A screening questionnaire to predict no return to work within 3 months for low back pain claimants

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Abstract The objective of the present study was to develop a short prediction questionnaire for estimating the risk of no return to work (RTW) within 3 months of sick leave to facilitate triage and management of a patient population of subacute low-back pain (LBP) sufferers. We conducted a prospective study with a 3-month follow-up on 186 patients with LBP introducing a claim for sickness benefits to the largest sickness fund in Belgium. Patients completed a screening questionnaire within 2 weeks after claim submission. All patients were invited for clinical assessment, at 6–8 weeks of sick leave, by the medical adviser. Patients' work status was recorded by the sickness fund. About 20% of the patients did not resume work at 3 months' sick leave. They were more likely to experience pain below the knee, to have an own previous prediction of a 100% no RTW and to have a severe interference of pain on daily activities. The screening tool based on these three items correctly classified 73.7% of the non-resumers and 78.4% of the resumers at a cut-off score of 0.22. The findings of this study provide evidence of the utility of a short screening questionnaire for future use in intervention studies in a social security setting.

Keywords Low back pain · Return to work · Screening · Predictors · Outcomes

Introduction

Although episodes of acute low back pain (LBP) are mostly short-lived and 80% of attacks of LBP recover in about 6 weeks, back complaints still constitute the second most common symptom after upper respiratory complaints [22]. Disability and early retirement from back pain places a significant socioeconomic burden on the individual and the community and are rising exponentially [15]. Most of the costs linked to the treatment of back pain apply to a small proportion of sufferers experiencing persistent symptoms leading to disability [5, 25].

Obstacles to recovery and return to work (RTW) usually fall under the categories red and yellow flags [10, 20]. Persistent disabling symptoms may be prevented by early identification and modification of psychosocial factors that have been shown to be effective when implemented early in the course of back pain and play even an important role in the transition from acute to chronic LBP [9]. Maladaptive attitudes and beliefs concerning back pain, particularly fear-avoidance beliefs, pain-coping strategies, reinforcement of pain behaviours by family members, and job dissatisfaction are important issues to consider when treating patients with back pain [21].

Multiple questionnaires are available for the assessment of LBP and disability, but only some address the problem of predicting which patients with LBP will develop long-term incapacity [6, 8, 20]. Most of these questionnaires have been set in the workplace or a primary care setting and require a long period for completion [7]. They mainly focus on administrative or clinical predictors, whereas back pain is a multidimensional health problem. A systematic review of the literature on prognostic factors for duration of sick leave for patients with acute LBP identified promising factors like expectations of workers, general health, job

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characteristics, attorney involvement, continuity of care, body mass index, lack of energy, life events and quality of management of LBP in occupational care [23].

In a former study, we identified a small number of important risk factors at 6 weeks of sick leave in a LBP population to predict no RTW at 3 months. Further investigations in other patient samples are needed to confirm the reliability and validity of a screening tool based on these prognosticators.

The present study aims to establish a screening questionnaire that would accurately assess LBP claimants who were not likely to resume work over a 3-month period of sick leave. Such a screening tool has to be practical to administer and not burdensome to medical advisers in identifying risk patients who need more intensive education, management and follow-up.

Materials and methods

Population

In Belgium, the compulsory social health insurance covers the entire population. When an employee becomes disabled, the first 2–4 weeks of work incapacity are paid by the employer. If work incapacity continues, the patient applies for a social security benefit by sending a medical certificate of the treating physician to the medical adviser of the sickness fund. Claim assessment, follow-up evaluation and the decision about benefit entitlement are done by the medical adviser. There is no time limit for coverage. Participants consisted of 186 patients entitled to sickness allowance by the Alliance of Christian Sickness Funds because of LBP. Patients with a certified diagnosis of lumbago, disc hernia or dorsal pains were identified by the medical adviser of the sickness fund. Patients suffering from LBP with neurological progression, infection, fracture, tumour or inflammation were excluded. Claims related to surgical operation for LBP were not entertained either.

Screening questionnaire

The questionnaire consisted of eight areas of medical and psychological functioning that are potential correlates of outcome. These areas included location of LBP, duration of symptoms, patient's own prediction, interference of pain on daily activities, patient's opinion about physical activity and perceived nervousness and anxiety. We identified eight screening questions from standardized questionnaires and included the Oswestry Disability Scale.

Design

The selected patients were sent the screening questionnaire. They were asked to fill out the questionnaire and to send it back to the medical adviser. Approximately 4–6 weeks after claim introduction, patients were invited by letter to the medical adviser's office for disability assessment unless they had in the meantime resumed working activities.

Outcome

A good outcome was defined as return to the previous occupational level at 3 months after the first day of sick leave. All other cases were classified in the no RTW group.

Analyses

Results were analysed using SPSS Version 15.0 (Chicago, Illinois). $P < 0.05$ were considered statistically significant. Logistic regression, applied because the length of follow-up was equal for all subjects and the outcome binary, was chosen for its ability to provide more accurate estimates when both continuous and categorical variables are used. Univariate logistic regression analysis was used to explore the association of the result to each question with the RTW status at the 3-month follow-up. Questions with more than two response categories were dichotomized using the cut-off point with both optimum sensitivity and specificity. Multiple logistic regression was used to identify factors independently associated with the RTW status at 3 months follow-up. All questions and Oswestry Disability Index were entered; non-significant variables were removed stepwise until all remaining variables had a significance of $P < 0.05$.

Receiver operating characteristic (ROC) curve was calculated to show the sensitivity and specificity of the screening tool.

Results

Subjects

We attained a 100% unit and item response. There were no missing data. The LBP diagnosis of the treating physician was confirmed by the medical adviser in all cases. The final sample consisted of 186 claimants, 110 males and 76 females with a mean age of 42.5 years ($SD \pm 10.55$). About 26.3% of the patients suffering from LBP had also pain below the knee. About 30.1% of the patients reported more than 12 weeks of LBP.

Return to work

About 20.4% claimants did not resume work at 3 months follow-up. About 27.6% of the female claimants were not able to RTW within 3 months versus 15.5% of the male patients ($P = 0.043$). The resumers and non-resumers did not significantly differ by age ($P = 0.860$).

Predictors

Table 1 shows the univariate associations of the nine questions with the RTW status.

The logistic regression analysis yielded a model with three variables, which provided a good fit to the data (Hosmer and Lemeshow Test χ^2 [four df] = 6.025, $P = 0.197$). Table 2 presents the results of this model. The regression coefficients indicate the magnitude of effect of each predictor on the log-odds of RTW with all the remaining variables held constant.

The model had a good ability to discriminate between the two outcome groups (c statistic = 0.801: 95% Confidence Interval: 0.727–0.876). LBP claimants who were not able to resume work within 3 months were more likely to experience pain below the knee, to have an own prediction of a 100% no RTW and to have a severe interference of pain on daily activities. In addition, age and sex were not significantly related to the RTW status.

When plotted as an ROC curve, the logistic regression model was highly sensitive and specific in that it was able

to correctly identify 73.7% of the non-resumers and 78.4% of the resumers at the cut-off point of 0.22 (Fig. 1).

Screening questionnaire

The three questions were rounded into weighted scores for a screening test (Table 3). Patient's own prediction of a 100% non-return or a severe interference of pain on daily planning are each indispensable and sufficient items to categorize a patient as having a high risk of non-resuming activities. LBP irradiating below the knee as such is an insufficient item to select high-risk patients. In the presence of one or both former items, however, it maximizes the discriminatory qualities of the model.

Discussion

Studies of the natural history of LBP show that it is a commonly persistent or recurrent problem and most workers do continue working or RTW while symptoms are still present [12]. Epidemiological studies show that early RTW with some persisting symptoms does not increase the risk of re-injury but actually reduces recurrences and sickness absence over the following years. We found that 20% of the claimants were unable to resume work at 3 months' follow-up. The natural history of back pain is however favourable since overall studies show that 30–60% of patients recover in 1 week, 60–90% recover in

Table 1 Variables related to return to work status assessed by χ^2 -tests: univariate comparisons

Variable	Returned to work ($n = 148$)	Not-returned to work ($n = 38$)	Odds ratio (confidence interval)
Pain location last week			
Below knee, %	21.6	44.7	2.9 (1.4–6.2)
Location of most pain last week			
Leg, %	16.2	26.3	1.8 (0.8–4.3)
Duration of present pain			
More than 12 weeks, %	44.6	73.7	3.5 (1.6–7.7)
Probability of returning to work within 6 months			
Very sure(ten on a ten point Likert scale), %	79.1	42.1	5.2 (2.4–11.1)
Interference of pain in daily activities			
Very important impediment(≥ 8 on a ten point Likert scale),%	48	84.2	5.8 (2.3–14.7)
Currently, it's not advisable to be physically active			
Agree to strongly agree, %	54.1	84.1	4.5 (1.8–11.5)
Feeling of nervousness			
Much to very much	53.4	73.7	2.4 (1.1–5.4)
Feeling of anxiousness			
Much to very much	37.2	52.6	1.9 (0.9–3.9)
Oswestry disability index >40%	33.1	63.2	3.5 (1.6–7.3)

Table 2 Logistic regression for questionnaire items that best identify cases that not returned to work

Items selected by the regression	Odds ratio (confidence interval)
Pain below knee	2.5 (1.1–5.8)
Not very sure to return to work within 6 months (<10 on a ten point Likert scale)	4.6 (2.1–10.3)
Very important interference of pain in daily activities (≥ 8 on a ten point Likert scale)	4.7 (1.8–12.5)
Constant

Fig. 1 Receiver operating characteristic (ROC) curve. This graph plots sensitivity versus 1-specificity giving rise to ROC curve. The graph shows area under the curve = 0.8. Point 0.22 represents the cut-off point with a sensitivity of 73.7% and a specificity of 78.4%

6 weeks and 95% recover in 12 weeks. Our no RTW figures may be inflated because the study population were claimants, whereas every patient with LBP will not

necessarily introduce a claim. Additionally the results are not necessarily representative for all LBP patients. Our cohort consists of patients who claim a social insurance benefit and the results must be interpreted within the context of a compulsory social security scheme.

The present study has shown that the variables independently associated with no RTW within 3 months of sick leave principally involved patient's own prediction, sciatic pain and interference of pain in daily activities. The results found in this study are consistent with those of previous findings illustrating the diversity of the obstacles to RTW. Scientific evidence demonstrated that the development of chronic pain and disability depends more on individual and work-related psychosocial issues than on physical or clinical features [1, 13, 14].

The patient's own prediction improves the prediction of RTW outcome. This corroborates with the evidence review for UK occupational health guidelines by Waddell and Burton. They found that the worker's own beliefs that their LBP was caused by their work and their own expectations about inability to RTW are particularly important [4, 11, 17, 19, 27]. A systematic review by Mondloch et al. summarized the mechanisms by which expectations can affect outcomes [16]. Self-efficacy, previous experience, vicarious learning, verbal persuasion and social support were all thought to contribute to recovery expectations. Feelings and perceptions may affect biological processes through behavioural and non-behavioural mechanisms such as triggering of a physiologic response, helping to motivate patients to achieve better outcomes, conditioning the patient psychologically to observe certain types of symptoms and ignore others, changing the understanding of the disease, or provoking anxiety to heighten or reduce symptoms. According to Cole et al., expectations may provide useful information on the complex process of

Table 3 Screening three-item questionnaire for patients at high risk of no return to work within 3 months. Patients at risk have a score of four or more

Question	Score
1. Where did you have pain last week?	
Back or above knee only	0
Below knee also	2
2. In your estimation, what are the chances that you will be able to resume work in six months? Circle one number	
0 1 2 3 4 5 6 7 8 9 10	10 = 0
No chance Very large chance	nine or less = 4
3. How much has your pain interfered with your ability to plan activities? Circle one number	
0 1 2 3 4 5 6 7 8 9 10	eight or more = 4
No interference Very large interference	seven or less = 0

recovering from work-related soft-tissue injuries. For clinicians, patients' negative or uncertain expectations may indicate the need for further intervention on psychosocial factors to facilitate recovery [3].

Severity of pain also appears to be an important predictor. Turk found that because pain severity is subjective it is influenced by numerous factors other than physical pathology [24]. Pain should be viewed as a psychosomatic factor that bridges physical and psychological domains.

Our study has demonstrated that sciatic pain is a significant predictor of no RTW. The likelihood of returning to work varied with location of pain, with sciatic pain patients being 150% more likely not to RTW. Similarly, neurological compression is a decisive predictor for the improvement in subjective disability in activities of daily living. This is not in line with the finding that bed rest is not more effective for treating sciatica than encouraging activity within comfort range [26]. Activity neither increases the risk of progression, nor does slow the rate of recovery. Acute non-progressive sciatica can be treated the same as mechanical LBP.

The risk-screening questionnaire was developed to identify the smallest possible number of questions that would permit acceptable discrimination between claimants who returned to work within 3 months and claimants who did not. Especially, patient's own prediction is a very important risk factor for disability and opens the perspective for modification by medical reassurance. The risk-screening questionnaire developed from the three variables with the greatest combined predictive power had very good discriminatory ability, with a cut-off score of four or higher indicating high likelihood of no RTW and low misclassification rate. The questionnaire is short enough and simple to score to be of practical application in a busy medical setting such as the medical adviser's practice in the sickness fund. The questionnaire could be sent to and completed by the patients. The medical advisers could score the questionnaire to help focus special attention to the 20% of claimants that would not RTW within 3 months. These claimants should be seen as soon as possible by the medical adviser of the sickness fund. There is strong empirical evidence that treatment at the sub-acute stage is more effective at preventing chronic pain and disability than attempts to treat chronic intractable pain and disability once it is established. One of the important treatment goals should be the carefully guided RTW of patients with a low-back disorder. They need an intensive medical evaluation and a focused intervention. Our findings suggest possible mechanisms of sub-optimal efforts of rehabilitation and RTW [18]. Patient's fear can worsen, for example, if patients perceive an important influence of back pain on daily activities and if there is a dismissive approach by the physician. In this instance, patients may be motivated to seek treatment elsewhere entailing a risk on conflicting

recommendations and further confusion. Evidence tells us that the essentials for a successful RTW are reassurance upon the benign condition of LBP, encouragement to return early to normal activity and early support in the workplace facilitating progressive return to normal work [10, 25]. Medical reassurance is probably the most cost-effective intervention for minimizing pain-related disability [2]. To do this successfully, health care providers must instill confidence in patients, which necessitates a careful physical examination and the willingness to take the necessary time to confidently reassure the patient. This may substantially alter patient's own prediction.

There are several drawbacks introduced by the study design and method. First, in the letter sent to the claimants it was emphasized that the information given by the patients was an important source of knowledge for the medical adviser to accomplish his legal function as manager of sickness absence. Thus, it is possible that some patients would respond in a dishonest way to mislead the medical adviser. Second, the letter was not administered by trained interviewers but was sent to the patient instead. This aspect of the study enhanced the probability that the questionnaire was not filled out by the patient but by a relative or other person. This might have led to biased responses. A potential limitation of this investigation may also be the relatively small number of cases included. Given the small number of variables and the geographic range we feel able to conclude our study focussing on the most important predictors. Consistency and inter-rate reliability of the screening instrument have not been established. Our screening instrument is purported to assess the probability of RTW. Its predictive validity should be further investigated. In a planned intervention study a comparison must be made between the predictive value of the screening instrument and the actual RTW rate. Finally, our sample is drawn from a worker's compensation population; hence generalizing our findings to other settings must be done with caution.

The strength of this study lies in its prospective design and the inclusion of claimants from multiple regional offices and medical advisers of the sickness fund. By using multiple offices the study has limited the influence of medical adviser-specific factors during follow-up that might influence the RTW status.

Conclusions

Our results suggest that sciatic pain, patient's own prediction and severity of pain on daily activities are the factors robustly related to increased risks of non-RTW among claimants with LBP. A screening instrument based on these elements can identify social security claimants at

risk of not returning to work within 3 months. The reliability and validity of the questionnaire has to be evaluated in a prospective intervention study.

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