Evidence for education and advice in patients with chronic pain -
A Systematic and analytic literature study

Degree Project in Medicine

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Abstract

Background
In Europe approximately 20% of the population suffers from chronic pain. Chronic pain affects both individuals and society negatively. Multimodal rehabilitation (MMR) is effective as treatment for chronic pain and understanding the separate effect of the individual interventions included in MMR is of great value. Education and advice are often a part of the rehabilitation process.

Aim
To investigate the current evidence for education and advice as treatment for chronic pain.

Methods
Systematic searches were conducted in five databases. Limitations for the searched was conducted according to the PICO model: Patient (chronic pain, ≥18 years), Intervention (education and/or advice), Comparison (to other interventions or no intervention), Outcome (pain, psychological function, physical function, daily life activity, disability, quality of life, sick-leave, health in general). Systematic reviews and meta-analysis, evaluating the effect of education/advise, were assessed for their quality by a modified model from The Swedish Agency for Health Technology Assessment and Assessment of Social Services.

Results
Eleven systematic reviews were included in the final report, eight were qualified as high quality and six included meta-analysis. There is limited-low evidence for education/advice as stand-alone treatment for reducing pain and low-moderate evidence for education/advice as stand-alone treatment for reducing disability in patients with chronic pain.

Conclusion
Pain Neuroscience education (PNE) in combination with another intervention seems to be most effective for reducing pain and disability in patients with chronic pain.

Key words
Advice, Chronic pain, Disability, Education, Meta-analysis, Persistent pain, Systemic-review
List of abbreviations

BPS- Biopsychosocial  
CLBP- Chronic low back pain  
HRQL- Health Related Quality of Life  
MA- Meta-analysis  
MMR- Multimodal rehabilitation  
MSK- Musculoskeletal pain  
NPE- Neuroscience pain education  
PICO- Patient, Intervention, Comparison, Outcome  
PNE- Pain neuroscience education  
RCT- Randomized controlled trials  
SBU- Swedish Agency for Health Technology Assessment and Assessment of Social Services  
SR- Systematic review
Introduction

Definition

The definition of pain is according to International Association for the Study of Pain (IASP) "an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage"(1). Pain can be divided into acute, cancer-related and chronic pain. Chronic pain is defined as pain existing more than 3 months. Pain can be categorized into subtypes concerning its 1) location: back, spine, abdominal etc. 2) affected system: neuropathic pain, nociceptive, nociplastic or 3) etiology: trauma, postoperative etc.(2). Common chronic pain conditions are neck-shoulder pain and lower back pain(3).

Chronic pain is often a combination of different physical pain mechanisms. It can be caused by an injury or due to a disease, however it can exist in lack of these as well(4). Changes in the central pain modulation can be one mechanism causing chronic pain by altering the way of sending and registering pain signals(5, 6). Plastic changes in the neural activity can appear at different levels of the somatosensory system(7). The balance between inhibitory descending signals and the stimulating signals can be interrupted and as a result lead to dysfunction in the central nervous system(8). It is likely that these changes from start are reversible, however in time they can become permanent(9).

The changes in the nervous system can be due to genes or emotion and cognition. Reaction and the way of handling pain will affect the outcome of pain. If handling pain in a positive way, by accepting pain and feeling control of pain, the risk of chronic pain can be reduced. On the contrary, by having dysfunctional strategies for handling pain the risk of developing chronic pain can be increased(10). The outcome of pain is also affected by how family, friends and health staff respond to patients telling them about the pain(11).

Epidemiology

Chronic or persistent pain is a major health care problem and nearly 20% of the population in Sweden and Europe suffer from moderate to intensive pain daily(12). Approximately, 30% of the patients at the general practice in Sweden are related to pain and within them 50% are patients with chronic pain(13). Chronic pain is more common in the age between 40-60 years old, more frequent in women than men and the most common locations are lower back and
joints(12, 14). Factors like low level of education and low socioeconomic status contributes as risk factors for chronic pain(15).

**Consequences of chronic pain**
Chronic pain is often related with other heath conditions such as depression and anxiety(14, 16, 17). The intensity of pain is reported higher among patients with both pain and depression comparing to pain patients without depression(17). Additionally, it affects daily life negatively in terms of sleep, attending social activities, increased avoidance, exercise, sexual relationships, family life and maintaining an independent lifestyle(12, 18, 19). Pain contribute to reduced quality of life, thus being able to treat pain will increase quality of life(20). Patients with non-malign chronic pain, at a multidisciplinary center in Norway, reported their health-related quality of life (HRQL) as low as palliative cancer patients(21).

Chronic pain has negative effects on the individual, however chronic pain also affects employers, healthcare systems and society in general. In 2003 chronic pain approximately costed 0.8 billion Swedish crones every year due to direct health care costs and 8.3 billion due to indirect costs such as absence of work, in total 9.1 billion Swedish crones(20). In Europe nearly 60% of the population with chronic pain is unable to work outside their home, 19% report that they lost their job and 13% report that they had to change their job due to pain(12). Sick leave and sickness-retirement was in Sweden in 2008 the major reason for money loss due to chronic pain(22). The second most common reason for sick-leave is chronic pain(3).

**Treatment**
Approximately, 40% of Europeans report that they experience inadequate management of their chronic pain condition(12). Concerning acute pain, a treatment can often be found since the cause often is known. In contrary, for the majority of patients suffering from chronic pain the reason is often multifactorial which makes it difficult to successfully treat and manage these patients(3). Chronic pain does not respond to pharmacological interventions as well as acute pain does(4). Therefore, chronic pain should not be considered as “long-term acute pain”(6).

There are several treatments for chronic pain: pharmacological treatment, physiotherapy, psychological interventions including psychoeducation and education(20). Today the main
treatment is based on rehabilitation programs that involve working actively with dysfunctional thoughts, acceptance and behavior since it is reported to reduce pain, increase function and ability to work. Multimodal rehabilitation (MMR) is reported as an effective treatment for chronic pain in reducing pain in long-term(20). Patient education concerning pain is often part of the program(4).

**Multimodal rehabilitation**
MMR includes a team consisting of the patient and professionals i.e. physician, physiotherapist, psychologist, nurse, occupational therapist and social worker and the rehabilitation is constructed to fit the patients aim. The involvement of the patient is important(4). MMR is offered by health care center or specialized care at hospitals, however the content of the treatment can differ locally(20). Patients who often are accepted for MMR are patients who are clearly limited in their everyday lives(4). The aim of the rehabilitation is to give the patient knowledge and strategies to handle their pain and its’ consequences in daily life. The aim is to increase physical activity. Together this works to give tools and better possibilities to handle daily activities and return to work. MMR is effective on outcomes like return to work and sick leave, while comparing to none or minor invention. The most advantageous MMR model is yet not known(12, 23).

**Education**
Education is a cornerstone in MMR since it is the key for motivation and understanding why advices concerning exercising and psychological therapy are useful(24). In 2018 IASP stated that recommended first-line treatment for chronic pain in guidelines globally is education(25). Thirty years ago patients were advised to stay active after hurting their back, without any education regarding the reason for this advice, according to the book *The back pain revolution*(26). The traditional musculoskeletal (MSK) education focused on explaining pain in a biomedical way as healthy/ anatomy, injured tissue/pathoanatomy and abnormal biomechanics(27, 28). This education is limited for explaining more complex mechanism such as neuroplasticity, periphery and central sensitization that is part of persistent pain(29). This type of education has even suggested to work the opposite way with increasing fear and anxiety(30, 31).
Today pain education has as purpose to deliver understanding of what pain is, the biological processes thought to underpin it and why pain exist in order to reduce the pain itself(32). Education as a treatment is described in many terms in the literature due to its’ rapid advance. Common terms used to describe this specific type of pain education are: ‘pain neuroscience education’, ‘pain biology education’, ‘therapeutic neuroscience education’, ‘neurophysiological pain education’, and ‘Explaining Pain’(33).

Pain neuroscience education (PNE) is an intervention with the intention to reduce pain and disability by describing the neurobiology and neurophysiology of pain experience to the patient. Patients should be taught that pain is a protection mechanism used by the body and not a sign for harm or damaged tissues. The aim of PNE is to change the maladaptive beliefs about pain and re-conceptualize attitudes towards pain. The increased knowledge will change the behaviors. There is less focus on biomedicine. The large amount of studies concerning PNE in patients with chronic pain indicates that this is a growing field(34).

Biopsychosocial approach (BPS) is an intervention that refers to education with one biological element to improve knowledge about pain and at least one psychosocial/social element. The goal is to improve daily life of patients in chronic pain. The focus of BPS is on psychosocial factors, i.e. understanding pain, unhelpful thoughts, coping styles and goal setting(35).

Back school is a therapeutic program supervised by a physical or medical specialist that includes both an educational and an exercise component with the aim to reduce pain and new episodes of back pain. The original “Swedish Back School” education involves anatomy, biomechanics and ergonomic to teach the patients to take care of their back. Today the content of back school differs(36).

The National Evidence Group
An earlier report by Gerdle and colleagues at Pain and Rehabilitation Centre, Linköping University Hospital in 2016 (based on literature searches 2012 and 2014) regarding the evidence for interventions in the pain rehabilitation program at the hospital, concluded that education based on pain physiology had a positive outcome on pain and physical function. More specifically, the report concluded that PNE had positive effects on pain and physical
function (moderate evidence) and that patients with CLBP are in need of advice to be physically active and in need of specific advice regarding physical exercise and/or resuming activities (strong evidence), only advice to “stay active” is not enough(37).

The national evidence group for pain rehabilitation is presently reassessing the current evidence for non-pharmacological interventions in pain rehabilitation programs for patients suffering chronic pain. The group consists of clinicians and researchers from the Swedish University hospitals performing pain rehabilitation.

**Objective and significance of the literature study**

Recent systematic reviews indicate that MMR is effective for patients with chronic pain. However, what MMR includes is unclear and differ locally(20). Therefore, to be able to improve the results of MMR there is of great value understanding the separate effect of the different interventions included in MMR. The aim of the study was to investigate the current evidence for education and advice as treatment for chronic pain.

The present systematic and analytic literature study will be part of the work the national evidence group for pain rehabilitation is performing concerning evidence for non-pharmacological interventions in MMR for patients with chronic pain. The result will be used for recommendations concerning chronic pain rehabilitation from the national evidence group. Furthermore, it will be used locally at the Pain Center at Östra Sjukhuset in Gothenburg, Sweden, to develop and improve pain rehabilitation for patients in chronic pain.

**Material and methods**

**Eligibility criteria**

For investigating the scientific question of this review the PICO-model, which includes population, intervention, comparison, and outcome was used.

**Population**

The population included adults (≥18 years) with chronic or persistent pain. Chronic pain was defined as pain 3 months or longer. Exclusion criteria were cancer-related pain and acute/subacute pain. However systemic reviews or meta-analysis were included even though they had mixed populations if they could report results for chronic pain separately or if the participations in the studies in majority had chronic pain.
Intervention
The interventions included were any form of education or advice concerning pain treatment/rehabilitation.

Comparison
The control group consisted of either another treatment/intervention or no treatment.

Outcomes
The outcomes studied were effects on pain, psychological function, physical function, daily life activity, disability, quality of life, sick-leave, health in general. The included studies did not have to cover all outcomes, but at least one of these outcomes.

Type of studies
Eligible studies met the following criteria; (1) systematic reviews or meta-analysis; and/or (2) written in English, Danish, Swedish or Norwegian; and (3) include prospective and controlled studies with or without randomized division compared to control groups; and (4) published in 2014-2019. The search was set up from 2014 since the most recent review of the national evidence group, that this work will update, was done in 2014. Systematic reviews and meta-analysis were selected since the national evidence group for pain rehabilitation had determined that if there are good systematic reviews of high quality, these reports should be used primary in order to assess the current evidence. Detailed described in Table 1.

Table 1. Inclusion and exclusion criteria.

<table>
<thead>
<tr>
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<tr>
<td>Article in English, Swedish, Norwegian, Danish</td>
<td>Narrative review, scoping review</td>
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<tr>
<td>Published the last 5 years (2014-2019)</td>
<td>Guidelines</td>
</tr>
<tr>
<td>Systematic reviews or meta-analysis</td>
<td>Systematic reviews and meta-analysis not based on observational studies</td>
</tr>
<tr>
<td>Based on randomized controlled trials</td>
<td>Not concurrent with PICO format</td>
</tr>
<tr>
<td>Latest search done in 2010 or later</td>
<td>If full text not available, not even through library</td>
</tr>
<tr>
<td>Concurrent with the predetermined PICO format</td>
<td></td>
</tr>
<tr>
<td>Full text available</td>
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</table>

Search strategy for identification of studies
AMED, CINAHL, Cohrane Library, PubMed and Scopus, were searched for systematic reviews and meta-analysis 18th of September 2019. The search terms were based on the PICO model. However, only population and intervention were included in the search terms. Control
and outcomes were used when screening the articles found by the search. Additionally, reference lists of included articles were screened for possible inclusion of more systematic reviews.

In PubMed a filter for publication type was used: systematic review, meta-analysis and review (Table 4 in Supplement). In AMED, CINAHL, Cochrane Library, and Scopus specific search terms were combined to find right publication types: (review OR reviews) AND (search* AND (medline OR medlars OR embase OR pubmed OR cochrane OR psycinfo OR psychlit OR CINAHL)) and systematic AND (review OR reviews OR overview OR search*) and meta-analy* OR metaanaly*(Table 5,6,7,8 in Supplement). Key words and mesh terms were determined together with the national evidence group for pain rehabilitation. Search terms used was: (education OR psychoeducation) AND (Pain AND (Chronic OR persistent)) AND (Humans[Mesh] AND (Meta-Analysis[ptyp] OR Review[ptyp]) AND adult[MeSH]). Mesh terms from the search terms were only applied in PubMed. The search terms (education OR psychoeducation) AND (Pain AND (Chronic OR persistent)) was searched in all fields since that was not defined to be title/abstract from the Swedish national evidence-based group for chronic pain.

Limits for language: Danish, English, Norwegian and Swedish and year-span 2014-2019 were applied to all five databases. The search was performed by help from staff at medical libraries at Sahlgrenska University Hospital, Östra and Biomedical Library at the University of Gothenburg.

**Study selection**

The search was conducted by the lead author with supervision from a librarian. To overview articles found, a flow diagram was made (Figure 1). All articles found were uploaded into the software Endnote, in which duplicates were removed. Subsequently, articles were rejected for a primary elimination after title and abstract not fitting criteria before full texts were evaluated for inclusion. The remaining articles were included in the systematic review. The lead author made a preliminary title elimination which was consulted and discussed with the supervisors. For the remaining articles (n=48) abstract was reviewed. All articles meeting the criteria (n=26) were reviewed by the lead author and the supervisors. For deciding about inclusion an algorithm used in the search done by Gerdle and colleagues was used (Figure 2 in
Supplement), as well as the determined PICO criteria (Table 9 in Supplement). If there were any disagreement concerning inclusion of articles discussion was reached among all four.

**Data items and collection**

The articles fitting the inclusion criteria for the final review are presented in tables separately based on their characteristics (Table 10 in Supplement). Data extraction was done by the lead author and controlled by supervisors. Data was extracted into Excel: writer, publication year, study design, design of included RCTs, number of RCTs included in the systematic review, number of RCTs included in meta-analysis, population of participations, number of patients included in total, number of patients included in intervention, number of patients included in comparison, search years included in the systematic review, intervention, comparison, primary outcome, secondary outcome, follow-up, results per outcome, loss and comment.

**Quality and evidence assessment**

The articles were assessed for quality according to the model used by the national evidence group for pain rehabilitation, based on SBU report(37). For this grading another table was done based on the seven different domains: design, selection, search, inclusion, number of patients, risk of bias and heterogeneity (Table 11 in Supplement). The seven domains could give one point each. In total the article could get a minimum of 0 points and maximum of 7 points. If the study had 5 points or more it was qualified as high-quality systematic review(37). Finally, a consensus overall quality grading was done grading each article as very low, low, moderate or high quality. The grading was done for each systematic review by at least two reviewers. Disagreement were solved with discussion among the reviewers.

**Ethics**

Ethic application for this systematic review was not considered as needed since it is based on already published data. Ethical approval is needed for research in order to protect the integrity, autonomy and basic rights and value of humans. According to the declaration of Helsinki the rights of the human is of greater value than the science and society. To involve patients in research the patient must declared inform consent(38).
Results

A summary of the results of the literature search is presented in Table 2.

Table 2 - Overview of results from literature search

<table>
<thead>
<tr>
<th>Number of articles(n)</th>
<th>Total:11</th>
<th>Systematic reviews:11</th>
<th>Meta-analysis:6</th>
<th>Quality</th>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>High: 8</td>
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<td></td>
<td></td>
<td>Moderate: 2</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Low: 1</td>
</tr>
<tr>
<td>Population(n)</td>
<td>CLBP:6</td>
<td>Chronic musculoskeletal pain at any site of body:4</td>
<td>Fibromyalgia:1</td>
<td></td>
</tr>
<tr>
<td>Intervention(n)</td>
<td>PNE:4</td>
<td>BPS:1</td>
<td>Back School:2</td>
<td>Unspecified education/advise:4</td>
</tr>
</tbody>
</table>

CLBP- chronic low back pain, PNE- Pain Neuroscience Education, BPS- Biopsychosocial Approach

Study selection

The primary literature search identified 412 articles. A number of 34 duplicates were removed. In total, 353 out of 379 records were excluded by screening and evaluating titles and abstracts. One additional article was identified from screening reference lists. Twenty-six articles were read for full-text valuation. Table with reason for abstract and full-text exclusion is stated in the supplement (Table 12,13 in Supplement). Eleven systematic reviews were included, six of the systematic reviews contained a meta-analysis.

Descriptions of included Studies

A detailed description of the included studies is presented in Table 8 in the supplement.

Patients

The most common patient group were CLBP, six systematic reviews included this patient population. Four reviews included chronic musculoskeletal pain at any site of the body and one assessed patients with fibromyalgia.
**Intervention**

Pain neuroscience education (PNE) was the intervention in 4 reviews. Biopsychosocial Approach (BPS) was investigated in one review. Back school was investigated in 2 reviews. Education or advice as treatment by facilitating knowledge concerning chronic pain was investigated in 4 reviews, it was not specified exactly what the education should include. In one study, education was defined as educational activities, with the purpose to improve patient’s health behavior and status, planned by qualified professionals. The patient should be informed and change behavior concerning the condition.

**Outcomes**

All included reviews, except for one, studied effect on pain intensity and disability/function status/physical movement/physical function. Other outcome measures used in the studies were healthcare utilization, pain catastrophizing, fear avoidance beliefs, changed attitude and beliefs about pain, knowledge in pain, quality of life, self-efficacy.

**Results of individual studies**

Data from each included systematic review and meta-analysis is presented in Table 3.

**Evidence for effect of treatment**

The detailed assessment of the quality of the included systematic reviews can be found in Table 9. In total 8 systematic reviews were qualified as high quality systematic reviews/meta-analysis. Of these, three systematic reviews included randomized controlled trials (RCT) with low risk of bias. Seven reviews were graded according to the Grading of Recommendations Assessment, Development, and Evaluation (GRADE). GRADE is a tool for assessment of quality of evidence and strength of recommendation as very-low, low, moderate and high. The quality is rated by authors(39).
Synthesis of results

Most promising results for PNE/NPE was found. The effect of PNE was greater when it was combined with other form of therapy. The evidence for only advice or education was limited or low evidence. Detailed results presented in Table 3.
<table>
<thead>
<tr>
<th>Author, year, county, design, quality assessment tool</th>
<th>Patients, Intervention</th>
<th>S</th>
<th>Evidence for education/advice efficacy 1</th>
<th>Evidence for education/advice efficacy 2</th>
<th>Evidence for education/advice efficacy 3</th>
<th>Evidence for education/advice efficacy 4</th>
<th>Conclusion by authors</th>
<th>Comment</th>
<th>Our conclusion</th>
</tr>
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<tr>
<td>Van Erp RMA, 2018, The Netherlands, SR, GRADE (40)</td>
<td>CLPB, BPS</td>
<td>4</td>
<td>Moderate evidence for BPS more effective than education/advice in reducing pain in short, medium and long term.</td>
<td>Moderate scientific evidence for BPS more effective than education/advice in improving functional disability in short, medium and long term.</td>
<td>BPS, including education/advice is better than education and advice only.</td>
<td>BPS, including education/advice is better than education and advice only.</td>
<td>Intervention only delivered by physical therapists.</td>
<td>Moderate quality SR with moderate evidence for education included in BPS intervention.</td>
<td>BPS better than education/advice alone for pain and disability</td>
</tr>
<tr>
<td>Louw A, 2016, USA, SR, PEDro scale (41)</td>
<td>MSK pain, PNE</td>
<td>5</td>
<td>Supporting evidence for improving pain ratings and pain knowledge</td>
<td>Supporting evidence for reducing disability, physical movement</td>
<td>Supporting evidence for improving healthcare utilization 1-year follow-up</td>
<td>State that there is supporting evidence for use of PNE for MSK for reducing pain, improving knowledge of pain, improving function and lowering disability, reducing psychosocial factors, enhancing movement and minimizing healthcare utilization.</td>
<td>PNE was only delivered by physiotherapists.</td>
<td>High quality SR. Including only RCTs with low risk of bias.</td>
<td>Strong evidence that PNE is effective for reducing pain when combined with physiotherapy. PNE may not be sufficient as stand-alone treatment.</td>
</tr>
<tr>
<td>Tegner H, 2018, Denmark, SR+MA GRADE (42)</td>
<td>CLBP, NPE</td>
<td>6</td>
<td>Moderate quality evidence for small to moderate effect on pain immediately post intervention.</td>
<td>Low quality evidence for small to moderate effect on disability immediately post intervention and 3 months follow up</td>
<td>Low to very low quality evidence for behavior attitude TSK immediately post intervention and 3 months (non-significant)</td>
<td>NPE has small to moderate effect on pain and disability.</td>
<td>Verbal education only.</td>
<td>High quality SR. Included RCTs of high risk of bias.</td>
<td>Moderate evidence for NPE on pain immediately, low evidence for pain short term. Low evidence for effect on disability.</td>
</tr>
<tr>
<td>Wood L, 2018, United Kingdom, SR+MA, GRADE (43)</td>
<td>CLPB, PNE</td>
<td>6</td>
<td>Low quality evidence for PNE as a stand-alone treatment for reducing pain in short term. Very low evidence for long term effect.</td>
<td>Moderate quality evidence for reducing disability in short term as stand-alone treatment. Low evidence for long-term results.</td>
<td>Moderate evidence that addition of PNE to usual physiotherapy improves disability and pain in short term. Uncertain about long term effect.</td>
<td>PNE should be combined with physiotherapy for reducing pain. For disability the improvement was greater when PNE was combined with usual physiotherapy.</td>
<td>High quality SR. Included only low risk of bias RCTs.</td>
<td>Moderate evidence for PNE in reducing disability. Low evidence for reducing pain greater effect when adding physiotherapy.</td>
<td></td>
</tr>
<tr>
<td>Watson J A, 2019, United Kingdom, SR+MA GRADE</td>
<td>Chronic MSK pain, PNE</td>
<td>5</td>
<td>Low quality evidence for pain reduction in short term</td>
<td>Moderate quality evidence for reducing disability in short and medium term</td>
<td>Moderate quality evidence for reduction in pain catastrophising short and medium term</td>
<td>PNE can decrease pain, disability, pain catastrophizing and kinesiophobia short to medium term. The reduction</td>
<td>Greater results on pain, disability and pain catastrophizing when PNE was used. Greater results on pain, disability and pain catastrophizing when PNE was used.</td>
<td>High quality SR. Included studies with high risk of bias.</td>
<td>Low quality</td>
</tr>
<tr>
<td>Study</td>
<td>Intervention</td>
<td>Duration</td>
<td>Level of Evidence</td>
<td>Findings</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Straube S, 2016, Canada/ United Kingdom/ SR+MA (44)</td>
<td>CLBP, Back School</td>
<td>5</td>
<td>Limited quality evidence for reducing pain intensity short, medium term</td>
<td>The evidence for Back Schools as treatment for CLBP is weak. Because of limitations with the study the findings should be interpreted with caution.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parreira P, 2017, Australia, Ghana/ S, Wie Otoo Kweku (46)</td>
<td>CLBP, non-specific, Back School</td>
<td>5</td>
<td>Very low -low quality evidence for reducing pain in short term, intermediate and long term comparing to no treatment/exercise/medical care/physiotherapy</td>
<td>Low- very low quality evidence for all treatment comparisons, outcomes and follow-up periods. Low quality, but no difference or a trivial effect for back school</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quinones A R, 2014, Ireland, SR, GRADE (47)</td>
<td>Chronic pain, Education group visits</td>
<td>4</td>
<td>Moderate quality evidence for increasing quality of life/function status in short term. Low evidence for long term</td>
<td>Many findings were not statistically significant, but some favored education group interventions.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kweku S, 2015, Ghana/ United Kingdom/ New Zealand SR, GRADE (48)</td>
<td>CLBP, non-specific, advice/education</td>
<td>6</td>
<td>Low quality evidence for exercise over education/advice improving in pain short term</td>
<td>Only 4/80 RCT focused on chronic pain. Few studies and one study were of poor quality.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Geneen L-J, 2015, United Kingdom, SR+MA (49)</td>
<td>Chronic pain at anybody site, Education</td>
<td>6</td>
<td>No evidence for improvement in pain</td>
<td>Exercise is no better than education/advice.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Garcia-Rios MC, 2019, Spain, SR, The Coch-rane group</td>
<td>Fibromyalgia, Health education</td>
<td>3</td>
<td>Limited scientific evidence for pain reduction</td>
<td>Limited evidence due to small sample sizes and different education types. The only support is for PNE. Cannot state that education is effective as a stand-alone treatment. It should be seen as an adjuvant treatment.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

GRADE SR: The United Kingdom, 2019, Coch Rios, 2019, Spain, SR, The Coch-rane group
GRADE I: Ireland, 2014, A R, Quinones
GRADE II: United Kingdom, 2016, Straube S, 2016, Canada/ United Kingdom/ SR+MA
GRADE III: Ghana/ S, Wie Otoo Kweku
GRADE IV: Chronic pain, Education group visits
GRADE V: Chronic pain at anybody site, Education
GRADE VI: Fibromyalgia, Health education

PNE/NPE. There were four high quality systematic reviews, three of them were meta-analysis investigated effect of PNE/NPE. All four presented effect on pain intensity. Three studies presented low evidence for reducing pain in short term. The fourth, not using GRADE, presented more supporting evidence for reduction in pain intensity and increased knowledge in pain. All four presented effect in reducing disability, where 3 presented moderate effect. Two presented positive effect on kinesophobia and three presented positive effect on reducing pain catastrophizing. All four presented greater effect when adding another treatment to PNE. Two presented greater results for longer duration of PNE.

BPS. One systematic review of moderate quality presented that BPS that includes an educational part is better than just education/advice as treatment for pain and disability for patients with chronic low back pain.

Back School. Two high quality systematic reviews both containing meta-analysis was included, none of them including RCTs of high quality. They showed low or limited evidence for effect for Back School on pain and disability for chronic low back pain. Greater effect of exercise when it is combined with Back School.

Non specified education/advice. Four systematic reviews were included, were two were of high quality. They presented limited or low evidence for education/advice as stand-alone treatment. One of the high-quality systematic review presented low evidence that exercise is no better than education/advice and the same one presented that PNE is more effective than just education/advice.

Discussion
This systematic and analytic literature study identified the evidence for education or advice as a treatment for chronic pain in adults that has been published from 2014 to 2019.
Most promising results were found for PNE, especially on pain intensity and disability when adding to another form of therapy. For no specified education and advice only, limited-low evidence was found. The concept called Back School found limited evidence for effect on pain and disability. This intervention includes both education and exercise. One could argue that it is challenging to reduce pain in CLBP, but there were no better results for other outcome measures either.

Based on the findings in the present systematic and analytic literature study, PNE in combination with other therapy is the most promising form of education, which is in line with earlier research on PNE. An article describing the last 15 years of pain education disclaims that modern pain education can be of benefit. It reported decreasing pain and disability in short term, mostly when combined to other treatment and as stand-alone treatment it was increasing knowledge of pain that lead to reduction in catastrophizing and pain-related and activity-related fear(32). Studies shows that patients understanding their pain experience reduced pain and disability for 12 months by being active and learning psychological strategies(51).

A narrative review of the literature on PNE reported positive outcomes in terms of reduced pain, disability, catastrophizing and improved physical performance when combined with manual therapy and supervised exercising. Still, there were no evidence found for it as a single treatment(52). Another systematic review concerning PNE for chronic low back pain presented encouraging results on outcomes as pain, physical function, psychological function and social function, but the evidence was of very- low quality(53). This conclude that PNE is benefitable when combined with other treatments, however little is known about how it should be performed in the clinic. A qualitative study, investigating patient experience of PNE, presented key factors to enhance PNE such as the importance of letting the patient tell their own story and that getting pain re-conceptualization can increase patients’ ability to copy their condition(54).

A cross sectional online survey implied that patients that received pain education and observed changes to pain cognition and self-management reported higher expectations on recovery and lower pain intensity when comparing to those patients that did not change pain cognition and self-management(55). Other studies demonstrate that pain education and its effect can be lost over time leading to no long-term benefits(56).
Our results are in line with results by Gerdle and colleagues at Pain and Rehabilitation Centre, Linköping University hospital concerning effect of PNE in reducing pain and disability(37). Moreover, both studies indicate that just simple advice is not enough.

**Future research**
In the systematic reviews presented, several knowledge gaps are discussed, i.e. which type of education is most advantageous and what should be included in the education chosen. Furthermore, evidence for how the education should be designed concerning who should deliver the education and how it should be communicated to the different patient groups. Research shows that physicians currently lack accurate knowledge of pain and that they tend to underestimate the patients‘ ability to understand pain biology and physiology(57). This is a barrier that need to be changed in order for education to be effective. There is of great value to utilize knowledge from different medical professionals. This systematic and analytic literature study found evidence for a more effective PNE when it was performed during longer durations. It did as well find few articles on long-term follow up which indicate that further research is needed. It is also of great value for society to evaluate how cost-effective education could is compared to other treatments.

**Clinical implication**
Majority of people living with chronic pain does not get in contact with health professionals(3). There is evidence for positive effect of education on the individual, but also for the society. Earlier studies strongly propose that education is cost beneficial as treatment for chronic health conditions(58). Without big efforts for the healthcare these patients could treat themselves, which would give big benefits for both individuals and society in general(3).

If there are such possibilities for education as a treatment for chronic pain, we need to understand how the education should be formed in the best way. Today the use of internet as a way to handling chronic pain and take decisions for health is increasing(59, 60). The second most popular website is YouTube (61) and one of the most popular sources for information concerning health is the internet(62). There are already videos on YouTube concerning chronic pain management that have been streamed over a million times(63). Chronic pain is as well common among youths(64) and they often use internet for health related issues as well(65). This suggest that internet pain education should be a focus area for future studies on
how to deliver education. Using internet would make the treatment geographically equal, however today the material is not equal for example due to language barriers(60). The use of internet seems to be more cost effective than a doctor’s appointment, which makes it even more important study.

**Strength and limitation**

This review was supposed to be an update of a search done by Gerdle and colleagues in order to be a support for Swedish pain rehabilitation clinics regarding how to treat chronic pain. The study by Gerdle and colleagues decided that if there were good quality systematic reviews or meta-analysis in the field these should be used and therefore this publication type limitation was used. The problem with this limitation is that you miss out the latest published randomized controlled trials since they have not been reviewed yet. Consequently, a search for RCTs from the latest 1-2 years would need to be added to this work.

There was a language limit made, however most systematic reviews and meta-analysis in the field were in English. We limited the patient group to musculoskeletal pain and most reviews found looked at chronic low back pain. This is representable since the most commonly reported location for pain is the back(12). In addition, this review does not include any unpublished data. Further methodology limitations are that not two independent reviewers selected the articles. This since it was performed in order to educate the student/lead author. It was only the student reading all the reviews included, however all were read by at least one of the supervisors. These limits were known and accepted. Moreover, concerning study design selected reviews and meta-analysis for this systematic and analytic literature study could include the same RCTs. This means that the same empirical material could be included more than once without adding new information to the study. One could argue that this could over-estimate results of this study, however on the other hand one could argue that our results are in line with the results of the earlier search done by Gerdle and colleagues at Pain and Rehabilitation Centre, Linköping University Hospital in 2016 (based on literature searches 2012 and 2014).

Although high quality systematic reviews were found, many of them were based on RCTs with high risk of bias and high heterogeneity. Several of included systematic reviews were based on RCTs that had problems with allocation and especially blinding of patient and staff.
The blinding issue was expected since the intervention is difficult to blind for. High heterogeneity in the meta-analysis was especially due to the variety of education.

For this search we assess see the effect of education alone, however that is not how it is clinically intended. When searching we found a lot of reviews looking at self-management programs were education is part of a treatment, still we could not separate the individual effect of education and therefore reviews of self-management programs were excluded. This might have affected the evidence for education in combination with other treatments, but not the effect of education/advice as stand-alone treatment.

**Conclusion**

This systematic review identified the current evidence for education or advice as a treatment for chronic pain. Most promising results were for Pain Neuroscience Education, especially when combined with other treatments such as active physiotherapy. There is limited-low evidence for education/advice as stand-alone treatment for reducing pain and low-moderate evidence for education/advice as stand-alone treatment for reducing disability in patients with chronic pain. For the future it is of great value for both individual and society finding the most advantageous education concerning outcomes on pain/disability for the lowest cost. For this purpose, more long-term randomized controlled trials should be performed.
Populärvetenskaplig sammanfattning

Smärta definieras som ”en obehaglig sensorisk och känslomässig upplevelse förenad med vävnadsskada eller beskriven i termer av skada”. Ungefär 20 % av den svenska befolkningen lider av långvarig smärta, som definieras som smärta som varat under minst tre månader efter förväntad läkning. Långvarig smärta påverkar individen negativt i form av nedsatt livskvalitet, nedsatt fysisk funktion och psykisk ohälsa, men det påverkar också samhället via direkta- och indirekta hälsokostnader. Långvarig smärta är den näst vanligaste orsaken till sjukskrivning efter psykisk ohälsa.

Multimodal rehabilitering (MMR) är en effektiv behandling av långvarig smärta och involverar ett team med läkare, fysioterapeut, psykolog, sjuksköterska, kurator och arbetsterapeut. MMR fokuserar på att ge patienten ökad kunskap och strategier att kunna hantera sin smärta och dess konsekvenser. Rehabiliteringen innebär att patienten ökar sin fysiska aktivitetsnivå och kroppsmedvetenhet. Tillsammans syftar detta till att ge patienten verktyg och bättre möjligheter att klara av dagliga aktiviteter samt på sikt kunna återgå i arbete. I studier rapporteras MMR vara en effektiv behandling, men vad som däremot exakt ska ingå är inte fastställt och varierar lokalt i landet. Mot denna bakgrund är det av stor vikt att förstå effekten av de olika ingående komponenterna i MMR för att kunna skapa en effektiv och lika behandling för patienter med långvarig smärta.

Patientutbildning utgör en viktig del i många rehabiliteringsprogram. Syftet med smärtutbildning idag är att patienten ska förstå vad smärta är, bakomliggande mekanismer och orsak till att den uppstår och på så vis kan den upplevda smärta minska. Vid tidigare genomgång av evidensläget för utbildning och råd vid Smärt- och rehabiliteringscentrum på Universitetssjukhuset i Linköping, fann man att smärtfysiologisk undervisning och råd om träning kan ha positiv effekt på smärta.

Syftet med denna rapport är att kartlägga de evidens som idag finns för utbildning och råd för patienter med långvarig smärta för att förbättra hantering av långvarig smärta i kliniken. Resultaten kommer ligga till grund för rekommendationer från den nationella evidensgruppen och användas inom smärtrehabilitering i Sverige. Arbetet utgör en del i det kontinuerliga nationella evidensarbetet genomförs vid universitetssjukhus i Sverige rörande evidens för icke-farmakologiska interventioner inklusive multimodal rehabilitering vid långvarig smärta.
Vidare kommer studieresultaten användas i Smärcentrums interna egna forskning- och utvecklingsarbete samt planering av utbildningar för patienter med långvarig smärta.

För att besvara frågeställningen genomfördes en systematisk sökning i 5 databaser efter artiklar publicerade de senaste 5 åren. Sökningen resulterade i 11 artiklar som undersökte utbildning som behandling för vuxna med kronisk smärta.


Acknowledgement

My biggest thanks to my supervisors at Östra, Sahlgrenska University Hospital for taking your time to fully support and encourage this project. This would not have been possible without Lars- Erik Dyrehag, Paulin Andréll and Emma Varkey. Thanks for all patience with reading all the articles, all feedback, all ideas and for always being there. A special appreciation to Paulin Andréll for inspiring me to future research by giving me knowledge about it. Moreover, thanks to the librarians at both Sahlgrenska University hospital and Biomedical Libraries at the University of Gothenburg. Lastly, I am grateful for family and friends for supporting me in this work.
References

61. 2018. AATwoti.
# Supplement- Tables and figures

## Table 4. PubMed- search terms with modified PICO.

<table>
<thead>
<tr>
<th>Database, PubMed</th>
<th>Search terms</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>P-population</strong></td>
<td>(Pain AND (Chronic OR persistent)) AND (Humans [Mesh] adult [MeSH]).</td>
</tr>
<tr>
<td><strong>I-Intervention</strong></td>
<td>(education OR psychoeducation)</td>
</tr>
<tr>
<td><strong>Limitations</strong></td>
<td>English, Swedish, Danish, Norwegian</td>
</tr>
<tr>
<td></td>
<td>Last 5 years: 2014-2019</td>
</tr>
<tr>
<td></td>
<td>Publication type: Filter for systematic review, meta-analysis and review was used</td>
</tr>
</tbody>
</table>

**Total amount of studies** 99

\(^{1}\) Search was performed on the 18\(^{th}\) of September 2019

## Table 5. AMED- search terms with modified PICO.

<table>
<thead>
<tr>
<th>Database, AMED</th>
<th>Search terms</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>P-population</strong></td>
<td>(Pain AND (Chronic OR persistent))</td>
</tr>
<tr>
<td><strong>I-Intervention</strong></td>
<td>(education OR psychoeducation)</td>
</tr>
<tr>
<td><strong>Limitations</strong></td>
<td>English, Swedish, Danish, Norwegian</td>
</tr>
<tr>
<td></td>
<td>Last 5 years: 2014-2019</td>
</tr>
<tr>
<td></td>
<td>Publication type: (review OR reviews) AND (search* AND (medline OR medlars OR embase OR pubmed OR cochrane OR psycinfo OR psychlit OR CINAHL)) and systematic AND (review OR reviews OR overview OR search*) and meta-analy* OR metaanaly*.</td>
</tr>
</tbody>
</table>

**Total amount of studies** 5

\(^{1}\) Search was performed on the 18\(^{th}\) of September 2019

## Table 6. CINAHL- search terms with modified PICO.

<table>
<thead>
<tr>
<th>Database, CINAHL</th>
<th>Search terms</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>P-population</strong></td>
<td>(Pain AND (Chronic OR persistent))</td>
</tr>
<tr>
<td><strong>I-Intervention</strong></td>
<td>(education OR psychoeducation)</td>
</tr>
<tr>
<td><strong>Limitations</strong></td>
<td>English, Swedish, Danish, Norwegian</td>
</tr>
<tr>
<td></td>
<td>Last 5 years: 2014-2019</td>
</tr>
<tr>
<td></td>
<td>Publication type: (review OR reviews) AND (search* AND (medline OR medlars OR embase OR pubmed OR cochrane OR psycinfo OR psychlit OR CINAHL)) and systematic AND (review OR reviews OR overview OR search*) and meta-analy* OR metaanaly*.</td>
</tr>
</tbody>
</table>

**Total amount of studies** 28

\(^{1}\) Search was performed on the 18\(^{th}\) of September 2019

## Table 7. The Cochrane Library - search terms with modified PICO.

<table>
<thead>
<tr>
<th>Database, Cochrane Library</th>
<th>Search terms</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>P-population</strong></td>
<td>(Pain AND (Chronic OR persistent))</td>
</tr>
<tr>
<td><strong>I-Intervention</strong></td>
<td>(education OR psychoeducation)</td>
</tr>
<tr>
<td><strong>Limitations</strong></td>
<td>English, Swedish, Danish, Norwegian</td>
</tr>
<tr>
<td></td>
<td>Last 5 years: 2014-2019</td>
</tr>
</tbody>
</table>
Publication type: (review OR reviews) AND (search* AND (medline OR medlars OR embase OR pubmed OR cochrane OR psycinfo OR psychlit OR CINAHL)) and systematic AND (review OR reviews OR overview OR search*) and meta-analy* OR metaanaly*.

| Total amount of studies | 25 \(^1\) |

\(^1\) Search was performed on the 18th of September 2019

**Table 8.** Scopus- search terms with modified PICO.

<table>
<thead>
<tr>
<th>Database, Scopus</th>
<th>Search terms</th>
</tr>
</thead>
<tbody>
<tr>
<td>P-population</td>
<td>(Pain AND (Chronic OR persistent))</td>
</tr>
<tr>
<td>I-Intervention</td>
<td>(education OR psychoeducation)</td>
</tr>
</tbody>
</table>
| Limitations      | English, Swedish, Danish, Norwegian  
                  | Last 5 years: 2014-2019  
                  | Publication type: (review OR reviews) AND (search* AND (medline OR medlars OR embase OR pubmed OR cochrane OR psycinfo OR psychlit OR CINAHL)) and systematic AND (review OR reviews OR overview OR search*) and meta-analy* OR metaanaly*. |

| Total amount of studies | 255 \(^1\) |

\(^1\) Search was performed on the 18th of September 2019

**Table 9.** The PICO-model used (Patient, Intervention, Comparison, Outcome) used.

<table>
<thead>
<tr>
<th>The PICO-model</th>
<th></th>
</tr>
</thead>
</table>
| Population (P) | Inclusion:  
                  - adult, 18+  
                  - chronic/persistent pain (chronic pain is considered as pain at least 3 months)  
                  - Mixed populations in studies are included if (1) results for the different conditions is reported separately or (2) chronic pain is the major condition in the review. Exclusion:  
                  - Cancer-related pain  
                  - acute/subacute pain |
| Intervention (I) | Education or advice. Mixed interventions in studies are included if results from education/advice is reported separately. Self-management interventions were excluded if not clearly defined the effect of education/advice. |
| Comparison (C) | Other active intervention, waiting list, non-intervention |
| Outcome (O) | Pain, psychological function, physical function, daily life activity, disability, quality of life, sick-leave, health in general. Studies do not have to cover all outcomes. |
| Studies | - The selection of studies in an included review should be prospective and controlled studies  
                  - The latest search should be done 2010 or later  
                  - Published in Swedish, Danish, Norwegian, English |
**Table 10. Characteristics of included articles.**

<table>
<thead>
<tr>
<th>Author, year, design, country</th>
<th>Search years</th>
<th>Included studies: quantity and design</th>
<th>Patient (P)</th>
<th>Intervention (I)</th>
<th>Comparison (C)</th>
<th>Outcome (O)</th>
<th>Follow-up</th>
<th>Limitation</th>
</tr>
</thead>
<tbody>
<tr>
<td>van Erp RMA, 2018, SR, The Netherlands</td>
<td>-2015</td>
<td>7, RCT</td>
<td>Adults 18+, Non-specific chronic low back pain</td>
<td>BPS, including a biological component about pain and a psychosocial/social component</td>
<td>Another treatment, no treatment, waiting list</td>
<td>Primary: Functional status, disability, pain, work status Secondary: generic function status/well being, improvement, satisfaction, emotional functioning and cognitions, adverse events.</td>
<td>Short term- 3 months, medium terms 3-12 months, long terms 12 months.</td>
<td>Intervention delivered by physiotherapist in primary care</td>
</tr>
<tr>
<td>Louw A, 2016, SR, USA</td>
<td>1999-2015</td>
<td>13, RCT</td>
<td>Adults, 18+. Musculoskeletal pain</td>
<td>PNE, (named pain neurophysiology education, therapeutic patient education, neuroscience education, pain physiology education, pain neuroscience education, neurophysiology education, pain biology education, neurophysiology of pain education)</td>
<td>Other treatment, no treatment, usual treatment</td>
<td>Primary: Pain, disability, function status, Secondary: psychosocial factor, movement, healthcare utilization</td>
<td>Immediate post intervention- 1 year follow-up.</td>
<td>Heterogeneity among the RCTs and therefore no MA was performed. Only physical therapists delivered education</td>
</tr>
<tr>
<td>Tegner H, 2018, SR/MA, Denmark</td>
<td>-</td>
<td>7, RCT. 7 for meta-analysis</td>
<td>Adults, 18+. Chronic low back pain</td>
<td>NPE, is cognitive-behavioral intervention that provides education in pain neurophysiology to change maladaptive illness beliefs, to alter maladaptive pain cognition and to re-conceptualize beliefs about pain. Verbal</td>
<td>No intervention, usual care</td>
<td>Pain, disability, ability to return to work, behavior attitudes</td>
<td>After treatment, 3 months, long term one year</td>
<td>Small sample sizes in included RCTs. Only verbal NPE. NPE was mostly supplement to other treatment. Low baseline pain at included patients.</td>
</tr>
<tr>
<td>Study</td>
<td>Year</td>
<td>Design</td>
<td>Region</td>
<td>Sample Size</td>
<td>Intervention Details</td>
<td>Comparator Details</td>
<td>Outcomes</td>
<td>Duration</td>
</tr>
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</tr>
<tr>
<td>Wood L</td>
<td>2018</td>
<td>SR/MA</td>
<td>United Kingdom</td>
<td>8, RCT</td>
<td>Adults, 18+. Chronic non-specific low back pain</td>
<td>PNE/therapeutic neuroscience education/explain pain</td>
<td>All controls were included if not provided PNE</td>
<td>Primary: Pain and disability. Secondary: adverse events</td>
</tr>
<tr>
<td>Watson J A</td>
<td>2019</td>
<td>SR/MA</td>
<td>United Kingdom</td>
<td>12, RCT</td>
<td>Adults, 18+. Chronic muscular-skeletal pain</td>
<td>PNE: aim to facilitate patients to re-conceptualize their pain as less threatening. Can be named: explain pain, therapeutic neuroscience education, pain biology education, neurophysiology education.</td>
<td>No treatment, usual care, concomitant studies were PNE was delivered in addition to another intervention, active intervention</td>
<td>Primary: pain and disability. Secondary: any validated measure that investigates the individuals physical and or psychosocial well-being.</td>
</tr>
<tr>
<td>Straube S</td>
<td>2016</td>
<td>SR/MA</td>
<td>Canada/Germany/United Kingdom</td>
<td>31, RCT</td>
<td>Adults, chronic low back pain</td>
<td>Back school, interventions that comprise exercise and education components. Lessons given by therapist with aim to treat or prevent low back pain.</td>
<td>Any intervention, no intervention</td>
<td>Primary: pain intensity or relief. Secondary: Function related: workdays missed, interference with work, interference with daily activities. Quality of life. Patient global impression. Adverse events.</td>
</tr>
<tr>
<td>Parreira P</td>
<td>2017</td>
<td>SR/MA</td>
<td>Australia</td>
<td>30 RCT/quasi RCT</td>
<td>Adults, chronic non-specific low back pain</td>
<td>Back school, therapeutic program given to groups of people that include both education and exercise supervised by physical therapist or medical specialist.</td>
<td>No treatment, medical care, physiotherapist-applied treatment, exercise.</td>
<td>Primary: pain and disability. Secondary: adverse events, work related</td>
</tr>
<tr>
<td>Quinones A R</td>
<td>2014</td>
<td>SR</td>
<td>Ireland</td>
<td>4/80, RCT</td>
<td>Common chronic condition</td>
<td>Educational group visits led by non-prescribing facilitators. 1. self-management</td>
<td>Primary: health outcomes were focus quality of life, functional</td>
<td>Short &lt;6 months, long term &gt;6 months</td>
</tr>
<tr>
<td>Study Author, Year, Country</td>
<td>Study Design</td>
<td>Participant Characteristics</td>
<td>Intervention</td>
<td>Outcome</td>
<td>Study Type</td>
<td>Duration</td>
<td>Study Limitations</td>
<td></td>
</tr>
<tr>
<td>----------------------------</td>
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<td></td>
</tr>
<tr>
<td>Geneen L-J., 2015, SR/MA, United Kingdom</td>
<td>RCT/cluster RCT</td>
<td>Adults, 18+. Chronic pain at any site. Of the body</td>
<td>Education as stand-alone treatment</td>
<td>Usual care, different education types</td>
<td>Not stated.</td>
<td>Small number of studies, no clear identified education type.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maria Carmen Garcia-Rios, 2019, SR/MA, Spain</td>
<td>RCT</td>
<td>Adults, fibromyalgia</td>
<td>Patient education. Defined as any educational activities planned by qualified professionals and aimed to improving a patient’s health behaviors and/or health status.</td>
<td>Not determined</td>
<td>Not stated.</td>
<td>Heterogeneity concerning patient group and education type.</td>
<td></td>
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</tr>
</tbody>
</table>

SR- Systematic review, MA- Meta-analysis, RCT- Randomized controlled trial, BPS- Biopsychosocial, PNE- Pain neuroscience education, NPE- Neuroscience education
<table>
<thead>
<tr>
<th>Author, year, design</th>
<th>Design</th>
<th>Selection</th>
<th>Search</th>
<th>Inclusion</th>
<th>Number of patients</th>
<th>Bias</th>
<th>Heterogeneity</th>
<th>Total score</th>
<th>Overall quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Van Erp RMA, 2018, SR</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>Moderate quality SR.</td>
</tr>
<tr>
<td>Louw A, 2016, SR</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>5</td>
<td>High quality SR including low risk of bias RCTs.</td>
</tr>
<tr>
<td>Tegner H, 2018, SR+ MA</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>6</td>
<td>High quality SR/MA, including high risk of bias RCTs.</td>
</tr>
<tr>
<td>Wood L, 2018 SR+ MA</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>6</td>
<td>High quality SR/MA, Including low risk of bias RCTs.</td>
</tr>
<tr>
<td>Watson J A, 2019 SR+ MA</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<td>High quality SR including high risk of bias RCTs.</td>
</tr>
<tr>
<td>Kweku Wie Otoo S, 2015, SR</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>6</td>
<td>High quality SR including low risk of bias RCTs.</td>
</tr>
<tr>
<td>Geneen L-J, 2015, SR+MA</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>6</td>
<td>High quality SR/MA including high risk of bias RCTs.</td>
</tr>
<tr>
<td>Maria Carmen Garcia-Rios, 2019, SR</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>Low quality SR. No RCT of high quality included.</td>
</tr>
<tr>
<td>Quinones A R, 2014, SR</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>Moderate quality SR including low-moderate quality RCTs.</td>
</tr>
<tr>
<td>Parreira P, 2017, SR+ MA</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>5</td>
<td>High quality SR/MA including high risk of bias RCTs.</td>
</tr>
<tr>
<td>Straube S, 2016, SR+ MA</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>5</td>
<td>High quality SR/MA including mostly moderate quality RCTs.</td>
</tr>
</tbody>
</table>

SR-Systematic review, MA-Meta-analysis, RCT- Randomized controlled trial

1. Design: Is there a clear design with patients, intervention and outcome stated?
2. Selection: Was the selection and data extraction done by at least 2 independent researchers? Did they state how to solve selection conflicts?
3. Search: Was the database search extensive enough? How many data bases, reference lists, date for searching, mesh/key words used?
4. Inclusion: Was both published and unpublished data included?
5. Number of patients: Was more than 200 participations included in total?
6. Bias: Did more than 75% of the studies have low risk of bias?
7. Heterogenicity: For meta-analysis: Was the heterogenicity estimated as I² <75%?
8. Total score: 5 or more good/high quality SR/MA
9. Overall quality: A final consensus overall quality was judge as very low, low, moderate or high quality.
<table>
<thead>
<tr>
<th>Title</th>
<th>Writer</th>
<th>Reason for exclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evidence-Based Non-Pharmacological Therapies for Fibromyalgia.</td>
<td>Aman MM et al.</td>
<td>Not systematic review/Meta-analysis</td>
</tr>
<tr>
<td>Fifteen Years of Explaining Pain: The Past, Present, and Future.</td>
<td>Moseley GL, Butler DS.</td>
<td>Not systematic review/Meta-analysis</td>
</tr>
<tr>
<td>Combining manual therapy with pain neuroscience education in the</td>
<td>Puentedura EJ, Flynn T.</td>
<td>Not systematic review/Meta-analysis</td>
</tr>
<tr>
<td>treatment of chronic low back pain: A narrative review of the</td>
<td></td>
<td></td>
</tr>
<tr>
<td>literature.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Presentation and management of chronic pain. Archives of Disease</td>
<td>Rajapakse D, et al.</td>
<td>Not systematic review/Meta-analysis</td>
</tr>
<tr>
<td>Management of Widespread Pain and Fibromyalgia. Current Treatment</td>
<td>Whibley D, et. al.</td>
<td>Not systematic review/Meta-analysis</td>
</tr>
<tr>
<td>The effectiveness of physiotherapist-delivered group education and</td>
<td>Toomey E, et al.</td>
<td>Not systematic review/Meta-analysis</td>
</tr>
<tr>
<td>exercise interventions to promote self-management for people</td>
<td></td>
<td></td>
</tr>
<tr>
<td>with osteoarthritis and chronic low back pain: A rapid review Part I</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The role of exercise and patient education in the noninvasive</td>
<td>Rebbeck T. et al.</td>
<td>Not systematic review/Meta-analysis</td>
</tr>
<tr>
<td>management of whiplash. Journal of Orthopaedic and Sports Physical</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Therapy.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The clinical application of teaching people about pain. Physiotherapy</td>
<td>Louw A, et al.</td>
<td>Not systematic review/Meta-analysis</td>
</tr>
<tr>
<td>Theory and Practice.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pain’: Incorporating level I evidence with expert clinical reasoning.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Multidisciplinary biopsychosocial rehabilitation for subacute low</td>
<td>Marin TJ, et al.</td>
<td>Intervention</td>
</tr>
<tr>
<td>back pain.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>improve patient outcomes: A systematic review.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Effectiveness of education based on neurosciences in patients with</td>
<td>Valdés-Orrego et al.</td>
<td>Language</td>
</tr>
<tr>
<td>chronic low back pain: Systematic review with meta-analysis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>with long-term conditions: A systematic review and meta-analysis. B</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reassuring patients about low back pain. JAMA Internal Medicine.</td>
<td>Chou R. et al.</td>
<td>Not systematic review/Meta-analysis</td>
</tr>
<tr>
<td>Management of fibromyalgia: practical guides from recent evidence-</td>
<td>Hauser W, et. al</td>
<td>Not systematic review/Meta-analysis</td>
</tr>
<tr>
<td>based guidelines.</td>
<td></td>
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<tr>
<td>Diagnosis and treatment of temporomandibular disorders.</td>
<td>Gauer RL, Semidey MJ.</td>
<td>Not systematic review/Meta-analysis</td>
</tr>
<tr>
<td>Know Pain, Know Gain? A Perspective on Pain Neuroscience Education</td>
<td>Louw A, et al.</td>
<td>Not systematic review/Meta-analysis</td>
</tr>
<tr>
<td>in Physical Therapy.</td>
<td></td>
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<tr>
<td>Chronic pain and the thoracic spine. Journal of Manual and</td>
<td>Louw A, Schmidt SG.</td>
<td>Not systematic review/Meta-analysis</td>
</tr>
<tr>
<td>Manipulative Therapy.</td>
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<tr>
<td>Title</td>
<td>Writer</td>
<td>Reason for exclusion</td>
</tr>
<tr>
<td>----------------------------------------------------------------------</td>
<td>----------------------------</td>
<td>-------------------------------------------</td>
</tr>
<tr>
<td>Secondary prevention of chronic musculoskeletal pain: A systematic review of clinical trials.</td>
<td>Meyer C, Denis CM, Berquin AD</td>
<td>Wrong patient, subacute/acute pain</td>
</tr>
<tr>
<td>Self-management interventions for chronic disease: A systematic scoping review.</td>
<td>Richardson J., et al.</td>
<td>Not a Systematic review or meta-analysis, but a Scoping review</td>
</tr>
<tr>
<td>The importance and impact of patients' health literacy on low back pain management: a systematic review of literature</td>
<td>Edward Jean et al.</td>
<td>Not based on RCTs</td>
</tr>
<tr>
<td>Does structured patient education improve the recovery</td>
<td>Yu H et al.</td>
<td>Mixed population</td>
</tr>
<tr>
<td>and clinical outcomes of patients with neck pain? A systematic review from OPTIM collaboration</td>
<td></td>
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<td>---</td>
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<tr>
<td>Wrong intervention. Education in both intervention and comparison.</td>
<td></td>
<td></td>
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<tr>
<td>The effectiveness of noninvasive interventions for musculoskeletal thoracic spine and chest wall pain: A systematic review</td>
<td>Danielle Southerst</td>
<td></td>
</tr>
<tr>
<td>Wrong population, acute chest pain</td>
<td></td>
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</tr>
</tbody>
</table>

**Figure 2.** Algorithm for judging if the review was relevant for inclusion or not.