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ORIGINAL REPORT

THE MULTIDISCIPLINARY BIOPSYCHOSOCIAL REHABILITATION PROGRAMME FOR PATIENTS WITH CHRONIC SPINAL PAIN: OUTCOMES WITH WORK STATUS AS THE PRIMARY FOCUS

Charlotte SCHEPENS, MD[1]*, Katie BOUCHE, MD[2], Lutgart BRAECKMAN, MD[3], Pascale ROMBAUTS, MD[1], Patrick LINDEN, MD[1] and Thierry PARLEVLIET, MD[2]

From the [1]Physical and Rehabilitation Medicine, AZ Delta, Roeselare, [2]Physical and Rehabilitation Medicine, Ghent University, Ghent, and [3]Department of Public Health and Primary Care, Ghent University, Ghent, Belgium

Objective: **To assess the efficacy of the multidisciplinary biopsychosocial rehabilitation programme for chronic spinal patients as to work status, physical functioning, pain intensity, health-related quality of life and the psychosocial domain.**

Design: **This is a retrospective, single-centre, observational cohort study.**

Subjects/Patients: **A total of 209 subjects (mean age 41.5 ± 11.4 years) with chronic spinal pain participated in the rehabilitation programme.**

Methods: **Evaluations were conducted through standardized questionnaires at baseline and at the end of the rehabilitation programme.**

Results: **Patients were more likely to be at work. Sick leave and work VAS changed significantly. Patients in blue-collar jobs are less likely to return to work. Pain intensity, physical functioning, health-related quality of life and lumbar and cervical range of motion improved significantly.**

Conclusion: **The multidisciplinary biopsychosocial rehabilitation programme for chronic spinal patients improved the rate of return to work. In daily clinical practice, attention must be given to reducing mobility issues in daily life in order to get patients back to work. The occupational therapist should give patients with blue-collar jobs sufficient attention early in the programme in order to achieve a higher rate of return to work.**

Key words: back pain; chronic pain; rehabilitation outcome; sick leave.

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LAY ABSTRACT

Chronic spinal pain causes more overall disability than any other condition (1). Absenteeism due to illness has become an issue of increasing importance in Belgian and European socio-economic actuality (2). However, to our knowledge, different biopsychosocial outcome measures with special attention to work-related outcomes have never been investigated in Belgium. The objective of the study is to assess the efficacy of the multidisciplinary biopsychosocial rehabilitation programme for chronic spinal patients on different outcome domains such as work status, physical functioning, pain intensity, health-related quality of life and the psychosocial domain. The evaluations were conducted through standardized questionnaires at baseline and at the end of the programme. The pain scores and functional outcomes improved. Improvements were noted in mobility. Patients were more likely to be at work. The multidisciplinary biopsychosocial rehabilitation programme for chronic spinal patients improved the rate of return to work, pain intensity, physical functioning and health-related quality of life.

Correspondence address: Charlotte Schepens, Physical and Rehebilitation Medicine, AZ Delta, Deltalaan 1, BE-8800 Roeselare, Belgium. E-mail: charlotte_schepens@hotmail.com

Chronic spinal pain (> 12 weeks) causes more overall disability than any other condition (1). Furthermore, it is a major cause of absenteeism, presenteeism and incapacity for work in Western industrialized countries (2–5). Due to the high annual economic burden of chronic

spinal pain, return to work has become an increasingly important outcome measure for the efficacy of rehabilitation programmes.

The multidisciplinary biopsychosocial rehabilitation (MBR) programme involves a physical component and at least 1 other element of a biopsychosocial approach, that is, psychological or social and occupational or educational. Prior research provided strong evidence for the effectiveness of the MBR programme for patients with spinal pain, resulting in better outcomes in terms of symptom relief and functional recovery (6, 7). A Cochrane review suggested that these programmes probably also increase the likelihood of patients returning to work (7). However, to our knowledge, different biopsychosocial outcome measures with special attention to work-related outcomes have never been investigated in Belgium.

MATERIALS AND METHODS

This is a retrospective, single-centre, observational cohort study. An analysis was performed on data obtained from the electronic patient record platform on patients who participated in the MBR programme for patients with chronic spinal pain between January 2018 and June 2019. Patients were enrolled in the MBR programme after being referred by a medical doctor according to the known guidelines of the Belgian Health Care Knowledge Centre (KCE). Written informed consent was obtained from all patients before including them in the study. A total of 209 patients referred to the spinal rehabilitation centre in AZ Delta Roeselare, Belgium, were included.

The permission to conduct this study was obtained from the Hospital Research Ethics Committee of Ghent University Hospital and AZ Delta Roeselare in accordance with the institutional rules for human research and the Declaration of Helsinki for Medical Research involving human subjects. This study conforms to all TIDieR and STROBE checklists and reports the required information accordingly (8, 9).

According to the KCE definition of the MBR programme:

"The multidisciplinary biopsychosocial rehabilitation program involves a physical component (such as specific exercise modalities, mobilisation, massage) and at least 1 other element from a biopsychosocial approach, that is psychological or social and occupational or educational (defined educational intervention e.g. education on anatomy, psychology, imaging, coping, medication, family, work and social life).

The MBR approach combines education and physiotherapy, with different forms of cognitive-behavioural psychology to address participants' unhelpful beliefs about their pain, reduce 'fear-avoidance' behaviours and catastrophic thinking and improve mood, thus decreasing disability and improving function. Following treatment modalities have been provided to the patients: functional and psychosocial evaluation (including questionnaires), information/education (biopsychosocial influencing factors), ergonomics (including work-related adjustments if applicable) and an individualized exercise program (6)." Exercises on the Tergumed devices were part of this programme and aimed at progressive resistance training of the trunk muscles and the spine's range of motion. The loads were set based on the initial evaluation. In case of pain exacerbation, loads were reduced.

The different components of the intervention are offered as an integrated programme. The MBR programme is in accordance with the definition of the KCE, as explained above in this article, and consists of 36 sessions, each 2 h long, at a pace of 2 sessions each week. The sessions are delivered face to face. From session 10, progressive resistance training with the Tergumed system is started.

Adherence to the MBR programme was assessed by the registration of presence during the programme. Eighty-seven per cent of the patients completed 33 sessions or more of the programme.

Evaluations were conducted as part of the programme at baseline and at the end of the MBR programme. The evaluation sessions consisted of questionnaires covering different domains of the MBR programme and included the following components:

Average pain intensity was monitored with the Visual Analogue Scale (VAS). The VAS is a generic measuring instrument. Participants were asked to make a hatch mark on a 100 mm line representing their average pain intensity over the previous 7 days, with the ends labelled as the extremes of pain. A higher score indicates more pain. The Tampa Scale for Kinesiophobia (TSK) evaluates fear of movement. It is a 17-item scale. Each item has 4 scoring options, varying from "strongly disagree" to "strongly agree." A higher score implies greater fear. The Beck Depression Inventory (BDI) is a self-report measure consisting of 21 items. A higher score shows a higher level of depression (10, 11).

Neck and low back pain-specific disability was measured with the Oswestry Disability Index (ODI) and the Neck Disability Index (NDI). With the ODI, all patients were asked to answer 10 questions concerning activities of daily living that might be disrupted by low back pain. Each question has 6 response options. The first option indicates no problem with the activity of daily living, and the 6th option indicates that the activity is not possible. The NDI is a modification of the ODI in which the 10 items are adjusted for patients with neck complaints. The EuroQol-5D-5L is a generic instrument to measure and evaluate health-related quality of life (HQRL). It is used for clinical and economic appraisal. The EQ-5D is a 6-item questionnaire. The first 5 questions cover different dimensions: mobility, self-care, activities of daily life (ADL), pain and anxiety/depression. These dimensions can be scored on scale categories of 1–5: no problems (Level 1); slight (Level 2); moderate (Level 3); severe (Level 4) and extreme problems (Level 5). The 6th question rates the patient's current state of health on a scale of 0 to 100, with higher scores reflecting a better state of health (12, 13). The Tergumed system is a fixed-weight resistance system which measures the range of motion (14).

Whether the patient is on sick leave or not at the start and the end of the MBR programme was assessed based on data obtained at the intake and final visits with the occupational therapist. Profession and collar colour were retrieved from the intake visit and coded with a blue, pink or white collar colour. Supervisor/manager and administrative roles were coded as white-collar professions. Pink-collar jobs included care workers, jobs in the service industry and hospitality. Manual labour jobs were coded as blue-collar jobs. Work VAS rates the patient's current health status with regard to their work on a scale from 0 to 10. Higher scores indicate greater interference of their health status on their work.

Statistical analysis was performed using version 27.0 of the SPSS programme (IBM, Armonk, NY, US). *P*-values smaller than 0.05.

The Generalized Estimating Equations method was performed to determine whether there was an association between a patient being on sick leave or not (Y = 1 and N=0) and mobility, pain, TSK, and Tergumed extension. We selected these 5 variables based on the literature and clinical knowledge to avoid overfitting the model (15).

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RESULTS

Patients' characteristics are shown in Table I. A total of 104 subjects had a blue-collar profession (49.8%), 36 subjects had a pink-collar profession (17.2%) and 66 had a white-collar profession (31.6%) (Table I).

Pain scores, the ODI, NDI, lumbar and cervical range of motion, the EQ-5D-5L scale categories and the EQ-5D-5L VAS score for patients with chronic spinal pain all improved significantly. The kinesiophobia did not improve significantly from baseline; see Tables II–IV.

At the start of the MBR programme, 86 out of 209 patients were on sick leave. At the end of the MBR programme, only 42 patients were on sick leave (Fig. 1). Sick leave changed significantly after participation in the MBR programme ($p<0.001$). Patients were more likely to be at work following the MBR programme. When we look at the different collar colour categories, we see the highest rate of return to work in the white-collar group, followed by the pink-collar and blue-collar groups. Of the white-collar group, 84% of those not at work at the start of the MBR programme returned to work, while 71.4% of the pink-collar group and only 42.85% of the blue-collar group returned to work.

Table I. Population characteristics ($n=209$)

Characteristics	Subject	*n* (%)
Sex	Male	68 (32.5)
	Female	141 (67.5)
Age in years	Mean (Standard Deviation)	41.5 (11.4)
Location of spinal pain	Cervical	32 (15.3)
	Lumbar	177 (84.7)
Collar colour	Blue	104 (49.8)
	White	66 (31.6)
	Pink	36 (17.2)
Sick leave	Retirement	3 (1.4)
	At the start of the MBR programme	86 (41.15)
	After the MBR programme	42 (20.10)

MBR: multidisciplinary biopsychosocial rehabilitation.

Chronic spinal pain interfered less with patients' work following the MBR programme. The mean work VAS after the MBR programme (M=3.89, SD=2.80) did differ significantly from the mean work VAS at baseline (M=5.60, SD=2.94). The estimated mean difference in

Table II. Wilcoxon signed-rank test: VAS, Work-VAS, TSK, ODI, NDI and EQ-5D-5L ($n=209$)

Parameters	Start of MBR-programme Mean (SD)	End of MBR-programme Mean (SD)	Start MBR-programme Median	End MBR-programme Median	Start MBR-programme IQR	End MBR-programme IQR	*p*
VAS	3.88 (1.86)	1.99 (1.37)	4	2	3	2	<0.0001
Work-VAS	5.60 (2.94)	3.89 (2.80)	6	3	5	4	<0.0001
TSK	34.40 (7.90)	33.78 (7.86)	34.5	33	10	10.1	0.878
ODI	12.16 (5.97)	8.46 (6.14)	12	7	8	7	<0.0001
NDI	15.34 (5.09)	12.83 (6.43)	16	12	8.3	3.7	<0.05
Mobility *EQ-5D-5L*	1.91 (0.816)	1.45 (0.706)	2	1	1	1	<0.0001
Selfcare *EQ-5D-5L*	1.23 (0.465)	1.10 (0.340)	1	1	0	0	<0.0001
Activity *EQ-5D-5L*	2.58 (0.90)	1.89 (0.729)	3	2	1	1	<0.0001
Pain *EQ-5D-5L*	2.83 (0.753)	2.11 (0.726)	3	2	1	1	<0.0001
Anxiety *EQ-5D-5L*	1.44 (0.705)	1.29 (0.625)	1	1	1	0	<0.003
EQ-VAS	64.06 (15.93)	73.46 (12.91)	70	75	20	15	<0.0001

Note: VAS: Visual Analog scale; TSK: Tampa scale For Kinesiophobia; ODI: Oswestry Disability Index; NDI: Neck Disability Index; MBR: multidisciplinary biopsychosocial rehabilitation; IQR: interquartile range.

Table III. Paired *t*-test: Lumbar Tergumed scores ($n=177$)

Parameters Lumbar	Start of MBR programme Mean (SD)	End of MBR programme Mean (SD)	Mean difference	95% confidence interval of thedifference	*p*
Flexion	55.92 (22.67)	77.52 (24.33)	−18.0	−20.57, −15.43	<0.001
Extension	53.50 (23.19)	74.43 (26.81)	−20.92	−24.42, −17.43	<0.001
Rotation left	41.23 (21.16)	64.26 (24.99)	−23.03	−25.80, −20.25	<0.001
Rotation right	40.34 (20.86)	60.54 (23.45)	−20.20	−23.91, −17.21	<0.001
Lateroflexion left	51.53 (23.94)	64.26 (24.99)	−12.73	−16.25, −9.21	<0.001
Lateroflexion right	46.15 (19.43)	62.63 (23.48)	−16.49	−19.53, −13.45	<0.001

Note: MBR: multidisciplinary biopsychosocial rehabilitation.

Table IV. Paired *t*-test: Cervical Tergumed scores ($n=32$)

Parameters Cervical	Start of MBR programme Mean (SD)	End of MBR programme Mean (SD)	Mean difference	95% confidence interval of the difference	*p*
Flexion	45.86 (31.62)	68.86 (42.85)	−23.00	−36.46, −9.54	<0.002
Extension	41.03 (31.69)	64.83 (34.35)	−23.79	−37.02, −10.56	<0.001
Lateroflexion left	42.28 (31.01)	69.28 (42.80)	−27.00	−36.01, −17.94	<0.001
Lateroflexion right	40.38 (33.70)	64.83 (34.35)	−24.45	−36.55, −4.14	<0.001

Note: MBR: multidisciplinary biopsychosocial rehabilitation.

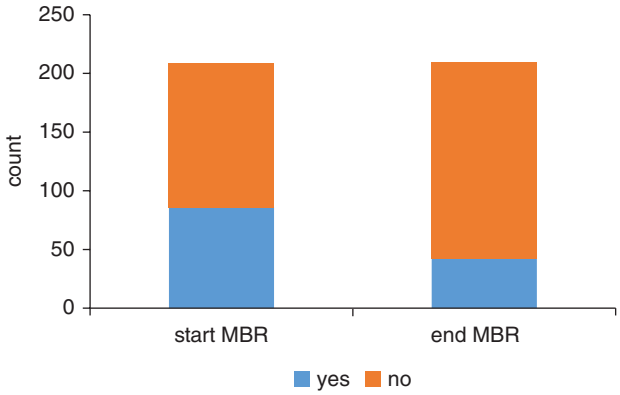

Fig. 1. Sick leave before and after the multidisciplinary biopsychosocial rehabilitation programme ($n = 206$).

work VAS after the MBR programme compared to baseline is 1.71, with 95% CI [1.28, 2.14], $p < 0.001$ (Table II).

The odds of being at work after participating in the MBR programme are twice as high as before the MBR programme for equal values on time with OR 95% CI [1.254–3.267] (Table V).

A 1-unit decrease in EQ-5D-5L mobility results in a significant increase in the rate of being at work (OR = 0.669). We see a significant increase in the odds of being at work when there is a 1-unit decrease in the score of the EQ-5D-5L mobility dimension. There is no significant interaction between mobility and time.

There is no relation between the score of the EQ-5D-5L pain dimension, the TSK score and the Range of Motion in extension and being at work after the MBR programme (Table V).

DISCUSSION

The main purpose of this study was to evaluate the efficacy of the MBR programme for chronic spinal pain patients on different outcome domains with the primary focus on return to work.

Pain intensity showed an overall decrease of 49% at the completion of the MBR programme. Similar findings recur with the mean EQ-5D-5L pain score. The minimal clinically important change (MCIC) for the VAS score is considered to be >2 cm in patients with chronic low back pain. The result in our study is not considered to be clinically significant (16), as opposed to the change in the EQ-5D-5L pain score, which is considered to be clinically significant in our study. The EQ-5D-5L scale categories have an MCIC of 0.03 in chronic low back pain (13).

The ODI and NDI improved significantly from baseline to the end of the MBR programme (Table II). The result in our study is not considered to be clinically significant (16). The changes for all the EQ-5D-5L scale categories, specifically mobility, self-care, usual activities, pain and anxiety, are considered to be clinically significant in chronic low back pain. The EQ-5D-5L scale categories have an MCIC of 0.03 in chronic low back pain. Unfortunately, the MCIC for chronic neck pain is not available (15).

The MBR programme investigated in this study improved the likelihood of being at work. Sick leave and the mean work VAS changed significantly after participating in the MBR programme ($p < 0.001$). Chronic spinal pain interfered less with patients' work after the MBR programme. More specifically, the Generalized Estimating Equations method indicates that the odds of being at work after participating in the MBR programme are twice as high as before the MBR programme (Table V). When patients report fewer problems with mobility, we see a significant increase in the odds of being at work (OR = 0.669). This finding may indicate the importance of good mobility as a factor in returning to work, as implicated in the significant correlation between improvement in overall mobility (walking, cycling, etc.) and returning to work.

There are some limitations to this study which could be improved. First, the study may be susceptible to selection bias. Only patients who signed the informed consent were included in the study. Furthermore, it can be assumed that only patients who are motivated will start with the MBR programme. The strongest limitation of the study is its observational and retrospective nature. Moreover, it concerns a single-centre study. Patient selection was not randomized, and the cohort may not be fully representative of the population of patients with chronic spinal pain. Due to the observational design of the study, we cannot report on the causality of the observed findings. Because of the absence of a control group, it cannot be stated that the MBR programme is of benefit, and neither can we say that the MBR programme is of no advantage. However, previous studies have already shown that mobility improved after the MBR programme (17–20). In addition, the correlation between return to work and the EQ-5D-5L mobility score has been demonstrated in our study. Lastly, in clinical practice, we see that when patients with chronic spinal pain do not get any treatment, most of them do not return to work because of the chronic character of the pathology.

Table V. Association between a patient being on sick leave or not and mobility, pain, TSK, Tergumed extension generalized estimating equations: OR, Standard error, 95% CI, *p*-value ($n = 206$)

Parameters	Odds ratio	Standard error	95%CI	*p*
Time	2.024	0.2442	(1.254–3.267)	0.004
Mobility	0.669	0.1800	(0.470–0.952)	0.026
Pain	0.383	0.1609	(0.1634–1.191)	0.383
TSK	0.980	0.0166	(0.949–1.013)	0.227
Tergumed extension	0.998	0.0050	(0.988–1.008)	0.703

Note: TSK: Tampa Scale for Kinesiophobia; CI: confidence interval.

Therefore, we are of the opinion that our results support the idea that the MBR programme led to a positive clinical evolution with more patients returning to work.

Cross-country differences in return to work in patients with chronic spinal pain are difficult to compare, given the various interventions applied. Additionally, there are also large cross-country differences in disability policies (21). Economic aspects were not included in this study. Results of a study conducted in the Netherlands suggest that interventions aimed at return to work should also focus on economic incentives (22). Future research should include these factors.

in conclusion,in daily clinical practice, sufficient attention must be given to restore normal mobility and reduce mobility issues in daily life to get patients back to work. Patients with blue-collar jobs are less likely to return to work. The occupational therapist should give this population sufficient attention early in the programme in order to achieve a higher rate of return to work.

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