



TITLE: Multidisciplinary Treatment Programs for Patients with Non-Malignant Pain: A Review of the Clinical Evidence, Cost-Effectiveness, and Guidelines

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CONTEXT AND POLICY ISSUES

The International Association for the Study of Pain defines pain as, “an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage.”¹ From a medical standpoint, pain is the most common cause for physician consultation.² While typically most pain is rapidly remediated, conditions exist where it is extended and is a chronic condition. In the United States, these chronic conditions cost health care organizations between 70 to 120 billion dollars annually.^{2,3} It is estimated that 15% of the Canadian population aged 20 to 64 have a chronic pain condition.⁴

Published reports usually consider pain to be a chronic condition when it exists for at least a six month period.^{3,5-7} The causative factor may be from a degenerative disease such as arthritis or from various other factors including neurological abnormality and psychological distress.⁵ In standard single modality medical procedures, treatment for chronic pain involves the use of analgesics such as opioids, non-steroidal anti-inflammatory drugs (NSAIDs) and adjuvant medications. These linear pharmacological approaches have been found to have modest success in many instances as they do not alleviate the root problems.^{1,2,6} More intensive surgical options have also proven lacking for long term quality of life restoration.¹

Treatment approaches incorporating a multidisciplinary style, whereby aspects from multifaceted health care are used, have been found to be more effective in returning patients to a desirable standard of living.² Published reports have documented that the proportion of people who are capable of returning to work after multidisciplinary treatment for chronic pain are between 80 and 85%, while the proportion returning after conventional treatment is 40%.³ In a multidisciplinary approach, facets from four areas are incorporated. The standard for these are: i) education, ii) physician- or pharmacist-mediated care incorporating prescription drug use, iii) gradual intensity exercise including physiotherapy, iv) psychological analysis focusing on both behavioral and cognitive operant therapy.^{1,2,5}

This report will review published clinical evidence and guidelines regarding multidisciplinary chronic pain treatment in medical practice. In addition, expenses associated with its use will be

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defined. This information will aid in the formulation of policy making decisions regarding multidisciplinary treatment programs for patients with chronic pain.

RESEARCH QUESTIONS

1. What is the clinical evidence regarding the effectiveness of a multidisciplinary treatment approach for adults with chronic, non-malignant pain in outpatient settings?
2. What is the clinical evidence regarding evidence-based outcomes for the evaluation of multidisciplinary treatment programs for adults with chronic, non-malignant pain?
3. What is the cost-effectiveness of a multidisciplinary treatment program for adults with chronic, non-malignant pain?
4. What are the evidence-based guidelines regarding multidisciplinary treatment programs for adults with chronic, non-malignant pain in outpatient settings?

KEY MESSAGE

Outpatient multidisciplinary treatment programs for the treatment of adults with chronic pain conditions are efficient at pain reduction, improve biopsychosocial standing, and can reduce use of prescription pain medications. Limited evidence on the cost effectiveness of these programs was identified.

METHODS

Literature Search Strategy

A limited literature search was conducted on key resources including PubMed, MEDLINE, CINAHL, The Cochrane Library (2011, Issue 10), University of York Centre for Reviews and Dissemination (CRD) databases, Canadian and abbreviated list of major international health technology agencies, as well as a focused Internet search. No filters were applied to limit the retrieval by study type. Where possible, retrieval was limited to the human population. The search was also limited to English language documents published between January 1, 2006 and October 6, 2011.

Selection Criteria and Methods

One reviewer screened the titles and abstracts of the retrieved publications and evaluated the full-text publications for the final article selection based upon the selection criteria outlined in Table 1.

Table 1: Selection Criteria

Population	Adult patients with chronic, non-malignant pain in outpatient settings
Intervention	Multidisciplinary treatment, multidisciplinary treatment programs for dealing with chronic pain (may also be called multi-professional, interdisciplinary)
Comparator	None or any.
Outcomes	<p>Q1 – effective pain management, quality of life, reduction in pain, return to work, outcomes proven to be good measures of pain management, long-term follow up outcomes (i.e., how long to these treatment programs work?)</p> <p>Q2- evidence based rating scales or tests regarding pain management (such as functional testing, quality of life, return to work, psychometric measures, general outcomes)</p> <p>Q3- cost-effectiveness of multidisciplinary programs</p> <p>Q4- guidelines for running the programs, guidelines for the type of patient that should be treated, guidelines for structuring the programs (e.g. 6 week half day program, weekend program to allow for working, evening programs, etc.)</p>
Study Designs	Systemic reviews, randomized controlled trials (RCTs), non-randomized trials, economic evaluations, and evidence-based guidelines

Exclusion Criteria

Articles were excluded from this report if they did not meet the criteria detailed in Table 1, were included in a selected systemic review, or were published prior to January 1, 2006.

Critical Appraisal of Individual Studies

Systemic reviews were assessed using the Assessment of Multiple Systemic Reviews (AMSTAR) tool.⁸ Randomized controlled trials (RCTs) and non-randomized trials were assessed using the Downs and Black checklist⁹ for the adequacy of allocation concealment, blinding of patients, healthcare providers, clinicians, data collectors and outcome assessors, randomization, losses to follow-up, description of intention-to-treat, and early stopping of trial. Guidelines were assessed using the Appraisal of Guidelines for Research and Evaluation.¹⁰ Economic evaluations were evaluated using the Drummond Checklist.¹¹

SUMMARY OF EVIDENCE

Quantity of Research Available

The literature search identified 243 citations for review. After examination of titles and abstracts, 215 were rejected and 28 were retrieved for full text screening. One additional study was identified in the grey literature. Of these, 14 did not meet the inclusion criteria, including two found to be described in included systematic reviews. In total, 15 publications were selected for inclusion. These publications included three systemic reviews,^{1,2,5} five RCTs,^{3,12-15} six non-randomized studies,^{4,7,16-19} and one economic evaluation.²⁰ One included systematic review provided guidelines on the use of multidisciplinary chronic pain programs.¹ No health technology

assessments were identified for inclusion. The study selection process is outlined in a PRISMA flow chart in Appendix 1.

Summary of Study Characteristics

Characteristics of the included studies, critical appraisals and study findings may be found in Appendix 2, 3, and 4 respectively.

Patient characteristics

In twelve of the fifteen studies the age of the patient population ranged from twenty to 75.^{1-5,7,12-16,19} Two of the fifteen studies were not specific in the age of patients included and included people age 18 and over.^{17,18} The final study included the largest spread in patient ages, and included patients aged 20 to 87.²⁰ Ten of the included studies focused on patients that were experiencing chronic non-cancer pain and did not restrict inclusion further.^{1-5,16-20} Three included patients experiencing chronic low back pain.¹²⁻¹⁴ One included patients experiencing fibromyalgia.⁷ The final study included patients suffering from chronic widespread pain.¹⁵

Study duration

Three of the studies were conducted over three week periods and had varying treatment sessions and duration.^{7,14,18} One of these included treatment sessions two to three times weekly for two hours per session.¹⁴ The other two lasted fifteen consecutive work days for eight hour sessions.^{7,18} Two other studies had durations of eight weeks one of which had treatments once per week for four hour sessions,¹⁶ the other did not include session details.⁴ One study utilized ten treatment sessions each lasting 90 minutes and spanning nine months.¹⁷ One study contained two treatment groups, one that had a brief treatment lasting 3.5 hours the other lasted four weeks with treatments five days per week lasting six hours per day.¹⁵ Another study lasted for six weeks with 14 days of treatment but the specific session duration was not described.¹⁹ Another study contained treatment lasting 13 to 18 weeks for two to three treatments per week each treatment lasting two hours.¹³ The final study is the economic evaluation which spanned three months.²⁰

Study design and follow up

All of the included studies utilized variations of the standard treatments described above which include medical, psychological and behavioral, education, and physical reconditioning treatments. Four of the studies included an extensive review by an occupational therapist in addition to the standard regimen.^{4,12,13,16} Follow up sessions were conducted in eight of the studies and included reviews at up to 54 months post treatment.^{1,3-5,14,15,18,19} Six of the included studies did not contain any follow up reviews.^{7,12,13,16,17,20}

Outcomes

All of the included studies expected varying degrees of improvement in areas such as pain intensity, physical functioning psychological status. Four of the studies also were focused on establishing methodologies for the prediction of patient outcome to determine if the individual would respond to this type of treatment.^{4,12,16,17} Two studies had an additional focus of returning the patients to work.^{14,15} One study also included an examination of the effects of analgesic drug

withdrawal during treatment.⁷ The economic study was designed to examine the societal costs associated with patients waitlisted at multidisciplinary treatment facilities.²⁰

Summary of Critical Appraisal

Systematic reviews

The systematic review by Scascighini and Sprott has clearly defined review criteria of journal articles.¹ The literature search utilized several different key resources such as PubMed, EMBASE and CINAHL and was designed to identify studies treating patients with back pain, chronic pain or fibromyalgia within a multidisciplinary treatment program.¹ The review by Chen discusses an extensive number of publications and documents review procedures in detail.⁵ Chen also attempts to review the cost associated with multidisciplinary treatment. The systematic review protocol by the Agency for Healthcare Research and Quality contained an a priori design with clear statement of review the questions that will be addressed and answered. It described a comprehensive literature search using both EMBASE and MEDLINE.²

Randomized controlled trials

The RCTs included are all of fair quality. Three contained rigorous selection criteria,^{3,13,14} but only the study by Gatchel et al.¹⁵ had 100% participation, likely due to the military setting. Two of the RCTs did not have adequate discussion of their randomization.^{3,14} Only one study had a treatment program that was easily adaptable for use in patient lifestyle.¹³ The treatment program designed by Demoulin et al.¹³ and Stapelfeldt et al.¹² were well structured incorporating all aspects of multidisciplinary programs as described in the literature. Two of the five RCTs had high drop-out rates^{13,14} and one did not include any long-term follow up.¹³

Non-randomized studies

Four of the six non-randomized trials had well-developed experimental progression.^{4,7,18,19} One of the remaining trials had weak study methodology and was prone to study selection bias as selection criteria were based on self-inclusion and patients had no economic limitations preventing trial inclusion.⁷ There was a high drop-out rate in two of the five studies^{4,18} and four^{4,16-18} had either no follow-up conducted or a lack of sufficient response by patients to make for a valid discussion of the results. Three of these investigations contained adequate use of statistical analysis and included well defined standardized testing for chronic pain investigations making for reliable result discussions.^{7,17,18} Gersh et al. have included a rigorous methodology for patient inclusion and exclusion.¹⁶ Unfortunately there was no randomization technique included in the process development and it contained a weak study interpretation that was qualitative instead of quantitative in nature.

Economic evaluation

The economic evaluation identified in this review contained a readily defined question and review of information. The costs and consequences were analyzed in readily identifiable units such as time lost during care, time lost at work and prescription medication cost. Allowances were made for differential timing of treatment and the results discussed all relevant aspects. The data analysis utilized standardized calculations and contained a multivariate linear regression model for comparing pain prediction and total cost.²⁰ It also contained a large sample size with well-defined inclusion and exclusion criteria.²⁰ There was also a well-developed analysis of the

results towards economic burden. Due to rigorous inclusion criteria any results from this study are only applicable towards a narrow demographic of treatment patients. In addition there was a lack of response from patients of 24.4% during cost analysis phase which, due to the type of analysis, may have affected the interpretation of results.

Table 2: Characteristics of the Included Economic Study

First Author, Publication Year, Country	Type of Economic Evaluation, Study Perspective	Patient Population	Intervention	Outcome
Guerriere, ²⁰ 2009, Canada	<ul style="list-style-type: none"> • Multivariate linear regression • Ambulatory and Home Care Record 	Random selection of participants in The Canadian STOP-PAIN Project (n=370)	Multidisciplinary Pain Treatment	<ul style="list-style-type: none"> • To examine the societal costs of patients waitlisted at multidisciplinary treatment facilities

Evidence-based guidelines

One identified review included evidence-based guidelines for multidisciplinary chronic pain care.¹ The included guidelines contain an extensive analysis of the current state of the medical field utilizing multidisciplinary methodologies based on a systematic literature review. The selection criteria and protocols for inclusion or exclusion are clearly defined. An analysis of what questions are posed and how the guideline answers them is included. The target users of this guideline are explained and the health benefits and side effects are analyzed.

Summary of Findings

Clinical evidence regarding the effectiveness of a multidisciplinary treatment approach for adults with chronic, non-malignant pain in outpatient settings

All included RCTs found beneficial results from using a multidisciplinary treatment plan over conventional methods, though the degree of success varied. Gatchel et al. found that the multidisciplinary treatment group had an increase of 29.8% in lifting ability from floor to waist compared with only 11.6% in the standard treatment group.³ They also found that the multidisciplinary group was four times less likely to require medical pain treatments at follow up appointments. For specific low back pain conditions Henchoz et al. demonstrated that their treatment program allowed participants to return to full time work at higher rates immediately post treatment and at 12 months follow up.¹⁴ The proportion of individuals returning to full-time work was 62.5% at twelve months in multidisciplinary group compared with and 33.3% in controls (P = 0.012). Similar findings were found by Stapelfeldt et al. though they identified that a brief treatment program resulted in quicker return to work for a subgroup of patients who have no fear of job loss due to sick leave.¹² They also discovered that more extensive multidisciplinary treatment was of greater benefit to patients experiencing poor job satisfaction. In contrast, Skouen et al. found that the only group of patients that had fewer missed days of work after extensive multidisciplinary treatment was the female cohort.¹⁵

All of the prospective non-randomized trials examined in this report validate the finding that multidisciplinary treatment is more beneficial for pain reduction than conventional modalities.^{4,7,16-19} They also establish that it is possible to reduce or completely remove the need for prescription analgesic medications. In the study by Darchuck et al. analgesic medication use decreased in all age groups examined; concurrent reductions in depression, pain catastrophizing and pain severity were found.¹⁸ Hooten et al. established that all forms of analgesic medications could be decreased.⁷ The use of opioids decreased 35.6% (P < 0.001) from admission to discharge and NSAIDs decreased 24.1% (P < 0.001).⁷

Clinical evidence regarding evidence-based outcomes for the evaluation of multidisciplinary treatment programs for adults with chronic, non-malignant pain

No clinical evidence regarding evidence-based outcomes for the evaluation of multidisciplinary treatment programs were identified in this review.

Cost-effectiveness of a multidisciplinary treatment program for adults with chronic, non-malignant pain

One economic study was found for this review.²⁰ This study examined the individual and societal costs of patients waitlisted at multidisciplinary treatment facilities. It was found that the median monthly cost per patient was C\$1,462 and the mean monthly cost was C\$3,112. Ninety-five percent of these costs were funded through private sources.²⁰

Evidence-based guidelines regarding multidisciplinary treatment programs for adults with chronic, non-malignant pain in outpatient settings

The guidelines identified in this literature review describe the appropriate patient population for treatment in a multidisciplinary treatment program rather than direct methodological requirements of such a program. A detailed guideline for patients to include in multidisciplinary programs was included in the systematic review by Scascighini et al.¹ These guidelines are that at least three of the following criteria should be fulfilled:

- "Persisting pain syndrome, painful experience lasting longer than the healing time (>3 months; chronic phase)
- With/without peripheral trigger (input)
- Psychosocial distress situations associated with, or triggering, the pain condition
- Yellow flags (maladaptive beliefs, lack of coping strategies, helplessness, fear avoidance, dysfunctional pain behaviour)
- Cardiovascular deconditioning, chronic fatigue syndrome
- Failure of previous monodisciplinary interventions
- Signs and symptoms of central sensitization (widespread pain, no organic correlate)
- Age 18-65 years
- Satisfactory level of motivation and readiness to change the pain behaviour, assessed at preadmission interview and performed by a trained clinical psychologist"¹ (page 76)

Scascighini and colleagues went on to indicate that all multidisciplinary treatment programs should begin with an initial multifaceted patient evaluation whereby various professionals are involved. This is followed by a consensus meeting allowing for discussion and evaluation of the patient's suitability. Typically patients who do not have sufficient language skill are excluded from this treatment option as verbal communication is essential.¹ Other benchmarks that prohibit

inclusion are medical conditions such as inflammatory disease, infection, neoplasia or major psychiatric disorder like psychotic episodes and chronic drug abuse.^{1,2,5} The overall goal of these types of treatment options as stated by Scascighini et al. are to:

- “Improve health related quality of life despite the existence of persisting pain symptoms
- to enhance the daily functioning of patients and their participation in normal life activities
- to teach the patients how to cope better with pain and to accept pain in some situations”¹ (page 77)

A typical multidisciplinary treatment program will contain professionals from medical, behavioural, physical and vocational treatment specialties.^{1,2,13} Medical professionals are responsible for patient physical well-being and medication management while physical reconditioning specialists, encompassing both physical and occupational therapy, would provide gradual therapeutic exercise, focusing on stretching and strengthening, to return the patient to previous levels of flexibility, endurance and stability.² Behavioural therapy specialists are responsible for psychosocial aspects of patient care, such as relaxation techniques, stress management and removal of dysfunctional pain responses.² An educational component focuses on increased self-management and independence and is often integrated with other areas.²

Limitations

There were no evidence-based guidelines for methodological components of multidisciplinary pain care discovered in this review. The guidelines that were found pertained to determination of the appropriate patient population to include in the studies, therefore interpretation should not encroach into technical methodology areas. The included randomized controlled trials were of moderate quality regarding various aspects of their methodology. There were high rates of patient drop out and multiple instances where criteria such as blinding and randomization were inefficient which will have an effect on study results and their interpretation. In addition, one study contained inclusion criteria that were open to definitive bias therefore caution must be taken when interpreting these results.¹⁵ These problems were also found in the study by Gersh et al.¹⁶ In addition, one of the systemic reviews⁵ contained a section describing cost expenditures but failed to include any concrete figures or calculations to prove their statements.

The non-randomized trials studied examined herein are of moderately low quality. There are multiple instances where questionable methodology and inefficient utilization of blinding, controls and selection criteria were encountered. In addition two of the five included studies had significantly high rates of patient drop out leaving the result interpretation open to bias and misinterpretation. The economic evaluation focused on waitlisted patients and as a result makes no analysis of cost expenditures associated with treatment procedures. As a result of this no insight can be given into costs associated with multidisciplinary treatment only the costs to private and public sectors through utilization of healthcare resources while waiting for treatment.

CONCLUSIONS AND IMPLICATIONS FOR DECISION OR POLICY MAKING

Despite the fact that there was one study included in this review that had somewhat conflicting results there is generally a trend indicating that the use of multidisciplinary treatment protocols for chronic pain are effective for chronic pain relief. Chronic pain conditions such as fibromyalgia, chronic wide-spread pain and low back pain were all relieved significantly from utilization of these techniques. While no evidence based rating scales or tests regarding pain management were identified there are ample studies indicating that increased return to work,

pain intensity reduction and reduced analgesic pain medication usage may be found. No single regimen of treatment was found to be more effective than any other which is likely a result of the extremely heterogeneous nature of chronic pain and the variability in individual lifestyle and pain tolerance. The analysis of cost-effectiveness of multidisciplinary pain treatment requires further investigation in order to make conclusive statements. The guidelines examined in this review only give detailed information on the patient population that should be included in the treatment and do not give information regarding treatment methodology.

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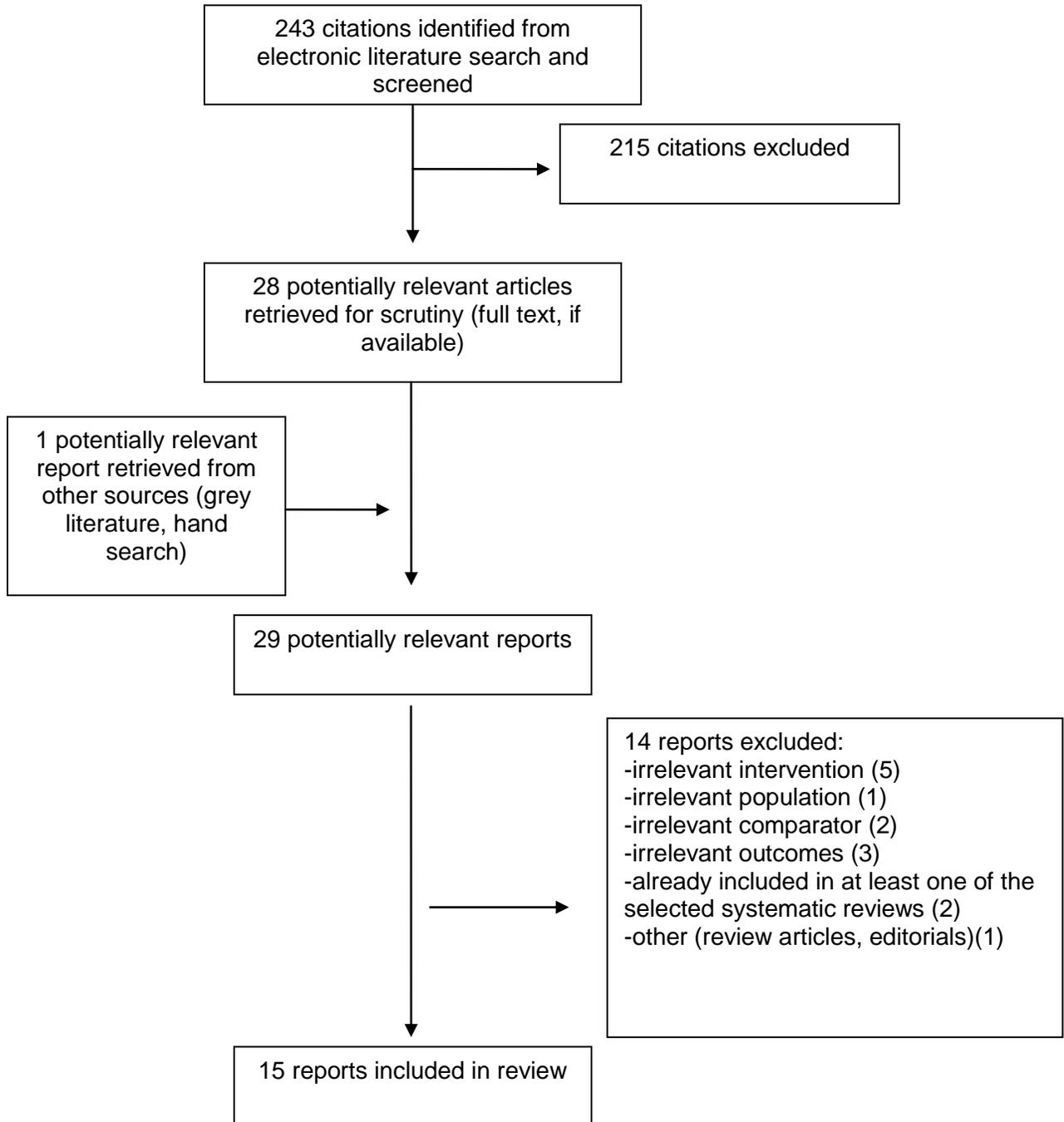
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APPENDIX 1: Selection of Included Studies



APPENDIX 2: Summary of Study Characteristics

Systematic reviews

First Author, Publication Year, Country	Eligibility Criteria	Included Study Designs	Number of Included Studies
Agency for Healthcare Research and Quality ² , 2010, United States of America	Adults with chronic non-cancer pain Multidisciplinary pain program described and includes the four following treatments – medical, behavioural, physical reconditioning and education,	<ul style="list-style-type: none"> • Grey literature included • No rejection based on study type (all included) 	3 systematic reviews, 1 meta-analysis, 2 randomized controlled trials, 1 non-randomized trial, 1 health technology assessment
Scascighini et al. ¹ , 2008, Switzerland	Patients experiencing back pain, chronic pain, fibromyalgia Utilized treatment is a multidisciplinary modality	<ul style="list-style-type: none"> • Systematic review • Randomized controlled trials • Meta-analyses • Non-randomized trials 	11 systematic reviews, 12 meta-analyses, 18 randomized controlled trials, 11 non-randomized trials, 2 guidelines, 1 economic evaluation
Chen et al. ⁵ , 2006, United States of America	Outpatient pain programs Interdisciplinary pain programs Short and long term success rates	<ul style="list-style-type: none"> • Systematic review • Randomized controlled trials • Meta-analyses 	7 systematic reviews, 5 meta-analyses, 6 randomized controlled trials

Randomized controlled trials and non-randomized studies

First Author, Publication Year, Country	Study Design, Length of Follow-up	Patient Characteristics, Sample Size (n)	Multidisciplinary Program Composition	Objectives
Randomized Controlled Trials				
Stapelfeldt et al. ¹² , 2011, Denmark	<ul style="list-style-type: none"> • RCT • Brief and multidisciplinary groups subject to medical consultation and testing, • Brief – after initial testing all further care provided by general practitioner • Multidisciplinary – after initial testing sent 	n=351 sick-listed for 3-16 weeks as result of lower back pain age 16-60	<ul style="list-style-type: none"> • Consultation with rehabilitation doctor, physiotherapy, social medical expert analysis, social worker treatment, occupational therapist review 	To identify subgroups of people defined by work related baseline factors that would benefit more from multidisciplinary treatment than a brief intervention

First Author, Publication Year, Country	Study Design, Length of Follow-up	Patient Characteristics, Sample Size (n)	Multidisciplinary Program Composition	Objectives
	to case manager for extensive interview and subsequent analysis by multifaceted team <ul style="list-style-type: none"> • Focus is on return to work 			
Demoulin et al. ¹³ , 2010, Belgium	<ul style="list-style-type: none"> • RCT • 13-18 weeks with 2-3 sessions of 2 hours per week (3 sessions dedicated to education and 25 to rehabilitation) 	n=262 patients with chronic low back pain age 20-75	<ul style="list-style-type: none"> • Physical medication, rehabilitation specialist, physical therapy, psychological analysis, occupational therapy 	To assess the efficacy of a multidisciplinary treatment program that meets the requirements of the Belgian universal health insurance agency
Henchoz et al. ¹⁴ , 2010, Switzerland	<ul style="list-style-type: none"> • RCT • 3 weeks of 5-7 hours per day 5 days per week • Follow-up at 9 weeks, 9 months and 12 months post treatment 	n=109 patients with low back pain age 28-50	<ul style="list-style-type: none"> • Physical and ergonomic training, psychological management of pain, back school 	To compare long-term functional and work status after multidisciplinary treatment
Gatchel et al. ³ , 2009, United States of America	<ul style="list-style-type: none"> • RCT • Follow-up at 6 months and 1 year post-program 	n=66 patients with musculoskeletal chronic pain and in an active military duty position, age 27-44	<ul style="list-style-type: none"> • Physical therapy, occupational therapy, psychological investigation 	To decrease chronic musculoskeletal pain and increase functioning in an active duty military population
Skouen et al. ¹⁵ , 2006, Norway	<ul style="list-style-type: none"> • RCT • Light – 1 hour session with physiotherapist, 0.5-1 hour with nurse and psychologist “only if needed”, 1 hour lecture about background information, given individual exercise program • Extensive – 4 weeks 5 days per week 6 hours per day in group sessions, exercise supervised by 	n=208 patients with chronic wide-spread pain (males aged 23 to 62, females aged 22 to 66)	<ul style="list-style-type: none"> • Medical treatment, physiotherapy, occupational therapy, psychological treatment 	To examine return to work outcome of extensive versus light multidisciplinary treatment modalities

First Author, Publication Year, Country	Study Design, Length of Follow-up	Patient Characteristics, Sample Size (n)	Multidisciplinary Program Composition	Objectives
	professionals extensive education provided <ul style="list-style-type: none"> • Follow-up 54 months post-treatment 			
Non-Randomized Trials				
Gersh et al. ¹⁶ , 2011, Australia	<ul style="list-style-type: none"> • Convenience sample • 8 week duration, sessions once per week 4 hours per session • Follow-up not conducted 	n=261 patients with chronic non-malignant pain, mean age 49	<ul style="list-style-type: none"> • Medical assessment, psychological evaluation, physiotherapy, occupational therapy 	To examine the utility of pain stages of change questionnaire as a predictor of treatment completion and how this relates to overall outcomes
Bosy et al. ⁴ , 2010, Canada	<ul style="list-style-type: none"> • Non-Randomized Trial • Duration: 8 weeks • program termination • 3-4 contact hours per day for 5 days per week • Follow-up 6 months after 	n=338 working, adult patients with long term chronic pain not responding to previous treatment	<ul style="list-style-type: none"> • Interdisciplinary assessment, cognitive-behavioural and biofeedback therapy, physical and occupational rehabilitation 	To describe essential elements of an 8 week multidisciplinary program with a cognitive/behavioural emphasis and the results that can be expected from chronic pain patients
Darchuck et al. ¹⁸ , 2010, United States of America	<ul style="list-style-type: none"> • Quasi-experimental Time Series • 3 week intensive group based therapy 15 consecutive working days 8 hours per day • Follow-up 6 months post-treatment • Focus on discontinuation of opioid and simple analgesic therapy in older patients 	n=411 patients with chronic non-cancer pain age 18+	<ul style="list-style-type: none"> • Physiotherapy, occupational therapy, biofeedback and relaxation training, wellness instruction, chemical health instruction, pain management training 	To examine pain catastrophizing, psychosocial functioning, physical/emotional health attributes for geriatric patients after multidisciplinary program and compare to results from younger and middle aged patients

First Author, Publication Year, Country	Study Design, Length of Follow-up	Patient Characteristics, Sample Size (n)	Multidisciplinary Program Composition	Objectives
Samwel et al. ¹⁷ , 2009, The Netherlands	<ul style="list-style-type: none"> • Non-randomized controlled trial • 10 group sessions, 90minutes per session • Follow-up not conducted 	n=220 patients presenting with chronic pain, age 18+	<ul style="list-style-type: none"> • Stress management, problem-solving techniques, cognitive therapy, relaxation exercises 	To evaluate the effects of a multidisciplinary treatment program and identify cognitive/behavioural predictors of outcomes
Hooten et al. ⁷ , 2007, United States of America	<ul style="list-style-type: none"> • Prospective Case Series • 3 week duration, 15 consecutive working days 8 hours per day • Follow-up not discussed • Focus on incorporation of analgesic withdrawal 	n=159 patients diagnosed with fibromyalgia, mean age 45	<ul style="list-style-type: none"> • Physical reconditioning, biofeedback and relaxation training, stress management, chemical health education, activity moderation, elimination of pain behaviours 	To test the hypothesis that immediate post treatment measures of psychosocial functioning, health attributes, negative pain related emotions and depression improve during multidisciplinary treatment while concurrently removing analgesic medications
Man et al. ¹⁹ , 2007, Hong Kong	<ul style="list-style-type: none"> • Prospective Study • 14 full days of treatment conducted over 6 weeks • Follow-up 1, 6 and 12 months post-treatment 	n=45 patients participated in previous 6 comprehensive outpatient pain engagement programs, age 23-57	<ul style="list-style-type: none"> • Pain education courses, cognitive reconceptualization, coping strategies, communication skills strategies, graded physical exercise, functional activities training 	To describe the experience with chronic pain management program in Hong Kong Chinese patients

APPENDIX 3: Critical Appraisal of Included Literature

First Author, Publication Year	Strengths	Limitations
Systematic Reviews		
Agency for Healthcare Research and Quality ² , 2010	<ul style="list-style-type: none"> Well reviewed assessment of existing literature Good description of included aspects and information well broken down and examined Comprehensive detail on patients to be included and indicators for treatment approaches 	<ul style="list-style-type: none"> No economic evaluation included Inadequate description of guidelines for treatment methodology
Scascighini et al. ¹ , 2008	<ul style="list-style-type: none"> Selection criteria documented and well categorized Wide range of studies discussed Key points summarized for typical procedures 	<ul style="list-style-type: none"> Oversimplification of included material therefore likely detail deficient
Chen et al. ⁵ , 2006	<ul style="list-style-type: none"> Comprehensive literature search based on pre-defined criteria. Detailed insight into multidisciplinary pain program requirements Both short and long term benefits are described Contains brief review of health care expenditure 	<ul style="list-style-type: none"> Lack of description on literature exclusion criteria Unclear whether grey literature was searched. Cost analysis of not attending a pain program is vague and inconclusive with no direct expenditure stated.
Randomized Controlled Trials		
Stapelfeldt et al. ¹² , 2011	<ul style="list-style-type: none"> Well characterized baseline variable characteristics Extensive discussion of return to work groupings 	<ul style="list-style-type: none"> Randomization only used to allocate patients to groups afterwards all parties aware of test allocation
Demoulin et al. ¹³ , 2010	<ul style="list-style-type: none"> Treatment program well-structured to allow for incorporation into patient lifestyle Extensive standardized questionnaires utilized for selection and evaluation 	<ul style="list-style-type: none"> High rate of patient drop out (48%) Examiners not blinded to trial groups No long term follow-up No evaluation of muscle rehabilitation due to physical reconditioning
Henchoz et al. ¹⁴ , 2010	<ul style="list-style-type: none"> Rigorous methodology for patient inclusion and exclusion Significant statistical analysis utilized (all functions appropriate for situation) 	<ul style="list-style-type: none"> Large amount of patients not reviewed at follow-up appointments (29% in multidisciplinary and 32% in control) Significant differences in baseline characteristics, such as age, marital status, and height, between groups
Gatchel et al. ³ , 2009	<ul style="list-style-type: none"> Patient participation 100% attendance Rigorous inclusion criteria 	<ul style="list-style-type: none"> No discussion of methodology for multidisciplinary treatment group Does not include any procedural/result limitations Randomization method not discussed Examiners not blinded to patient groups Emotional distress not effectively assessed

First Author, Publication Year	Strengths	Limitations
Skouen et al. ¹⁵ , 2006	<ul style="list-style-type: none"> • Extensive follow-up conducted with acceptable participation rate • Power calculation used to determine adequate sample size • Appropriate randomization of included patients using appropriate calculations • Results broken down and analyzed for differences between sexes 	<ul style="list-style-type: none"> • Poor methodology description for Light treatment group • Inconclusive discussion and interpretation of results • No discussion of study limitations or potential errors.
Non-Randomized Trials		
Gersh et al. ¹⁶ , 2011	<ul style="list-style-type: none"> • Rigorous criteria for patient inclusion or exclusion 	<ul style="list-style-type: none"> • No randomization for inclusion to study groups (based solely upon clinician discussion) • Weak study interpretation strategy for outcomes (qualitative in nature not quantitative) • No follow-up analysis completed
Bosy et al. ⁴ , 2010	<ul style="list-style-type: none"> • Patients and outcome assessors blinded. • Adequate method of randomization. • Power calculation performed to determine adequate sample size. • Losses to follow-up described. 	<ul style="list-style-type: none"> • Follow-up at 6 months only completed on <10% of patients. • High drop-out rate during treatment (26%)
Darchuck et al. ¹⁸ , 2010	<ul style="list-style-type: none"> • Efficient use of statistical analysis • Adequate methodological development and use of standardized protocols • Low level of drop-out from treatment 	<ul style="list-style-type: none"> • Inefficient follow-up protocol (28.9% lost mostly from younger age groups) • Study not randomized • No control group for verification of results • Older cohort studied is considered affluent in regards to medical insurance, economic standing and ease of transportation therefore benefits may not be directly comparable to younger cohorts analyzed
Samwel et al. ¹⁷ , 2009	<ul style="list-style-type: none"> • Statistical analysis is adequate for testing utilized • Standardized pain investigation protocols utilized for patient analysis 	<ul style="list-style-type: none"> • Inadequate description of treatment protocols • Study not randomized • Inadequate analysis of patient psychological state during study experimentation • Patients in the control groups were wait-listed for 3 months while in multidisciplinary group this was not compensated for • Potential selection bias as patients included have a long history of chronic pain with previous treatment modalities used • No follow-up study conducted
Hooten et al. ⁷ , 2007	<ul style="list-style-type: none"> • Effective study methodology • Efficient use of standardized pain 	<ul style="list-style-type: none"> • No control group used for result verification therefore not possible to

First Author, Publication Year	Strengths	Limitations
	inventory protocols	determine if decreased analgesic use due to experimental procedure or withdrawal of prescription <ul style="list-style-type: none"> • Patients included in trial made available through self-selection and had ample medical coverage and desire to participate making for inherent bias • Inadequate discussion of patient demographics
Man et al. ¹⁹ , 2007	<ul style="list-style-type: none"> • Adequate method development and progression 	<ul style="list-style-type: none"> • Significant cultural impact on study methodology impacts upon outcomes • Relatively small sample size compared to other similar studies • Inadequate discussion of patient demographic and social standing
Economic Study		
Guerriere et al. ²⁰ , 2010	<ul style="list-style-type: none"> • Large sample size utilized • Well documented and rigorous inclusion and exclusion criteria • Strictly analyzed patient demographic and economic burden analysis 	<ul style="list-style-type: none"> • Not every patient included returned every questionnaire which therefore may bias subsets of results • These results are only applicable to chronic pain patients on waitlists for multidisciplinary pain treatment facilities, other patient modalities of treatment are not analyzed • Societal bias regarding “lost time” between the sexes was not analyzed

APPENDIX 4: Summary of Main Study Findings and Authors' Conclusions

First Author, Publication Year	Main Study Findings	Authors' Conclusions
Systematic Reviews		
Agency for Healthcare Research and Quality ² , 2010	<ul style="list-style-type: none"> • Breakdown of potential methodologies for inclusion in four main areas of multidisciplinary treatment (medical, behavioral, physical and educational) • chronic pain is best understood using a biopsychosocial model where focus is on physiological, psychological and societal factors that exacerbate pain conditions 	<ul style="list-style-type: none"> • Conclusions not given (not a technical report or scientific study)
Scascighini et al. ¹ , 2008	<ul style="list-style-type: none"> • Standard treatment frequently offers only short-term or partial relief from chronic pain • Interdisciplinary treatment is unfortunately usually only introduced at a very late stage when all other hopes have failed • RCTs indicate that multidisciplinary pain programs represent the best option for complex chronic pain patients 	<ul style="list-style-type: none"> • More research into chronic pain is required from all levels of research society • Benchmarking approaches is required to improve the level of competition between different pain programs and therefore improve treatment • Treatment programs should involve a physician, physiotherapist, psychologist, occupational therapist and a social worker • Main goals should be to improve health related quality of life and teach patient to accept and cope with their situation • Pre-existing psychological vulnerabilities and high distresses should be considered during a comprehensive assessment before treatment begins.
Chen et. al, ⁵ , 2006	<ul style="list-style-type: none"> • Rehabilitation team consists of physical and occupational therapists, psychologists and nurses • May also include medical social workers, vocational rehabilitation counselors and recreational therapists • Patient should receive individual treatment plan • Typical plan consists of 2-12 weeks with typically at least 100 contact hours giving best results • 90.4% of patients who complete program capable of working versus only 48.7% of non- 	<ul style="list-style-type: none"> • Physicians are encouraged to be aware of clinical effectiveness of multidisciplinary programs • Although initial cost of treatment may be high this is compensated by the cost to society of not using

First Author, Publication Year	Main Study Findings	Authors' Conclusions
	completers (P = <0.05)	
Randomized Controlled Trials		
Stapelfeldt et al. ¹² , 2011	<p>Treatment: initial medical consultation for both groups</p> <p>Brief – all further care provided by general practitioner</p> <p>Multidisciplinary – case manager gives extensive interview and subsequent analysis by multidisciplinary team</p> <ul style="list-style-type: none"> • Job satisfaction Hazard Rate Ratio 1.18, 95% CI 0.91 to 1.51, P = 0.020 for all participant comparison • Job satisfaction high Hazard Rate Ratio 0.52, 95% CI 0.35 to 0.76, P = 0.002 for all participant comparison • Job satisfaction low Hazard Rate Ratio 1.25 95% CI 0.88 to 1.78 for all participant comparison 	<ul style="list-style-type: none"> • Multidisciplinary intervention had better effect in subgroup of patients who presented with low job satisfaction, no influence on work planning and feeling of risk of job loss
Demoulin et al. ¹³ , 2010	<p>Treatment: 13 to 18 weeks, 2 to 3 sessions per week, 2 hours per session</p> <ul style="list-style-type: none"> • Significant improvements in pain and function scores: (session 1 to 36 average 44% and 40% respectively, P < 0.001) • Kinesiophobia improved significantly (session 1 to 36 11% P < 0.001) • Knowledge improved by 95% P < 0.05 • Improves in trunk muscle strength 40% on average, trunk extensor muscle endurance 90%, mobility 8% and aerobic capacity 18% (P < 0.05) 	<ul style="list-style-type: none"> • Multidisciplinary treatment program beneficial in chronic low back pain patients • Patients may continue work during treatment
Henchoz et al. ¹⁴ , 2010	<p>Treatment: 3 weeks, 5 days per week, 5 to 7 hours per day</p> <ul style="list-style-type: none"> • Oswestry Disability Index improved significantly over control in multidisciplinary group at 9 weeks, 9 months and 12 months (P = 0.012, 0.023 and 0.011 respectively) • Work status return changes only significant in multidisciplinary group 40% at T0 and 	<ul style="list-style-type: none"> • Functional multidisciplinary treatment much better than outpatient physiotherapy in improving functional work status

First Author, Publication Year	Main Study Findings	Authors' Conclusions
	62.5% at T12 months P = 0.012	
Gatchel et al. ³ , 2009	<p>Treatment: multidisciplinary treatment protocol methods not described</p> <ul style="list-style-type: none"> • Significant improvements in: <ul style="list-style-type: none"> - Lifting floor to waist Pre 49.4%, Post 79.2% (controls 40.9% and 52.5% respectively) P < 0.001 - Lifting waist to ears Pre 40.6%, Post 67.1% (controls 32.5% and 40.8% respectively) P < 0.001 - Lumbar flexion Pre 42.6%, Post 52.0% (controls 47.3% and 43.1% respectively) P = 0.016 - Oxygen consumption Pre 32.7%, Post 41.6% (controls 27.6% and 29.8% respectively) P < 0.001 • 6 month outcome <ul style="list-style-type: none"> - Pain Disability Questionnaire 51.3% (control 81.7%) P < 0.001 Oswestry Disability Scale 10.3% (control 19.5%) P < 0.001 	<ul style="list-style-type: none"> • Results indicate marked improvements in psychosocial and physical outcomes at various intervals by multidisciplinary group • Psychosocially multidisciplinary group report improvement in self-reported pain intensity, perceived disability and emotional distress while control improvement was limited
Skouen et al. ¹⁵ , 2006	<p>Treatment: light – 1 hour physiotherapy, 0.5 hour nurse practitioner psychologist only if needed, given individual exercise program</p> <p>extensive – 4 weeks, 5 days per week, 6 hours per day group sessions professional supervision</p> <ul style="list-style-type: none"> • Mean effect of extensive treatment versus treatment as usual for female, total number of days absent from work is -206.95 (P = 0.02) though these effects taper off at later follow up • Among men light treatment is less effective than treatment as usual (P = 0.05) • In general older persons usually have more days absent from work • Higher age only significantly increases missed work days for females 	<ul style="list-style-type: none"> • Extensive program more effective among women with fewer days absent from work • Men and women with a poor prognosis were absent from work more than those with good prognosis

First Author, Publication Year	Main Study Findings	Authors' Conclusions
Non-randomized Studies		
Gersh et al. ¹⁶ , 2011	<p>Treatment: 8 weeks, one session per week, 4 hours per session</p> <ul style="list-style-type: none"> • Precontemplation completion mean 3.10, not completed mean 3.40 F-value 14.69, P < 0.01 • Contemplation completion mean 3.81, not completed mean 3.50 F-value 15.96, P < 0.01 • Action completion mean 3.08, not completed mean 2.78 F-value 9.76, P < 0.01 • Maintenance completion mean 3.19 not completed mean 2.97 F-value 5.67 p=<0.01 	<ul style="list-style-type: none"> • Results suggest Pain Stages of Change Questionnaire may be useful in making treatment more efficient both by predicting who is less likely to complete treatment and by providing targeted treatments according to patients readiness to engage in self-management
Bosy et al. ⁴ , 2010	<p>Treatment: 8 weeks, 5 days per week, 3 to 4 hours per day (total 130 to 150 hours per patient)</p> <ul style="list-style-type: none"> • Primary pain complaint improved 16.4%, P < 0.001, Effect size: 0.74, 95% CI (0.58 to 0.90) • Secondary pain complaint improved 14.2%, P < 0.001, Effect size: 0.46, 95% CI (0.29 to 0.63) • Tertiary pain complaint improved 16.9%, P < 0.001, Effect size: 0.47, 95% CI (0.26 to 0.68) • Anxiety improved 12.6% P < 0.001, Effect size: 0.38, 95% CI (0.23 to 0.54) • Depression improved 16.8% ,P < 0.001, Effect size: 0.41, 95% CI (0.27 to 0.58) <p>Effect size was determined using Cohen's <i>d</i></p>	<ul style="list-style-type: none"> • Nearly 75% of patients in intensive integrated interdisciplinary pain program able to improve their work status • Early intervention in the subacute phase is recommended for prevention of long-term disability in patients with chronic pain
Darchuck et al. ¹⁸ , 2010	<p>Treatment: 3 weeks, 15 consecutive working days, 8 hours per day (group based therapy)</p> <ul style="list-style-type: none"> • Using MANOVA <ul style="list-style-type: none"> - Pain severity improved mean 47.8% P = 0.004 - Physical functioning improved mean 29.2% P < 0.001 - Social functioning improved mean 30.3% P < 0.001 - Health perception improved mean 36.3% 	<ul style="list-style-type: none"> • Interdisciplinary pain rehabilitation incorporating opioid withdrawal can improve long term psychological, social and physical functioning for geriatric chronic pain patients

First Author, Publication Year	Main Study Findings	Authors' Conclusions
	<p>P < 0.001</p>	
<p>Samwel et al.¹⁷, 2009</p>	<p>Treatment: 10 sessions, 90 minutes per session (group approach)</p> <ul style="list-style-type: none"> • ANCOVA demonstrated significant effect for pain intensity (F(1.125)=7.909, P = 0.005) and functional disability (F(1.214)=6.526, P = 0.011) for group effects • Paired t-tests showed pain intensity significantly decreased in treatment condition (t=4.17, df=106, P < 0.001) but not in control condition and in functional disability (t=6.20, df=106, P < 0.001) • ANCOVA gives significant main group effect for acceptance (F(1.214)=9.145, P = 0.003) • Paired t-test showed acceptance increased significantly in treatment group (t=-5.56, df=106, P < 0.001) but not in control 	<ul style="list-style-type: none"> • Multidisciplinary treatment of chronic pain complaints was effective in reducing pain intensity and functional disability • Results demonstrated that patients able to accept their conditions had most benefit from treatment
<p>Hooten et al.⁷, 2007</p>	<p>Treatment: 3 weeks, 15 consecutive working days, 8 hours per day</p> <ul style="list-style-type: none"> • Pain catastrophizing improved mean 6.5% P < 0.001 • Health perception improved 33.9% P < 0.001 • Physical functioning improved 37% P < 0.001 • Use of opioids decreases 35.6% P < 0.001 • Use of Benzodiazepine decreases 16.9% P < 0.001 • Use of NSAIDs decreases 24.1% P < 0.001 • Use of muscle relaxants decreases 10.9% P < 0.01 	<ul style="list-style-type: none"> • Study results support hypothesis that immediate post-treatment measures of physical and emotional functioning are favorable for fibromyalgia patients using multidisciplinary treatment program that incorporates drug withdrawal
<p>Man et al.¹⁹, 2007</p>	<p>Treatment: 14 full days over 6 weeks</p> <ul style="list-style-type: none"> • Standing tolerance in minutes at baseline 12.2 (95% CI 9.7 to 14.7), 1 month 21.8 (95% CI 14.8 to 28.8), 6 month 23.5 (95% CI 17.0 to 30.0), 12 month 23.1 (95% CI 14.1 to 32.1) • Sitting tolerance in minutes at baseline 14.7 (95% CI 11.9 to -17.6), 1 month 28.4 (95% CI 21.8 to 35.0), 6 month 30.5 (95% CI 24.1 to 	<ul style="list-style-type: none"> • This type of program should be promoted in the Chinese population • Program appears to help patients with a variety of chronic pain syndromes, including those where the cause of pain was not understood

First Author, Publication Year	Main Study Findings	Authors' Conclusions
	36.9), 12 month 27.3 (95% CI 21.9 to 32.7) • Number of analgesics at baseline 1.2 (95% CI 0.9 to 1.4), 1 month 1.0 (95% CI 0.7 to -1.3), 6 month 1.0 (95% CI 0.7 to -1.4), 12 month 1.0 (95% CI 0.7 to 1.2)	
Economic Study		
Guerriere et al. ²⁰ , 2009	Study design: self-administered costing tool (Ambulatory and Home Care Record) • Public - Health care appointments \$25,286 - Hospitalization \$23,922 - Medication \$8,190 • Private - Healthcare appointments \$17,056 - Medications \$25,767	• Overall the median monthly cost of care was \$1,462 per study participants with 95% of the total expenditures privately financed • Mean monthly cost per participant was \$3,112 CDN

ANCOVA = analysis of covariance, CI = Confidence Interval, df = degrees of freedom, MANOVA = multivariate analysis of variance