



SAHLGRENSKA ACADEMY

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

Degree Project in Medicine

Sandra Steffenburg

Programme in Medicine

Gothenburg, Sweden January 2020

Main Supervisor:

Med Dr. Lars-Erik Dyrehag, MD,

Region Västra Götaland, Sahlgrenska University Hospital/Östra, Department of
Anaesthesiology and Intensive Care Medicine/Pain Centre, Gothenburg

Department of Anaesthesiology and Intensive Care Medicine, Hallands Sjukhus Halmstad,
Halmstad, Sweden

Co-Supervisors:

Ass Prof. Paulin Andréll, MD, adjunct senior lecturer in pain medicine

Region Västra Götaland, Sahlgrenska University Hospital/Östra, Department of
Anaesthesiology and Intensive Care Medicine/Pain Centre, Gothenburg

Department of Anesthesiology and Intensive care, The Institute of Clinical Sciences,
Sahlgrenska Academy, University of Gothenburg

Med Dr. Emma Varkey, RPT

Region Västra Götaland, Sahlgrenska University Hospital/Östra, Department of
Physiotherapy, Gothenburg

Department of Health and Rehabilitation/Physiotherapy, Institute of Neuroscience and
Physiology, Sahlgrenska Academy, University of Gothenburg

Table of Contents

TABLE OF CONTENTS	2
ABSTRACT	4
BACKGROUND.....	4
AIM.....	4
METHODS.....	4
RESULTS.....	4
CONCLUSION.....	4
KEY WORDS.....	4
LIST OF ABBREVIATIONS	5
INTRODUCTION	6
DEFINITION.....	6
EPIDEMIOLOGY.....	6
CONSEQUENCES OF CHRONIC PAIN.....	7
TREATMENT.....	7
<i>Multimodal rehabilitation</i>	8
<i>Education</i>	8
THE NATIONAL EVIDENCE GROUP.....	9
OBJECTIVE AND SIGNIFICANCE OF THE LITERATURE STUDY	10
MATERIAL AND METHODS	10
<i>Eligibility criteria</i>	10
<i>Population</i>	10
<i>Intervention</i>	11
<i>Comparison</i>	11
<i>Outcomes</i>	11
<i>Type of studies</i>	11
SEARCH STRATEGY FOR IDENTIFICATION OF STUDIES.....	11
STUDY SELECTION.....	12
DATA ITEMS AND COLLECTION.....	13
QUALITY AND EVIDENCE ASSESSMENT.....	13
ETHICS	13
RESULTS	14
STUDY SELECTION.....	14
DESCRIPTIONS OF INCLUDED STUDIES.....	14
<i>Patients</i>	14
<i>Intervention</i>	15
<i>Outcomes</i>	15
RESULTS OF INDIVIDUAL STUDIES.....	15
EVIDENCE FOR EFFECT OF TREATMENT.....	15
IDENTIFICATION.....	16
SCREENING.....	16
ELIGIBILITY.....	16
FULL TEXT ASSESSED FOR ELIGIBILITY.....	16
INCLUDED.....	16
SYNTHESIS OF RESULTS.....	16
<i>PNE/NPE</i>	19
<i>BPS</i>	19
<i>Back School</i>	19
<i>Non specified education/advice</i>	19
DISCUSSION	19
FUTURE RESEARCH.....	21
CLINICAL IMPLICATION.....	21

STRENGTH AND LIMITATION	22
CONCLUSION.....	23
POPULÄRVETENSKAPLIG SAMMANFATTNING	24
ACKNOWLEDGEMENT.....	25
REFERENCES.....	26
SUPPLEMENT- TABLES AND FIGURES	30
TABLE 4. PUBMED- SEARCH TERMS WITH MODIFIED PICO.	30
TABLE 5. AMED- SEARCH TERMS WITH MODIFIED PICO.....	30
TABLE 6. CINAHL- SEARCH TERMS WITH MODIFIED PICO.....	30
TABLE 7. THE COCHRANE LIBRARY - SEARCH TERMS WITH MODIFIED PICO.	30
TABLE 8. SCOPUS- SEARCH TERMS WITH MODIFIED PICO.	31
TABLE 9. THE PICO-MODEL USED (PATIENT, INTERVENTION, COMPARISON, OUTCOME) USED.....	31
TABLE 10. CHARACTERISTICS OF INCLUDED ARTICLES.....	32
TABLE 11. ASSESSMENT OF QUALITY OF INCLUDED SYSTEMATIC REVIEWS AND META-ANALYSIS	35
TABLE 12. ARTICLES EXCLUDED BY ABSTRACT AND REASON FOR EXCLUSION.....	36
TABLE 13. ARTICLES EXCLUDED AFTER FULL-TEXT READING AND REASON FOR EXCLUSION.	37
FIGURE 2. ALGORITHM FOR JUDGING IF THE REVIEW WAS RELEVANT FOR INCLUSION OR NOT.....	38

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/advise as stand-alone treatment for reducing pain and low-moderate evidence for education/advise 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 health 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 intervention. 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.

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

Search strategy for identification of studies

AMED, CINAHL, Cochrane 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

Number of articles(n)	Total:11	Systematic reviews:11	Meta-analysis:6	Quality High: 8 Moderate: 2 Low: 1
Population(n)	CLBP:6	Chronic musculoskeletal pain at any site of body:4	Fibromyalgia:1	
Intervention(n)	PNE:4	BPS:1	Back School:2	Unspecified education/advise:4
Outcome(n)	Pain intensity:10	Disability/ functionality:11		
Result for each intervention	PNE: effect on pain intensity, disability, pain catastrophizing and kinesiophobia.	BPS: greater effect on pain and disability than education as stand-alone treatment.	Back School: limited evidence.	Just education/advise limited evidence.

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).

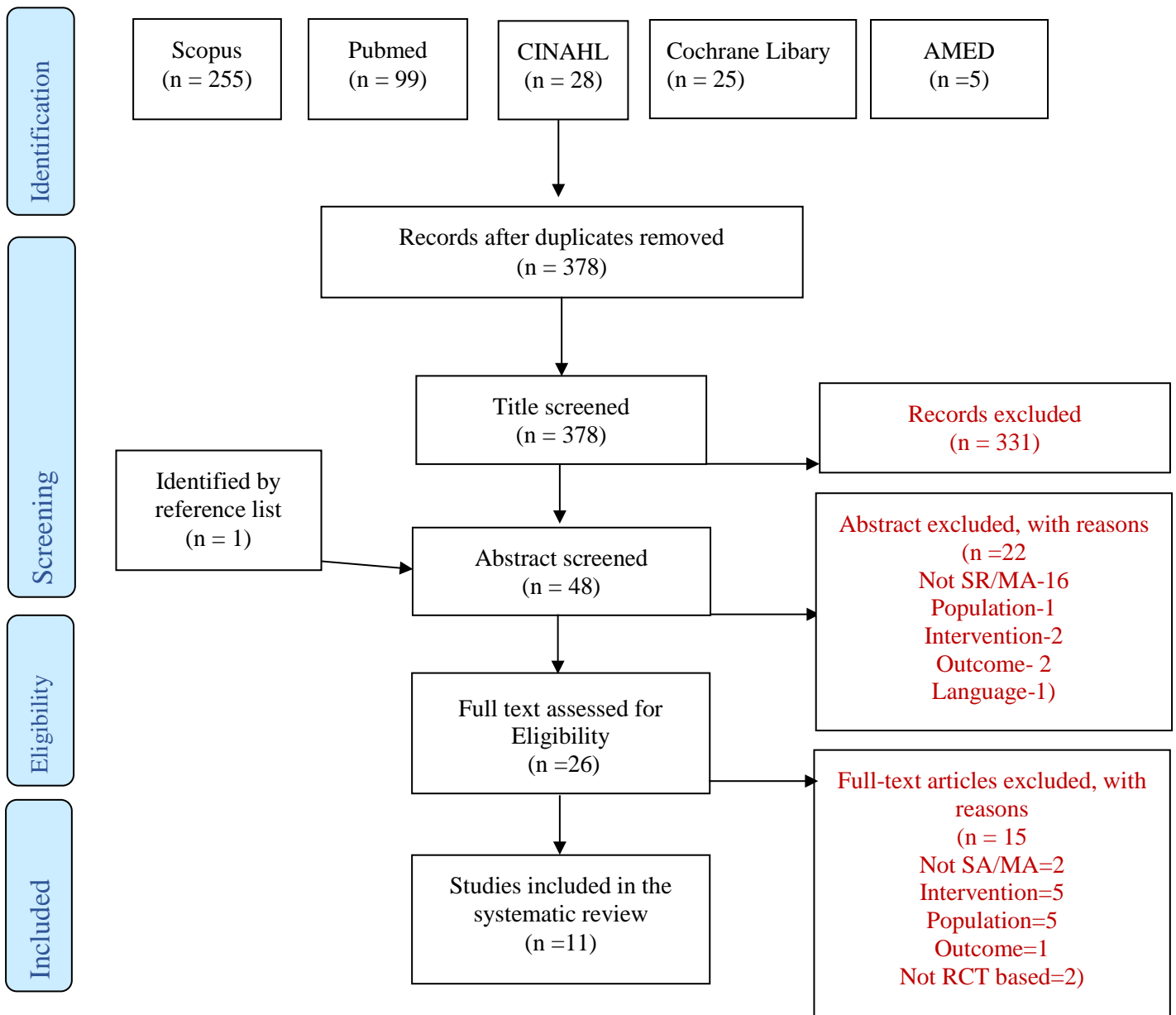


Figure 1- PRISMA flow diagram of search and the study selection process
 SR- Systematic review, MA- Meta-analysis, RCT- Randomized controlled trial

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 3- Main results and grading for included Systematic reviews and Meta-analysis

Author, year, county, design, quality assessment tool	Patients, Intervention	Score	Evidence for education/advice efficacy 1	Evidence for education/advice efficacy 2	Evidence for education/advice efficacy 3	Evidence for education/advice efficacy 4	Conclusion by authors	Comment	Our conclusion
van Erp RMA, 2018, The Netherlands, SR, GRADE (40)	CLPB, BPS	4	Moderate evidence for BPS more effective than education/advice in reducing pain in short, medium and long term.	Moderate scientific evidence for BPS more effective than education/advice in improving functional disability in short, medium and long term			BPS, including education/advice is better than education and advice only.	Intervention only delivered by physical therapists.	Moderate quality SR with moderate evidence for education included in BPS intervention. BPS better than education/advice alone for pain and disability
Louw A, 2016, USA, SR, PEDro scale (41)	MSK pain, PNE	5	Supporting evidence for improving pain ratings and pain knowledge	Supporting evidence for reducing disability, physical movement	Supporting evidence for improving pain catastrophization, fear avoidance, attitude and behaviors regarding pain	Supporting evidence for improving healthcare utilization 1-year follow-up	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.	PNE was only delivered by physiotherapists and mostly face-to-face.	High quality SR. Including only RCTs with low risk of bias. Strong evidence that PNE is effective for reducing pain when combined with physiotherapy. PNE may not be sufficient as stand-alone treatment.
Tegner H, 2018, Denmark, SR+MA GRADE (42)	CLBP, NPE	6	Moderate quality evidence for small to moderate effect on pain immediately post intervention. Low evidence for small to moderate effect on pain at 3 months	Low quality evidence for small to moderate effect on disability immediately post intervention and 3 months follow up	Low to very low quality evidence for behavior attitude TSK immediately post intervention and 3 months (non-significant)		NPE has small to moderate effect on pain and disability.	Verbal education only. No difference between different NPE. More intense and focused NPE perhaps better for pain and disability. Mostly given as supplement to other treatment.	High quality SR. Included RCTs of high risk of bias. Moderate evidence for NPE on pain immediately, low evidence for pain short term. Low evidence for effect on disability.
Wood L, 2018, United Kingdom, SR+MA, GRADE (43)	CLBP, PNE	6	Low quality evidence for PNE as a stand-alone treatment for reducing pain in short term. Very low evidence for long term effect. Moderate evidence when combined with physiotherapy short term effect.	Moderate quality evidence for reducing disability in short term as stand-alone treatment. Low evidence for long-term results. Moderate evidence when combined with physiotherapy.	Low quality evidence for reducing fear avoidance and catastrophizing.		Moderate evidence that addition of PNE to usual physiotherapy improves disability and pain in short term. Uncertain about long term effect.	PNE should be combined with physiotherapy for reducing pain. For disability the improvement was greater when PNE was combined with usual physiotherapy.	High quality SR. Included only low risk of bias RCTs. Moderate evidence for PNE in reducing disability. Low evidence for reducing pain greater effect when adding physiotherapy.
Watson J A, 2019, United Kingdom, SR+MA GRADE	Chronic MSK pain, PNE	5	Low quality evidence for pain reduction in short term Very low-quality	Moderate quality evidence for reducing disability in short and medium term	Moderate quality evidence for reduction in pain catastrophizing short and medium term	Moderate quality evidence for reduction in kinesiophobia, short term.	PNE can decrease pain, disability, pain catastrophizing and kinesiophobia in short to medium term. The reduction	Greater results on pain, disability and pain catastrophizing when PNE was	High quality SR. Included studies with high risk of bias. Low quality

(44)			evidence for pain reduction in medium term			in pain and disability are of little clinical relevance. Reduction in pain catastrophizing and kinesiophobia are of clinical relevance.	combined with other treatments. Greater effect on disability when longer duration	evidence for PNE in reducing pain. Moderate quality evidence for PNE in reducing disability. Changes not clinically relevant.
Straube S, 2016, Canada/ Germany/ United Kingdom/ SR+ MA (45)	CLBP, Back School	5	Limited quality evidence for reducing pain intensity short, medium term	Limited quality evidence for reducing disability short term		The evidence for Back Schools as treatment for CLBP is weak. Because of limitations with the study the findings should be interpreted with caution	Back school additional to exercise seems more effective than just exercise in reducing pain. No RCTs of high quality included.	High quality SR. Includes RCTs of moderate quality. Limited evidence for Back school on pain and disability
Parreira P, 2017, Australia, SR+MA; GRADE (46)	CLBP, non-specific, Back School	5	Very low -low quality evidence for reducing pain in short term, intermediate term and long term comparing to no treatment/ exercise/ medical care/physiotherapy	Very low evidence quality for reducing disability in short term, intermediate and long term comparing to no treatment/exercise/ medical care/physiotherapy.		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	Uncertain whether Back school is effective for CLBP. Inconsistent results or no significant differences when comparing to other treatments.	High quality SR. High risk of bias of included RCTs. Low to very-low evidence for back school on pain and disability
Quinones A R, 2014, Ireland, SR, GRADE (47)	Chronic pain, Education group visits	4	Moderate quality evidence for increasing quality of life/function status in short term. Low evidence for long term	Low quality evidence for self-efficacy in short term. No evidence for long-term.	Low evidence for utilization (reduction in physician visits) in short and long term	Many findings were not statistically significant, but some favored education group interventions.	Only 4/80 RCT focused on chronic pain. Few studies and one study were of poor quality.	Moderate quality SR. Including RCTs of low quality. Low evidence for education for improvement in self-efficacy, quality of life and utilization
Kweku Wie Otoo S, 2015, Ghana/ United Kingdom/ New Zealand SR, GRADE (48)	CLBP, non-specific, advice/ education	6	Low quality evidence for exercise over education/advice improving in pain short term			Low quality evidence exercise is no more effective than advice and education at short term	Education type Pain biology (PNE) is better than just advice to stay active	High quality SR. Included RCTs of low risk of bias Exercise is no better than education/advice.
Geneen L-J., 2015, United Kingdom, SR+MA (49)	Chronic pain at anybody site, Education	6	No evidence for improvement in pain	Limited scientific evidence for PNE reducing disability immediately post intervention. No evidence for improvement in disability.		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.		High quality SR/MA. High risk of bias of included RCTs. Limited evidence for education as single treatment for reducing pain intensity and disability
Garcia-Rios MC, 2019, Spain, SR, The Coch-rane group	Fibro-myalgia, Health education	3	Limited scientific evidence for pain reduction	Limited scientific evidence for increasing functionality	Limited scientific evidence for decreasing catastrophizing	Limited scientific evidence for increasing quality of life in general	Limited number of studies with only education. Strong supporting evidence for combination of education with other therapies.	Indicate that education should be combined with other treatment for effect Low quality SR. Including no RCT of high quality, mostly of low quality. Limited evidence

SR- Systematic review, MA-meta-analysis, RCT- Randomized Controlled Trial, CLBP- chronic low back pain, MSK-Chronic musculoskeletal pain, BPS-Biopsychosocial, PNE- Pain Neuroscience education, NPE- Neuroscience Pain 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 be 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 where 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 smärtan 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 Smärtcentrums 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.

Denna systematiska översikt presenterar dagens evidens för utbildning och råd som behandling för patienter med kronisk smärta. Det mest framträdande resultatet är för utbildningsformen som kallas Pain Neuroscience Education (PNE). PNE visar sig ha effekt på framförallt smärta och funktionsförmåga framförallt när det kombineras med andra behandlingsformer. Enbart utbildning och råd som behandling visade sig ha begränsad-låg evidens. För framtiden behövs kunskap kring hur utbildningen ska utformas för största effekt.

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

1. IASP. Washington D.C USA. International Association for the Study of Pain; Washington, D.C. [Available from: <https://www.iasp-pain.org/terminology?navItemNumber=576>].
2. Treede RD, Rief W, Barke A, Aziz Q, Bennett MI, Benoliel R, et al. A classification of chronic pain for ICD-11. *Pain*. 2015;156(6):1003-7.
3. (NSK) NSfK. Nationellt uppdrag Smärta. Stockholm; 2016.
4. S Fredenberg EV, M Karling. Smärta och smärtbehandling 2015 [Available from: https://lakemedelsboken.se/kapitel/smarta/smarta_och_smartbehandling.html#q1_6].
5. Moseley GL, Flor H. Targeting cortical representations in the treatment of chronic pain: a review. *Neurorehabil Neural Repair*. 2012;26(6):646-52.
6. DeLeo JA, Winkelstein BA. Physiology of chronic spinal pain syndromes: from animal models to biomechanics. *Spine (Phila Pa 1976)*. 2002;27(22):2526-37.
7. Tinazzi M, Fiaschi A, Rosso T, Faccioli F, Grosslercher J, Aglioti SM. Neuroplastic changes related to pain occur at multiple levels of the human somatosensory system: A somatosensory-evoked potentials study in patients with cervical radicular pain. *J Neurosci*. 2000;20(24):9277-83.
8. Lidbeck J. Central hyperexcitability in chronic musculoskeletal pain: a conceptual breakthrough with multiple clinical implications. *Pain Res Manag*. 2002;7(2):81-92.
9. Woolf CJ, Salter MW. Neuronal plasticity: increasing the gain in pain. *Science*. 2000;288(5472):1765-9.
10. Gatchel RJ, Peng YB, Peters ML, Fuchs PN, Turk DC. The biopsychosocial approach to chronic pain: scientific advances and future directions. *Psychol Bull*. 2007;133(4):581-624.
11. Edmond SN, Keefe FJ. Validating pain communication: current state of the science. *Pain*. 2015;156(2):215-9.
12. Breivik H, Collett B, Ventafridda V, Cohen R, Gallacher D. Survey of chronic pain in Europe: prevalence, impact on daily life, and treatment. *Eur J Pain*. 2006;10(4):287-333.
13. Hasselstrom J, Liu-Palmgren J, Rasjo-Wraak G. Prevalence of pain in general practice. *Eur J Pain*. 2002;6(5):375-85.
14. Tsang A, Von Korff M, Lee S, Alonso J, Karam E, Angermeyer MC, et al. Common chronic pain conditions in developed and developing countries: gender and age differences and comorbidity with depression-anxiety disorders. *J Pain*. 2008;9(10):883-91.
15. Bergman S, Herrstrom P, Hogstrom K, Petersson IF, Svensson B, Jacobsson LT. Chronic musculoskeletal pain, prevalence rates, and sociodemographic associations in a Swedish population study. *J Rheumatol*. 2001;28(6):1369-77.
16. Turner-Stokes L, Erkeller-Yuksel F, Miles A, Pincus T, Shipley M, Pearce S. Outpatient cognitive behavioral pain management programs: a randomized comparison of a group-based multidisciplinary versus an individual therapy model. *Arch Phys Med Rehabil*. 2003;84(6):781-8.
17. McWilliams LA, Cox BJ, Enns MW. Mood and anxiety disorders associated with chronic pain: an examination in a nationally representative sample. *Pain*. 2003;106(1-2):127-33.
18. Dueñas M, Ojeda B, Salazar A, Mico JA, Failde I. A review of chronic pain impact on patients, their social environment and the health care system. *J Pain Res*. 2016;9:457-67.
19. Harris S, Morley S, Barton SB. Role loss and emotional adjustment in chronic pain. *Pain*. 2003;105(1-2):363-70.

20. SBU. Metoder för behandling av långvarig smärta. En systematisk litteraturöversikt. SBU-rapport nr 177/1. Stockholm: Statens beredning för medicinsk utvärdering (SBU); 2006. 2006.
21. Fredheim OM, Kaasa S, Fayers P, Saltnes T, Jordhoy M, Borchgrevink PC. Chronic non-malignant pain patients report as poor health-related quality of life as palliative cancer patients. *Acta Anaesthesiol Scand*. 2008;52(1):143-8.
22. Gustavsson A, Bjorkman J, Ljungcrantz C, Rhodin A, Rivano-Fischer M, Sjolund KF, et al. Socio-economic burden of patients with a diagnosis related to chronic pain-register data of 840,000 Swedish patients. *Eur J Pain*. 2012;16(2):289-99.
23. SBU. Rehabilitering vid långvarig smärta. En systematisk litteraturöversikt. SBU-rapport 198. Stockholm: Statens beredning för medicinsk utvärdering (SBU); 2010. 2010.
24. Moseley GL. Whole of community pain education for back pain. Why does first-line care get almost no attention and what exactly are we waiting for? *British Journal of Sports Medicine*. 2019;53(10):588.
25. Buchbinder R, van Tulder M, Oberg B, Costa LM, Woolf A, Schoene M, et al. Low back pain: a call for action. *Lancet*. 2018;391(10137):2384-8.
26. Waddell G. *The back pain revolution*. 2. ed. ed. Edinburgh: Edinburgh : Churchill Livingstone; 2004.
27. Haldeman S. North American Spine Society: failure of the pathology model to predict back pain. *Spine (Phila Pa 1976)*. 1990;15(7):718-24.
28. Louw A BD. Chronic pain. In Brotzman SB, Manske RC (Eds), *Clinical Orthopaedic Rehabilitation: An Evidence-Based Approach*. Philadelphia, PA, Elsevier Health Sciences. 2011.
29. Nijs J, Roussel N, Paul van Wilgen C, Koke A, Smeets R. Thinking beyond muscles and joints: therapists' and patients' attitudes and beliefs regarding chronic musculoskeletal pain are key to applying effective treatment. *Man Ther*. 2013;18(2):96-102.
30. Hirsch MS, Liebert RM. The physical and psychological experience of pain: the effects of labeling and cold pressor temperature on three pain measures in college women. *Pain*. 1998;77(1):41-8.
31. Nachemson AL. Newest knowledge of low back pain. A critical look. *Clin Orthop Relat Res*. 1992(279):8-20.
32. Moseley GL, Butler DS. Fifteen Years of Explaining Pain: The Past, Present, and Future. *J Pain*. 2015;16(9):807-13.
33. Robins H, Perron V, Heathcote LC, Simons LE. Pain Neuroscience Education: State of the Art and Application in Pediatrics. *Children (Basel)*. 2016;3(4):43.
34. Louw A, Diener I, Butler DS, Puentedura EJ. The effect of neuroscience education on pain, disability, anxiety, and stress in chronic musculoskeletal pain. *Arch Phys Med Rehabil*. 2011;92(12):2041-56.
35. Kamper SJ, Apeldoorn AT, Chiarotto A, Smeets RJ, Ostelo RW, Guzman J, et al. Multidisciplinary biopsychosocial rehabilitation for chronic low back pain: Cochrane systematic review and meta-analysis. *Bmj*. 2015;350:h444.
36. Forssell MZ. The Swedish Back School. *Physiotherapy*. 1980;66(4):112-4.
37. Björn Gerdle AK, Olle Skogberg, Frida Svanholm, Martin Södermark, Christine Wennersten, Ulrika Wentzel-Olausson, Linn Karlsson & Britt Larsson. *Evidens för de ingående behandlingarna vid Multimodal rehabilitering–ett kontinuerligt evidensarbete vid Smärt- och rehabiliteringscentrum, US, Linköping*. 2016.
38. World Medical Association Declaration of Helsinki: ethical principles for medical research involving human subjects. *Jama*. 2013;310(20):2191-4.

39. Guyatt G, Oxman AD, Akl EA, Kunz R, Vist G, Brozek J, et al. GRADE guidelines: 1. Introduction-GRADE evidence profiles and summary of findings tables. *J Clin Epidemiol.* 2011;64(4):383-94.
40. van Erp RMA, Huijnen IPJ, Jakobs MLG, Kleijnen J, Smeets R. Effectiveness of Primary Care Interventions Using a Biopsychosocial Approach in Chronic Low Back Pain: A Systematic Review. *Pain Pract.* 2019;19(2):224-41.
41. Louw A, Zimney K, Puentedura EJ, Diener I. The efficacy of pain neuroscience education on musculoskeletal pain: A systematic review of the literature. *Physiotherapy Theory and Practice.* 2016;32(5):332-55.
42. Tegner H, Frederiksen P, Esbensen BA, Juhl C. Neurophysiological Pain Education for Patients with Chronic Low Back Pain. *Clinical Journal of Pain.* 2018;34(8):778-86.
43. Wood L, Hendrick PA. A systematic review and meta-analysis of pain neuroscience education for chronic low back pain: Short-and long-term outcomes of pain and disability. *European Journal of Pain (United Kingdom).* 2019;23(2):234-49.
44. Watson JA, Ryan CG, Cooper L, Ellington D, Whittle R, Lavender M, et al. Pain Neuroscience Education for Adults With Chronic Musculoskeletal Pain: A Mixed-Methods Systematic Review and Meta-Analysis. *Journal of Pain.* 2019.
45. Straube S, Harden M, Schröder H, Arendacka B, Fan X, Moore RA, et al. Back schools for the treatment of chronic low back pain: Possibility of benefit but no convincing evidence after 47 years of research-systematic review and meta-analysis. *Pain.* 2016;157(10):2160-72.
46. Parreira P, Heymans MW, van Tulder MW, Esmail R, Koes BW, Poquet N, et al. Back Schools for chronic non-specific low back pain. *Cochrane Database Syst Rev.* 2017;8:Cd011674.
47. Quiñones AR, Richardson J, Freeman M, Fu R, O'Neil ME, Motu'apuaka M, et al. Educational group visits for the management of chronic health conditions: A systematic review. *Patient Education and Counseling.* 2014;95(1):3-29.
48. Otoo SKW, Hendrick P, Ribeiro DC. The comparative effectiveness of advice/education compared to active physiotherapy (manual therapy and exercise) in the management of chronic non-specific low back pain. *Physical Therapy Reviews.* 2015;20(1):16-26.
49. Geneen LJ, Martin DJ, Adams N, Clarke C, Dunbar M, Jones D, et al. Effects of education to facilitate knowledge about chronic pain for adults: A systematic review with meta-analysis. *Systematic Reviews.* 2015;4(1).
50. García-Ríos MC, Navarro-Ledesma S, Tapia-Haro RM, Toledano-Moreno S, Casas-Barragán A, Correa-Rodríguez M, et al. Effectiveness of health education in patients with fibromyalgia: A systematic review. *European Journal of Physical and Rehabilitation Medicine.* 2019;55(2):301-13.
51. Lee H, McAuley JH, Hubscher M, Kamper SJ, Traeger AC, Moseley GL. Does changing pain-related knowledge reduce pain and improve function through changes in catastrophizing? *Pain.* 2016;157(4):922-30.
52. Puentedura EJ, Flynn T. Combining manual therapy with pain neuroscience education in the treatment of chronic low back pain: A narrative review of the literature. *Physiotherapy Theory and Practice.* 2016;32(5):408-14.
53. Clarke CL, Ryan CG, Martin DJ. Pain neurophysiology education for the management of individuals with chronic low back pain: A systematic review and meta-analysis. *Manual Therapy.* 2011;16(6):544-9.

54. Watson JA, Ryan CG, Cooper L, Ellington D, Whittle R, Lavender M, et al. Pain Neuroscience Education for Adults With Chronic Musculoskeletal Pain: A Mixed-Methods Systematic Review and Meta-Analysis. *J Pain*. 2019;20(10):1140.e1-.e22.
55. Mittinty MM, Vanlint S, Stocks N, Mittinty MN, Moseley GL. Exploring effect of pain education on chronic pain patients' expectation of recovery and pain intensity. *Scand J Pain*. 2018;18(2):211-9.
56. Niedermann K, Fransen J, Knols R, Uebelhart D. Gap between short- and long-term effects of patient education in rheumatoid arthritis patients: A systematic review. *Arthritis Care & Research*. 2004;51(3):388-98.
57. Moseley L. Unraveling the barriers to reconceptualization of the problem in chronic pain: the actual and perceived ability of patients and health professionals to understand the neurophysiology. *The Journal of Pain*. 2003;4(4):184-9.
58. Stenberg U, Vågan A, Flink M, Lynggaard V, Fredriksen K, Westermann KF, et al. Health economic evaluations of patient education interventions a scoping review of the literature. *Patient Education and Counseling*. 2018;101(6):1006-35.
59. McMullan M. Patients using the Internet to obtain health information: how this affects the patient-health professional relationship. *Patient Educ Couns*. 2006;63(1-2):24-8.
60. Ziebland S, Lavie-Ajayi M, Lucius-Hoene G. The role of the Internet for people with chronic pain: examples from the DIPEX International Project. *Br J Pain*. 2015;9(1):62-4.
61. 2018. AATwoti.
62. Sampson M, Cumber J, Li C, Pound CM, Fuller A, Harrison D. A systematic review of methods for studying consumer health YouTube videos, with implications for systematic reviews. *PeerJ*. 2013;1:e147.
63. Heathcote LC, Pate JW, Park AL, Leake HB, Moseley GL, Kronman CA, et al. Pain neuroscience education on YouTube. *PeerJ*. 2019;7:e6603-e.
64. Huguet A, Miro J. The severity of chronic pediatric pain: an epidemiological study. *J Pain*. 2008;9(3):226-36.
65. Wartella E RV, Montague H, Beaudoin-Ryan L, Lauricella. A. Teens, health and technology: a national survey. *Media and Communication*. 2016;4:13–23. doi: 10.17645/mac.v4i3.515. 2016.

Supplement- Tables and figures

Table 4. PubMed- search terms with modified PICO.

Database, PubMed	Search terms
P-population	(Pain AND (Chronic OR persistent)) AND (Humans [Mesh] adult [MeSH]).
I-Intervention	(education OR psychoeducation)
Limitations	English, Swedish, Danish, Norwegian Last 5 years: 2014-2019 Publication type: Filter for systematic review, meta-analysis and review was used
Total amount of studies	99 ¹

¹ Search was performed on the 18th of September 2019

Table 5. AMED- search terms with modified PICO.

Database, AMED	Search terms
P-population	(Pain AND (Chronic OR persistent))
I-Intervention	(education OR psychoeducation)
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	5 ¹

¹ Search was performed on the 18th of September 2019

Table 6. CINAHL- search terms with modified PICO.

Database, CINAHL	Search terms
P-population	(Pain AND (Chronic OR persistent))
I-Intervention	(education OR psychoeducation)
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	28 ¹

¹ Search was performed on the 18th of September 2019

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

Database, Cochrane Library	Search terms
P-population	(Pain AND (Chronic OR persistent))
I-Intervention	(education OR psychoeducation)
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	25 ¹

¹ Search was performed on the 18th of September 2019

Table 8. Scopus- search terms with modified PICO.

Database, Scopus	Search terms
P-population	(Pain AND (Chronic OR persistent))
I-Intervention	(education OR psychoeducation)
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.

The PICO-model	
Population (P)	<p>Inclusion:</p> <ul style="list-style-type: none"> - 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. <p>Exclusion:</p> <ul style="list-style-type: none"> - 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	<ul style="list-style-type: none"> - 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.

Author, year, design, country	Search years	Included studies: quantity and design	Patient (P)	Intervention (I)	Comparison (C)	Outcome (O)	Follow-up	Limitation
van Erp RMA, 2018, SR, The Netherlands	-2015	7, RCT	Adults 18+, Non-specific chronic low back pain	BPS, including a biological component about pain and a psychosocial/so cial component	Another treatment, no treatment, waiting list	Primary: Functional status, disability, pain, work status Secondary: generic function status/well being, improvement, satisfaction, emotional functioning and cognitions, adverse events.	Short term- 3 months, medium terms 3-12 months, long terms 12 months.	Intervention delivered by physiotherapist in primary care
Louw A, 2016, SR, USA	1999-2015	13, RCT	Adults, 18+. Musculo skeletal pain	PNE, (named pain neurophysiology education, therapeutic patient education, neuroscience education, pain physiology education, pain neuroscience education, neuro-physiology education, pain biology education, neuro-physiology of pain education)	Other treatment, no treatment, usual treatment	Primary: Pain, disability, function status, Secondary: psychosoci al factor, movement, healthcare utilization	Immediate post intervention-1 year follow-up.	Heterogeneity among the RCTs and therefore no MA was performed. Only physical therapists delivered education
Tegner H, 2018, SR/MA, Denmark	-	7, RCT. 7 for meta-analysis	Adults, 18+. Chronic low back pain	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	No intervention, usual care	Pain, disability, ability to return to work, behavior attitudes	After treatment, 3 months, long term one year	Small sample sizes in included RCTs. Only verbal NPE. NPE was mostly supplement to other treatment. Low baseline pain at included patients.

education.								
Wood L, 2018, SR/MA, United Kingdom	2011-2017	8, RCT. 8 for meta-analysis	Adults, 18+. Chronic non-specific low back pain	PNE/therapeutic neuroscience education/explain pain	All controls were included if not provided PNE	Primary: Pain and disability. Secondary: adverse events	short term <12 weeks. Long term >1 year.	High degree of heterogeneity. Small sample sizes. Lack of registered protocol
Watson J A, 2019, SR/ MA, United Kingdom	2002-2018	12, RCT	Adults, 18+. Chronic muscular-skeletal pain	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.	No treatment, usual care, concomitant studies were PNE was delivered in addition to another intervention, active intervention	Primary: pain and disability. Secondary: any validated measure that investigates the individuals physical and or psych-social well-being.	short term <3 months, medium terms 3-6-month, long term <12 months.	Did not find many long-term studies. Heterogeneity problems: design, patient group, delivery, outcome measures.
Straube S, 2016, SR/MA, Canada/ Germany/ United Kingdom	-2015	31, RCT. 5 for meta-analysis	Adults, chronic low back pain	Back school, interventions that comprise exercise and education components. Lessons given by therapist with aim to treat or prevent low back pain.	Any intervention, no intervention	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.	1 to 2 months, 4-6 months	Meta-analysis could only be excuted when comparing back school to no intervention, however not for active treatment control because of heterogeneity.
Parreira P, 2017, SR/MA, Australia	-2016	30 RCT/quasi RCT, 22 for meta-analysis	Adults. Chronic non-specific low back pain	Back school, therapeutic program given to groups of people that include both education and exercise supervised by physical therapist or medical specialist.	No treatment, medical care, physiotherapist-applied treatment, exercise.	Primary: pain and disability. Secondary: adverse events, work related	short less than 3 months, intermediate 3-6 months, long-term more than 6 months	
Quinones A R, 2014, SR, Irland	-2013	4/80, RCT was about. Chronic pain	Common chronic condition	Educational group visits led by non-prescribing facilitators. 1. self-management		Primary: health outcomes were focus quality of life, functional	Short <6 months, long term >6 months	Only 4/80 were. Focusing on chronic pain

				education: tech self-management skills to patients. 2. didactic education content informational and format is usually lecture based. (pathophysiology of diseases) 3. experimental education instruction based on demonstrations.		status. Secondary: utilization and medication adherence. Self-efficacy. Patient activation, coping skills, illness beliefs			
Kweku Wie Otoo S, 2015, SR, Ghana/United Kingdom/Nya Zeeland	-2013	4, RCT	Adults, 18+. Chronic No specific low back pain	Advice/education, all forms.	One of: 1. manual therapy, 2. exercise, 3. both manual therapy and exercise or 4. manual therapy and/or exercise plus advice/education	Primary: pain and disability. Secondary: varied	short term: one month. Medium term: 6 months. Long-term. 12 months.	Heterogeneity, therefore, no MA could be performed	
Geneen L-J., 2015, SR/ MA, United Kingdom	-2013	9, RCT/cluster RCT. 8 for meta-analysis	Adults, 18+. Chronic pain at any site. Of the body	Education as stand-alone treatment	Usual care, different education types	Primary: Pain severity, physical function, Secondary: psychosocial	Not stated.	Small number of studies, no clear identified education type.	
Maria Carmen Garcia-Rios, 2019, SR/MA, Spain	-2018	12, RCT	Adults, fibromyalgia	Patient education. Defined as any educational activities planned by qualified professionals and aimed to improving a patient's health behaviors and/or health status.	Not determined	Pain, quality of life, function, catastrophizing		Heterogeneity concerning patient group and education type	

SR- Systematic review, MA- Meta-analysis, RCT- Randomized controlled trial, BPS- Biopsychosocial, PNE- Pain neuroscience education, NPE- Neuroscience education

Table 11. Assessment of quality of included Systematic reviews and Meta-analysis

Author, year, design	Design ¹	Selection ²	Search ³	Inclusion ⁴	Number of patients ⁵	Bias ⁶	Heterogeneity ⁷	Total score ⁸	Overall quality ⁹
Van Erp RMA, 2018, SR	1	1	1	0	1	0	0	4	Moderate quality SR.
Louw A, 2016, SR	1	1	1	0	1	1	0	5	High quality SR including low risk of bias RCTs.
Tegner H, 2018, SR+ MA	1	1	1	1	1	0	1	6	High quality SR/MA, including high risk of bias RCTs.
Wood L, 2018 SR+ MA	1	1	1	1	1	1	0	6	High quality SR/MA. Including low risk of bias RCTs.
Watson J A, 2019 SR+ MA	1	1	1	1	1	0	0	5	High quality SR including high risk of bias RCTs.
Kweku Wie Otoo S, 2015, SR	1	1	1	1	1	1	0	6	High quality SR including low risk of bias RCTs.
Geneen L-J, 2015, SR+MA	1	1	1	1	1	0	1	6	High quality SR/MA including high risk of bias RCTs.
Maria Carmen Garcia-Rios, 2019, SR	1	0	1	0	1	0	0	3	Low quality SR. No RCT of high quality included.
Quinones A R, 2014, SR	1	1	1	0	1	0	0	4	Moderate quality SR including low-moderate quality RCTs.
Parreira P, 2017, SR+ MA	1	1	1	1	1	0	0	5	High quality SR/MA including high risk of bias RCTs.
Straube S, 2016, SR+ MA	1	1	1	0	1	0	1	5	High quality SR/MA including mostly moderate RCTs.

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. Heterogeneity: For meta-analysis: Was the heterogeneity estimated as $I^2 < 75\%$?
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 12. Articles excluded by abstract and reason for exclusion.

Title	Writer	Reason for exclusion
Evidence-Based Non-Pharmacological Therapies for Fibromyalgia.	Aman MM et al.	Not systematic review/Meta-analysis
Fifteen Years of Explaining Pain: The Past, Present, and Future. Journal of Pain.	Moseley GL, Butler DS.	Not systematic review/Meta-analysis
Combining manual therapy with pain neuroscience education in the treatment of chronic low back pain: A narrative review of the literature.	Puentedura EJ, Flynn T.	Not systematic review/Meta-analysis
Presentation and management of chronic pain. Archives of Disease in Childhood. 2014;99(5):474-80.	Rajapakse D, et al.	Not systematic review/Meta-analysis
Management of Widespread Pain and Fibromyalgia. Current Treatment Options in Rheumatology. 2016;2(4):312-20.	Whibley D, et. al.	Not systematic review/Meta-analysis
The effectiveness of physiotherapist-delivered group education and exercise interventions to promote self-management for people with osteoarthritis and chronic low back pain: A rapid review Part I	Toomey E, et al.	Not systematic review/Meta-analysis
The role of exercise and patient education in the noninvasive management of whiplash. Journal of Orthopaedic and Sports Physical Therapy.	Rebbeck T. et al.	Not systematic review/Meta-analysis
The clinical application of teaching people about pain. Physiotherapy Theory and Practice.	Louw A, et al.	Not systematic review/Meta-analysis
The 'Best Practice Guide to Conservative Management of Patellofemoral Pain': Incorporating level 1 evidence with expert clinical reasoning.	Barton CJ, et al.	Not systematic review/Meta-analysis
Multidisciplinary biopsychosocial rehabilitation for subacute low back pain.	Marin TJ, et al.	Intervention
Does patient self-management education of primary care professionals improve patient outcomes: A systematic review.	Rochfort A, et al.	Intervention
Effectiveness of education based on neurosciences in patients with chronic low back pain: Systematic review with meta-analysis	Valdés-Orrego et al.	Language
The effectiveness of self-management support interventions for men with long-term conditions: A systematic review and meta-analysis. B	Galdas P, et al.	Population
Reassuring patients about low back pain. JAMA Internal Medicine.	Chou R. et al.	Not systematic review/Meta-analysis
Management of fibromyalgia: practical guides from recent evidence-based guidelines.	Hauser W, et. al	Not systematic review/Meta-analysis
Diagnosis and treatment of temporomandibular disorders.	Gauer RL, Semidey MJ.	Not systematic review/Meta-analysis
Know Pain, Know Gain? A Perspective on Pain Neuroscience Education in Physical Therapy.	Louw A, et al.	Not systematic review/Meta-analysis
Chronic pain and the thoracic spine. Journal of Manual and Manipulative Therapy.	Louw A, Schmidt SG.	Not systematic review/Meta-analysis

Sleep disturbances in chronic pain: Neurobiology, assessment, and treatment in physical therapist practice.	Nijs J, et al.	Not systematic review/Meta-analysis
How Patient Education Influences Utilization of Nonpharmacological Modalities for Persistent Pain Management: An Integrative Review..	Andrews-Cooper IN, et al.	Not systematic review/ Meta-analysis
Systematic Review of Costs and Effects of Self-Management Interventions for Chronic Musculoskeletal Pain: Spotlight on Analytic Perspective and Outcomes Assessment.	Hernon MJ, et. al.	Wrong outcome
Health economic evaluations of patient education interventions a scoping review of the literature.	Stenberg U, et al.	Wrong outcome

Table 13. Articles excluded after full-text reading and reason for exclusion.

Title	Writer	Reason for exclusion
The effectiveness of Self-Management interventions in adults with chronic orofacial pain: a systematic review, meta-analysis and meta regression.	Aggarwal V R et al.	Wrong intervention. Not separate effect of education and not all self-management including education.
Spinal Manipulative Therapy and Other Conservative Treatments for Back Pain: A Guideline From the Canadian Chiropractic Guideline Initiative.	Bussieres A, et al.	Not a Systematic review or meta-analysis, but a Guideline
The clinical effectiveness of self-care interventions with an exercise component to manage knee conditions: A systematic review.	Button K, et al.	Mixed population and intervention
Secondary prevention of chronic musculoskeletal pain: A systematic review of clinical trials.	Meyer C, Denis CM, Berquin AD	Wrong patient, subacute/acute pain
Clinical practice guidelines for the noninvasive management of low back pain: A systematic review by the Ontario Protocol for Traffic Injury Management (OPTIMA) Collaboration.	Wong JJ, , et al.	Did not review RCT but excising guidelines
Self-management program for chronic low back pain: A systematic review and meta-analysis	Shizheng Du et al.	Wrong intervention. Cannot separate effect of education.
Patient-professional partnerships and chronic back pain self-management: A qualitative systematic review and synthesis.	Fu Y, et al.	Wrong intervention
A meta-analytic review of brief guided self-help education for chronic pain.	Liegl G, et al.	Wrong population, mixed adults and children
Self-management interventions for chronic disease: A systematic scoping review.	Richardson J,, et al.	Not a Systematic review or meta-analysis, but a Scoping review
Evaluation of Cognitive Behavioral Interventions and Psychoeducation Implemented by Rehabilitation Specialists to Treat Fear-Avoidance Beliefs in Patients With Low Back Pain: A Systematic Review.	Baez S, et al.	Mixed population, subacute/acute/chronic
The importance and impact of patients' health literacy on low back pain management: a systematic review of literature	Edward Jean et al.	Not based on RCTs
A systematic review of outcome measures utilized to assess self-management in clinical trials in patients with chronic pain.	Banerjee A, et al.	Wrong outcome
Does structured patient education improve the recovery	Yu H et al.	Mixed population

and clinical outcomes of patients with neck pain? A systematic review from OPTIM collaboration		
The effectiveness of Non-invasive interventions for tempomandibular disorders. A Systematic Review by the Ontario Protocol for Traffic Injury Management (OPTIMa) Collaboration	Randhawa K, et al.	Wrong intervention. Education in both intervention and comparison.
The effectiveness of noninvasive interventions for musculoskeletal thoracic spine and chest wall pain: A systematic review	Danielle Southerst	Wrong population, acute chest pain

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

