

Clinical prediction rule for return to work after back pain

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Back pain is the main cause of work absence and disability in industrialized societies, and one of the most common reasons for a visit to a physician.¹ Effective treatments for workers with back pain range in complexity and cost from simple advice and reassurance,² through exercise programs,³ to functional restoration programs that involve 4–6 weeks of full-time multidisciplinary treatment.⁴ The more expensive treatments are usually reserved for workers who are believed to have a poor prognosis; however, this approach presumes that it is possible to reliably identify these individuals.

A large number of studies have attempted to identify predictors of poor outcome in people with back pain. The most consistently identified predictors are psychosocial; for example, mood, thoughts and feelings about the person's back pain and the perceived support from workplace and family.⁵ Combining single predictors to develop an algorithm for identifying workers with a high risk for poor outcome has been attempted less often, and rarely done well. That is why Dionne and colleagues' study⁶ is important (see page 1559).

Dionne's group enrolled a prospective cohort of 1007 consecutive workers with back pain presenting to primary care, collected data on potential predictors at baseline and then followed the workers for 2 years. The constructs measured as potential predictors were very broad and included sociodemographic, anthropometric, health behaviour, clinical, occupational and psychological factors. A successful return-to-work outcome required the worker to be at his or her normal job with minimal recent work absences and minimal disability. The authors then used recursive partitioning to develop a clinical prediction rule that can be used to identify workers at risk of poor outcome. The 7 predictors were the patient's expectations of recovery, radiating pain, previous back surgery, pain intensity, frequent changes of position because of back pain, irritability and bad temper, and difficulty sleeping.

This study is significant because it is the first to both derive and validate a clinical prediction rule for identifying those at high risk of a poor occupational outcome. The study is also important because the authors measured return to work in a more meaningful way than usual. Too often, researchers have measured return to work on a yes/no scale,⁷ which may be simple for data collection and analysis

but ignores the reality that return to work in good health is a multidimensional construct. The return-to-work goal should arguably be *durable* return with no functional limitations, which is what is reflected in Dionne and colleagues' definition of a successful outcome. The study had good follow-up, and because classification error rates of the final predictive model were similar between the derivation and validation samples, the obtained solution seems robust.

Unfortunately, the algorithm overall is not as accurate as we might wish. Its classification error rate is about 40%, which is only a little more accurate than simply advising all patients that their prognosis is good — the advice in most guidelines for managing lower-back pain.⁸ Because the prevalence of success at 2 years in the Dionne group's sample was about 55%, a strategy of telling all patients that they will recover would produce a classification error rate of 45%. However, other clinical algorithms often do no better than this. The classification error rates of the best-known tool, the Orebro Musculoskeletal Pain Questionnaire,⁹ is 20%–30% for prediction of recovery of function, for example, and 30%–50% for prediction of pain recovery. Dionne and colleagues considered all constructs known or believed to be important prognostic factors, so it is unclear why better prediction was not achieved. Our current understanding about back pain perhaps makes more accurate prediction impossible.

Although overall the algorithm is not that accurate, the negative predictive value was much higher than the positive predictive value, meaning that the algorithm is much better at predicting those who will not have a poor outcome than those who will. Moreover, there are individual decision pathways within the algorithm where classification error appears to be small, which means that accurate prediction may be possible for some workers. The authors have provided some examples in Fig. 3; however, a note of caution is essential. Extrapolation of the predictive values in Fig. 3 is meaningful only in groups of patients with similar prevalences; this is because, as noted in a footnote to their Table 3, positive and negative predictive values of tests are influenced by the prevalence of the underlying disorder.¹⁰ If Dionne and colleagues had provided counts rather than percentages, likelihood ratios could be derived that would allow clinicians to quickly generate patient-specific estimates of prognosis using a simple nomogram. This would allow the algorithm to be used in patient populations

among which the probability of return to work differs from that in the study under discussion.

Can this or other algorithms assist treatment selection? The authors suggest that the algorithm can be used in deciding the best allocation of clinical resources for patients with back pain, and they provide some examples. The rationale is that more extensive multidisciplinary treatment should be reserved for those at high risk of a poor outcome. Although this treatment approach appears sensible, Dionne's group provides no direct data to support the suggestions. One study, however, does provide some data to confirm the treatment suggestions provided by the authors: Haldorsen and coauthors¹¹ randomly assigned employees sick-listed for a long period to receive usual care or a brief or extensive multidisciplinary program. Consistent with the treatment suggestions of Dionne and colleagues, those classified as having a high risk for a poor outcome did much better with an extensive multidisciplinary treatment, whereas for those with a good prognosis, the 3 treatments showed equal effectiveness. It would make sense to offer these patients the simpler and cheaper management options. Unfortunately, there are no other studies like that of Haldorsen's group, and further evaluation of this issue is therefore required.

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Competing interests: None declared.

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