red blood cell transfusion requirement,
- decreasing the medication consumption (pain killers and adjuvant pain medications) during surgery,
- increasing the patients' wellbeing,

But they had no effect on:

- medication consumption postoperatively,
- recovery.

Clinical relevance of our research:

- As the need of red blood cell transfusion decreases, the complications resulting from their administration will also decrease.
- Patients' intraoperative medication consumption decreases, and their wellbeing ameliorates.

- The personnel's workload decreases as less medication and transfusion has to be administered.
- Patient-physician relationships improve due to the general satisfaction-increment.
- Better medication consumption and transfusion requirement have a favourable impact on the institutes' budget. Patients' satisfaction towards the institute will probably also increase.

6.2. The effectiveness of psychoeducational interventions as adjuncts to orthopaedic surgeries (systematic review and meta-analysis)

New observations:

- The current analysis revealed encouraging findings regarding the effects of psychosocial interventions
    - on postoperative pain,
    - on pre- and postoperative anxiety,
    - on recovery.

  However, more well-powered high-quality studies are needed to improve researcher's confidence in the size of the effects. The effects of psychosocial interventions are most consistent on decreasing preoperative anxiety.

- Psychoeducational interventions were significantly more effective in acute surgeries than in elective ones.
- Evidence supports the use of
    - patient education to decrease postoperative pain, pre- and postoperative anxiety,

- relaxation techniques to ameliorate postsurgical pain and anxiety, and improve recovery, and
- cognitive or behavioural interventions to improve recovery.

At this point, we do not have enough evidence to support the effectiveness of other psychological interventions.

Clinical relevance of our research:

- Psychoeducational interventions – beside the pharmacological methods - can be effectively used at orthopaedic and traumatological surgeries to decrease postoperative pain and perioperative anxiety and to improve recovery.
- Use of psychoeducational methods is likely to increase patients' adherence to treatment and compliance.
- Use of psychoeducational methods is likely to increase patients' satisfaction.
- The favourable consequences have a cost-reducing effect as well.

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Registry number: DEENK/339/2020.PL
Subject: PhD Publication List

Candidate: Csenge Szeverényi
Doctoral School: Doctoral School of Clinical Medicine

List of publications related to the dissertation

1. **Szeverényi, C.**, Kekecs, Z., Johnson, A., Elkins, G., Csernátony, Z., Varga, K.: The Use of Adjunct Psychosocial Interventions Can Decrease Postoperative Pain and Improve the Quality of Clinical Care in Orthopedic Surgery: a Systematic Review and Meta-Analysis of Randomized Controlled Trials.
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List of other publications

3. Rúzsa, G., **Szeverényi, C.**, Varga, K.: Person- and job-specific factors of intuitive decision-making in clinical practice: results of a sample survey among Hungarian physicians and nurses.
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Total IF of journals (all publications): 7,777
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