Evaluating the chronic pain collaborative movement therapy consultation

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Abstract

Introduction

Chronic pain is a prevalent and complex health problem with a significant impact on patients' well-being. The collaborative movement therapy consultation (CMTC), offered by the Division of Pain Medicine at the University Medical Center Utrecht, aims to provide individualized treatment for chronic pain. This study investigates the characteristics of patients who may benefit from this therapy.

Method

This retrospective observational cohort study examined chronic pain patients who attended a CMTC. The patients pain scores are analyzed and participants' characteristics were summarized in a baseline table and assessed for significance using t-tests and Pearson correlations. To evaluate the consultation's effectiveness in managing chronic pain, a minimum clinically important difference was set on two points of pain score decrease.

Results

A total of 212 patients were analyzed. The lowest, highest, and combined VAS score all showed a decrease. However, none of the scores reached the MCID threshold. Head pain, other pre-consultation treatment, and longer pain duration were associated with less pain reduction.

Discussion

This research study found that participating in the CMTC led to a significant reduction in pain scores after 3 months, although it did not meet the MCID threshold. Movement therapy have been shown to be effective for chronic pain. Head pain, prior treatments, benefited less for the CMTC. The study's limitations included the lack of a control group and variability time of in questionnaire completion. Further research is needed to explore treatment adherence and specific types of movement therapy within CMTC.

Introduction

Chronic pain is a pervasive health problem that affects a significant proportion of the global population, with one fifth of all adults suffering of chronic pain.[1] With a total healthcare cost of 271 billion euro for the European Union, which contribute to an average of 2.4% of the Gross domestic product of the countries. [2,3]

The impact of chronic pain on patients is profound and multidimensional, and interferes with the mental and physical aspects of patients' lives. [4] The impact on emotional status and mood is evident. Therefore, there is also a greater risk of depressive and anxiety disorders.[5] In addition to the mental aspect, individuals with chronic pain often experience restricted range of motion, decreased speed, and limited variability in the painful area. This is protective in acute pain patients, but is counterproductive over time.[6]

The Cognitive Fear Avoidance Model postulates that pain functions as a physiological defense mechanism. However, in certain individuals experiencing pain, they tend to perceive their pain as threatening or dangerous This cognitive interpretation of pain is also a defensive mechanism, but it can result in the development of irrational negative thoughts regarding the pain, which can lead to catastrophizing.[7] Catastrophizing is a cognitive distortion that involves the irrational anticipation of negative outcomes or the overestimation of the severity of potential or actual events.[8] And can avoid the movement of the affected area, due to the belief that it will worsen the pain or cause further injury. Which can lead to the vicious cycle of pain and inactivity. [7] This fear of movement is called kinesiophobia, and can lead to further physical decline.[9] This results in a lower quality of life for chronic pain patients.[4,10] The interpretation of the pain experience plays an important factor in the recovery of pain.[11] Addressing these cognitive and behavioral factors that contribute to fear and avoidance of physical activity can break the cycle of chronic pain and improve overall functioning.[9]

Despite the significant burden of chronic pain, the typical pain management with medication or surgical interventions lacks long-term benefit and has additional side effects and risks. [12] Therefore, the biopsychosocial model is now widely accepted as the best model for the treatment of chronic pain. As indicated earlier, chronic pain arises from complex interactions between biological, psychological, and social factors. In this model, pain is not solely a physical sensation, but rather a complex experience that is influenced by factors such as emotional state, cognitive processes, and social context.[13] A physical therapist can play an important role in the biopsychosocial model and is crucial in interdisciplinary multimodal pain programs.[14]

Movement therapy is helpful in reducing pain and improving in physical function and mental health. The goal of physical therapy is to improve physical function and reduce pain through a variety of mechanisms. Additionally, physical therapy has been extensively researched and shown to lower pain levels in chronic pain patients and next to this be cost-effective and safe, with a low risk of adverse effects. [15–18]

Collaborative movement therapy consultation

Since October 2020, the Division of Pain Medicine of the University Medical Center Utrecht initiated an outpatient consultation hour in collaboration with a physical therapist. The collaborative movement therapy consultation (CMTC) involve a comprehensive examination by the physical therapist and a pain management specialist. Resulting in the development of a treatment plan that incorporates the regular pain management approaches. Additionally, the physical therapist may refer the patients to a specialized physical therapist with a expertise in pain management or the patient's

own physical therapist can be consulted for further guidance on pain management for the specific needs of the patient. This approach is an alternative to traditional interventions for chronic pain management. Collaborative care between pain management specialists and physical therapists can address the physical aspects of chronic pain, as well as provide individualized care plans for patients. By incorporating non-pharmacological treatments such as physical therapy or other movement therapies, this approach aims to improve the overall functioning and quality of life for patients with chronic pain. Understanding which types of patients benefit most from this CMTC can inform future research and improve the implementation of this approach in clinical practice. There is no consensus on which patients might benefit from this specific pain strategy. It is therefore important to investigate what type of chronic pain patients are visiting the CMTC.

Method

Study Design

This retrospective observational cohort study was conducted to analyze the characteristics of patients visiting a CMTC and to evaluate their pain severity before and after the consultation. The study aimed to provide insights into the effectiveness of the CMTC and inform future pain management practices.

Study population

All adult chronic pain patients who received a consultation at the CMTC in the time period from October 2020 until December 2022 were enrolled retrospectively, excluding the patients for whom a baseline VAS score was not available.

Collection of data and Outcomes

Data was obtained from the patients' medical records, for each patient, demographic data, pain diagnosis, pre- and post-consultation pain treatment, and standardized questionnaires were collected. Standardized questionnaires are administered to all patients during their first visit to the outpatient clinic. After three and six months, patient-reported outcome measures (PROMs) will be conducted to assess the pain. This allows the pain management specialist to assess the effect of the treatment on the patient. For quality reasons, all pain clinics are obliged by the Dutch Society of Anesthesiologists to register the PROMs.

During visits to the pain clinic, some patients fill out multiple questionnaires and administration or completion of the PROMs may not always occur at the three and six month follow-up periods after the consultation. For this study, we extracted the questionnaire closest in time to the consultation and closest to the three month follow-up. For patients who completed the PROMs at both three and six months, we also extracted the six month PROMs. But if only the six months PROMs is missing the patients is not called.

If the PROMs questionnaire is missing, the patient will be contacted by telephone by an assistant of the pain outpatient clinic. Before contacting the patient, there will be checked if the patient indicated that they do not want to be contacted for research purposes. The PROMs will be registered in the patients clinical medical record so the pain management specialist has an indication of the patients pain progression. If patients visited the CMTC hour for multiple times, the pain score from before the first visit and the pain score after the second visit are extracted for analyses.

The physical therapist can give multiple recommendations including the option of engaging in movement therapy or not. The movement therapy options may involve basic strengthening

exercises, consultation with the physical therapist for advice, referral to a specialized physical therapist experienced in chronic pain management, or referral to a pain rehabilitation program.

Questionnaires

The following standardized questionnaires were utilized for this research study:

- The outpatient pain clinic utilizes patient-reported outcome measures (PROM), which includes the assessment of Visual Analogue Scale (VAS) score pain score at both its lowest and highest points.
- Douleur Neuropathique 4 questionnaire (DN4): used to indicate peripheral neuropathic pain. The total score ranges from 0 to 10, with score higher than 4 indicating a higher likelihood of neuropathic pain.[19]
- Pain Catastrophizing Scale (PCS): used to assess a patient's level of catastrophizing tendencies, with a high score indicating more severe tendencies. The range is between 0-52 were 0-14 are indicative of low levels of pain catastrophizing, scores between 15-29 are indicative of moderate levels, and scores of 30 or higher are indicative of high levels. [20]
- Tampa Scale for Kinesiophobia (TSK): used to assess a patient's level of fear of movement, with a higher score indicating a higher level of kinesiophobia. With a range from 17 to 68, if the score is higher than 37 the patient suffers from kinesiophobia. [21]
- Short Form 12 Health Survey (SF-12): used to measure physical and mental health-related quality of life, with higher scores indicating better health. The scores range from 0 to 100, with a score of 50 indicating average health status. A score above 50 indicates better health than the average, while a score below 50 indicates worse health than the average. [22]
- Hospital Anxiety and Depression Scale (HADS): used to assess the severity of anxiety and depression symptoms in patients with physical health problems. Each ranges from 0-21, with scores of 8 or above indicating the likely presence of clinically significant symptoms. [23]

Data analysis

The collected data was analyzed using SPSS version 27. Statistical significance was considered when $p < 0.05$, with a two-tailed test. The demographic characteristics of the participants were summarized in a baseline table, presenting means with 95% Confidence Intervals (CI) or medians with interquartile ranges (IQR). The VAS scores are presented as mean decrease with CI and tested on significance with an Paired T-test. For further analyses the maximal and minimal VAS score is added together to get a combined VAS score. This combined VAS score is analyzed using an independent sample T-tests (for dichotomous variables) and Pearson correlation (for continuous variables). And is presented as mean and CI difference of the VAS decrease and or R-value with a P-value. We preformed subset analyses on patients that received advise to undergo movement therapies and patients who did not. Furthermore, subset analyses were conducted participants were divided into two subgroups: those who received advice and those who did not. Subgroup comparisons were made using appropriate statistical tests.

Minimum clinically important differences

This study contains no control group. To account for this, a minimum clinically important differences (MCID) is used to determine if the consult is effective against chronic pain. This clinical threshold is set to a VAS decrease of two points.[24]

Results

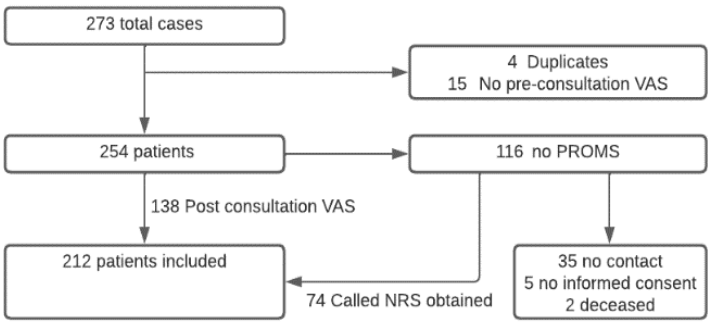

Figure 1 flowchart

A total of 273 consultations were conducted, with four patients attending multiple times, resulting in a sample size of 212 analyzed patients. See flowchart 1.

The majority of the patients are between 50-59 years old (25.9%), with an even distribution of males (50.9%) and females (49.1%). The most common site of pain is in the lower back (66.0%), in the hips or knees (31.1%) and in neck, shoulders or upper back (30.2%). Most patients had prior pain treatment, just 4.2% did not have any pain treatment at all with most patients having used pain medication (92.0%). Also, 80.7% are still using pain medication at the time of the consultation, mostly paracetamol (43.4%). Almost half (44.3%) of the patients have been referred from the pain outpatient clinic.

The prescribed therapy mostly consisted of movement therapy (91.0%). Next to the movement therapy, invasive techniques (22.2%) and medication (20.3%) were mostly prescribed. “Other treatment” (13.7%) consisted of transcutaneous electrical nerve stimulation, iontophoresis, and lidocaine or ketamine infusion.

		Missing
Age, n, %		
18-29	26(12.3%)	
30-39	40(18.8%)	
40-49	32(15.1%)	
50-59	55(25.9%)	
60-69	38(17.9%)	
>70	21(9.9%)	
Gender, Male, n, %	108 (50.9%)	
Location pain, n, %		
Head	13(6.1%)	
Neck, shoulders, upper back	66(31.1%)	
High extremities	20(9.4%)	
Lower back	140(66.0%)	
Hips, knees	64(30.2)	
Feet, ankles	19(9.0%)	
Thorax, abdomen	7(3.3%)	
Other	12(5,7%)	
Duration of pain, n, %		
< 1 year	74 (34.9)	
2-5 years	71 (33.5)	
>5 years	67 (31.6)	
Start pain: abruptly, n, %	141(66.5%)	3 (1.4%)
Referred internally	94(44.3%)	
SF12 Physical, median, IQR	24 (18.0-31.0)	12(5.7%)
SF12 mental, median, IQR	45 (39.0-50.0)	12(5.7%)
DN4, median, IQR	4 (2.0-5.0)	1(0.5%)
HADS fear, median, IQR	6 (4.0-9.0)	3(1.4%)
HADS depression, median, IQR	7 (3.5-9.0)	3(1.4%)
TSK, median, IQR	39 (34.0-44.0)	1(0.5%)
PCS, median, IQR	21 (12.0-31.0)	3(1.4%)
Pre pain treatment, n, %		
Non	9(4,2%)	
Medication	195 (92.0%)	
Invasive techniques	100 (47.2%)	
Other treatment	73(34.4%)	
Pain medication use, n, %		1(0.5%)
Non	41(19.3%)	
Paracetamol	92(43.4%)	
NSAIDS	73(34.4%)	
Opioid use (without tramadol)	46(21.7%)	
Tramadol	22(10.4%)	
Tricyclic antidepressant	39(18.4%)	
Anti-epileptic	44(20.8%)	
Other pain medications	6(2.8%)	
Treatment, n, %		
Movement therapy	193 (91.0%)	
Invasive techniques	47 (22.2%)	
Pain Medication	43(20.3%)	
Other treatment	29(13.7 %)	
Questionnaire response period, median, IQR	18 (13 – 56)	

Table 1: Baseline characteristics

The study found that the participants reported lower physical health, with a median score of 24 (IQR 18.0-31.0) on the SF-12 physical component. Additionally, the mental component had a median score of 45 (IQR 39.0-50.0), which is slightly below average. The DN4 had a median score of 4 (IQR 2.0-5.0), suggesting that neuropathic pain was present in approximately half of the patients. The median scores for the HADS and TSK were around the cutoff point, with a median score of 6 (IQR 4.0-9.0) for fear, 7 (IQR 3.5-9.0) for depression, and 39 (IQR 34.0-44.0) for TSK. Finally, the median score

for the PCS was 21 (IQR 12.0-31.0), indicating that most participants experienced moderate levels of pain catastrophizing. The response period for the patients' initial PROMs had a median duration of 17 weeks, with an interquartile range of 13.7-56.4 weeks. The most recent patient's response occurred after 155 weeks.

		Mean decrease	T-test
Lowest VAS pre consult, Mean, CI,	4.36 (3,78-4,93)		
Lowest VAS post consult, Mean, CI	3,46 (2,88-4,05)	1.009 (0.719-1.299)	>0.000
Highest VAS pre consult, Mean, CI,	8,48 (8,15-8,81)		
Highest VAS post consult, Mean, CI	7,70 (7,23-8,17)	1.118(0.837-1.399)	>0.000
Combined VAS pre consult, Mean, CI,	12,84 (12,06-13,61)		
Combined VAS post consult, Mean, CI	11,16 (10,22-12,11)	2.127(1.643-2.612)	>0.000

Table 2: Mean VAS scores

Table 2 displays the results of the pre-consultation and post-consultation mean VAS scores, revealing a statistically significant reduction in all VAS scores, including the lowest score (1.009 (0.719-1.299)), highest score (1.118(0.837-1.399)), and the combined score (2.127(1.643-2.612)). However, none of the VAS scores surpassed the MCID.

For all three pain scores, lowest, highest and combined VAS score, there were no significant differences between the three months consultation and 6 months post-consultation scores ($p > 0.05$). The mean differences for the lowest, highest and combined VAS score were -0.015, 0.132, and 0.118 (N=68)

	Mean Difference combined VAS decrease	Sig. (2-tailed)
Sex, male	-.458 (-1.427- 0.512)	0.353
Pain start, abruptly	-0.071 (-1.121-0.979)	0.895
Location		
Head	1.857 (2.983 - 0.731)	0.003
Neck, shoulders, upper back	0.581 (1.627 – -0.465)	0.275
Higher extremities	-1.240 (1.080 - -3.559)	0.279
Lower back	-0.214 (0.485 – -1.239)	0.681
Hips or knee	0.429 (1.485 – -0.628)	0.425
Feed, ankles	1.585 (3.272 – -0.102)	0.065
Thorax, abdomen	-0.016 (2.703 – -2.735)	0.991
Other	1.990 (4,075 - -0,095)	0.061
Previous pain treatment, yes	0.642 (1,622 - -0,339)	0.198
Legal proceedings, yes	1.077 (3,281 - -1,126)	0.336
Help filling out questionnaire, yes	0.608 (1,653- -0.438)	0.248
Referred within outpatient clinic, yes	0.458 (1.434 – -0.518)	0.356
Pre pain treatment		
Non	0.365 (2.348 – -1.618)	0.689
Medication	-1.162 (0.620 – -2.943)	0.200
Invasive techniques	0.544 (1.514 – -0.426)	0.270
Other treatment	1.281 (2.211 - 0.350)	0.007
Pain medication use		
No medication	-0.719 (0.507 – -1.945)	0.249
Paracetamol	-0.499 (-1.063- -0.079)	0.079
NSAIDs	-0.594 (0.428 – -1.616)	0.253
Opioid use (without tramadol)	1.125 (2.296 – -0.047)	0.060
Tramadol	-0.933 (0.658 – -2.524)	0.249
Tricyclic antidepressant	0.428 (1.684 – -0.827)	0.502
Anti-epileptic	0.580 (1.779 – -0.618)	0.341
Other pain medications	0.465 (3.399 – -2.469)	0.755
Treatment		
Movement therapy	-0.140 (1.967 – -2.247)	0.891
Invasive techniques	-1.121 (0.038 – -2.281)	0.058
Pain Medication	-0.161 (1.047 – -0.784)	0.793
Other treatment	0.627 (2.038 – -0.784)	0.382
Called for PROMs, yes	-0.801 (0.212 – -1.814)	0.121

Table 3: Mean difference in VAS score decrease

Table 3 illustrates the mean difference in VAS decrease. Patients with pain located at their head had a significantly lower decrease in VAS (1.857 CI: 2.983 - 0.731). (1.857 CI: 2.983 - 0.731). Patients witch received other pre-consultation treatments also had significant less decrease in VAS (1.281 CI: 2.211 - 0.350). There were no significant pain difference in whether patients have been called or have filled out PROMs.

The R-value is presented in table 4. Here the duration of pain is the only significant determent with a R- of 0.122. If the pain duration is longer dan 8 years there is no longer a significant mean difference. The mean decrease at this point is -0.70 (CI -1.51 – 0.12)

In the subset analysis there were no statistically significant ($P>0.05$) differences observed between the

group of patients who received recommendations to undergo movement therapy and the group of patients who did not receive such advice.

	R-value	P-value
Age	0.122	0.078
Number of pain locations	0.099	0.152
Duration of pain	0.207	0.002
SF-12 psychical	-0.003	0.971
SF-12 mental	0.079	0.269
DN4	-0.009	0.898
HADS Fear	0.046	0.510
HADS Depression	0.042	0.542
TSK	-0.086	0.215
PCS	0.047	0.499
Questionnaire response period	-0.102	0.139

Table 4: Correlation of characteristics and mean VAS score decrease

Discussion

This research study has demonstrated that patients who participated in the CMTC experienced a significant reduction in pain score after 3 months. However, it is important to acknowledge that the reduction in pain did not surpass the MCID. It is possible that other factors, such as regression to the mean, placebo effects, or changes in other treatments or lifestyle factors could have contributed to the changes in pain severity over time. Despite these, there is lot of evidence supporting the effectiveness of movement therapy for chronic pain in adults. Studies have shown that exercise and physical therapy can provide pain relief and improvements in physical function[15–18,25] Furthermore, exercise can also reduce symptoms of depression and anxiety.[15] This study also demonstrates that the effects of the CMTC hour on pain severity in chronic pain patients appear to have a lasting impact. This is demonstrated due to the lack of further significant mean decrease between the three and six month follow-up periods. However, it is important to consider that the earlier stated factors may have contributed to the decrease in pain score. It should be noted that the number of patients who completed both the three-month and six-month VAS scores was relatively small, which may limit the generalizability of the findings.

With two-thirds of the patients experiencing lower back pain, this group is by far the largest. This is not surprising, as when measuring years lived with disability, low back pain has consistently ranked among the leading causes of disability on a global scale.[26] Study show that patients with chronic lower back pain that exercise, when compared to standard care, led to less pain intensity and a better functional ability upon completion of the treatment. However, these effects was reduced during the long-term follow-up period. [27] In a review comprising 37 studies, it was observed that the average reduction in lower back pain, as measured by the Visual Analog Scale (VAS), over a follow-up period of 6-12 weeks was -16.36 [-20.32, -12.40] points on a 100-point scale[25]

The patients in our study scored considerably lower on the SF-12 physical health score (median 24, IQR 18.0-31.0) compared to the general population.[22] Additionally, this score is substantially lower compared to previous research that investigated patients with nonspecific chronic low back pain (mean 36.7, standard deviation ± 9.8).[28] Interestingly, the mental health component of the SF-12 (median 45, IQR 39.0-50.0) remained relatively high, also compared to other research of chronic pain conditions (mean 45.2 standard deviation ± 11.8). [28] The underlying reason for this disparity may be related to the selection of patients referred to this CMTC. Patients with lower physical health scores may benefit more from a consultation focused on movement therapy, as its improves the overall health as stated earlier. Missing in this study is the improvement of the patients physical health score. Its might be interesting to see what the outcome the CMTC is on physical health of the patients. Psychological factors such as fear, depression, and pain catastrophizing were prevalent in a large part of the study population, for these patients movement therapy in the form of psychosomatic physical therapy may offer greater benefits for these individuals.

Patients with pain located in their head had a significantly less decrease in their combined VAS score, indicating a lack of beneficial effect from the CMTC. This may be due to a more frequent underlying issue that is not related to the musculoskeletal system. [29] Alternatively, patients may have been referred to the CMTC for pain at a different location, and the combined VAS score may not accurately

reflect the decrease in pain at that location. The same less decrease of the VAS score is seen in the patients that have had used other pain treatment than invasive, medical or physical therapy treatment. This "other treatment" is thought by the research team to mainly consisted of transcutaneous electrical nerve stimulation. However, it is not clear how many patients received TENS, as this information was not adequately captured. Patients with longer durations of pain complaints showed a lesser reduction in the combined VAS score. After 8 years, patients no longer experienced a significant decrease in the combined VAS score. Earlier research has also indicated that longer durations of pain are associated with reduced physical therapy response or slower improvement [30]. Patients referred from external healthcare provider to the outpatient clinic are selected for the CMTC through a multidisciplinary team. The referral though form within the outpatient clinic or form a external healthcare provider did not make an difference in pain reduction. This finding suggests that a multidisciplinary team can effectively identify suitable patients for CMTC.

Limitations

One of the limitations of our study is the absence of a control group. Without a control group, it is challenging to establish a direct comparison between the outcomes observed in our study and those that could have occurred in the absence of the CMTC.

It would be interesting to investigate the effect of CMTC on patients who have already undergone physical therapy for their pain. However, there were inconsistencies in the reporting in the medical file whether the patient had already received physical therapy, or the patient did not always indicate that they had received it because they did not consider it as a prior pain treatment.

The study had a substantial variation in time taken for patients to fill out the questionnaires. Additionally, there was significant variability in the timing of phone calls made to patients for questionnaire completion when they did not fill out the questionnaires. The time gap between completing the questionnaires may introduce variability in the patients' responses, as their pain levels and perceptions may change over time.[31] Although, a longer time to response to the questionnaire had no significant effect on the pain decrease.

One limitation of our study is the heterogeneity of movement therapies within the CMTC. Different types of movement therapies may have varying effectiveness in addressing patients' pain and improving their outcomes. This heterogeneity limits our ability to draw definitive conclusions about the effectiveness of the CMTC as a whole. Next to the heterogeneity it is unclear whether patients consistently followed the advice given during the CMTC. It is unclear to what extent patients consistently followed the recommended advice and treatment plans provided during the CMTC. Treatment adherence significantly impact the effectiveness of physical therapy interventions. Adherence to physical therapy is particularly low. This is because of initial worsening of pain, kinesiophobia and having lower physical activity capacity at baseline. [32] Future research should focus on exploring patients' compliance with the prescribed movement therapies and obtaining patient-reported data on the specific types of movement therapy they underwent. This additional information would provide valuable insights into the relationship between treatment adherence and the effectiveness of physical therapy interventions within the CMTC.

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