Employees with common mental disorders: from diagnosis to return to work
Nieuwenhuijsen, K.

Citation for published version (APA):
Nieuwenhuijsen, K. (2004). Employees with common mental disorders: from diagnosis to return to work

General rights
It is not permitted to download or to forward/distribute the text or part of it without the consent of the author(s) and/or copyright holder(s), other than for strictly personal, individual use, unless the work is under an open content license (like Creative Commons).

Disclaimer/Complaints regulations
If you believe that digital publication of certain material infringes any of your rights or (privacy) interests, please let the Library know, stating your reasons. In case of a legitimate complaint, the Library will make the material inaccessible and/or remove it from the website. Please Ask the Library: http://uba.uva.nl/en/contact, or a letter to: Library of the University of Amsterdam, Secretariat, Singel 425, 1012 WP Amsterdam, The Netherlands. You will be contacted as soon as possible.

UvA-DARE is a service provided by the library of the University of Amsterdam (http://dare.uva.nl)
Chapter 4

Predicting return to work in patients with common mental disorders in occupational health care
Abstract

Objective To determine what factors best predict the duration of absence from work in employees with common mental disorders.

Methods A cohort of 188 employees with common mental disorders on sick leave was followed for one year. To be of clinical use to the occupational physician, only information that was potentially available during a first consultation was included in the predictive model. The following 13 variables were included: diagnosis, severity of depressive symptoms, work-relatedness of disorder, pre-baseline duration of symptoms and pre-baseline days of sickness absence, age, gender, marital status, educational level, recovery expectation of the patient, job demands, supervisor support, and co-worker support. The predictive power of these variables was tested using a Cox’s regression analysis with a stepwise backward selection procedure. The hazard ratios (HRs) from the final model were used to deduce a simple prediction rule. The resulting prognostic scores were then used to predict the probability of not returning to work after 3, 6, and 12 months. Calculating the area under the curve (AUC) from the ROC curve tested the discriminative ability of the prediction rule.

Results The final model resulted in four predictors of a longer time till return to work: age older than 50 (HR 0.5), expectation of duration absence longer than 3 months (HR 0.5), educational level medium or high (HR 0.5), and diagnosis depression and/or anxiety disorder (HR 0.7). The prediction rule stated that one point has to be assigned for each of the predictors if present. The resulting prognostic score yielded areas under the curves of 0.68 when predicting return to work after 3 months, 0.71 after 6 months, and 0.73 after 12 months, which represents acceptable discrimination of the rule.

Conclusion A simple prediction rule based on four simple variables can be used by occupational physicians to predict the duration of sickness absence. We recommend that occupational physicians use the sum score to identify unfavourable cases.

Nieuwenhuijsen K, Verbeek JHAM, De Boer AGEM, Blonk RWB, van Dijk FJH. (submitted) (Chapter 4)
Chapter 4 Predicting return to work in common mental disorders

Introduction

Mental disorders such as adjustment disorder, depression, and anxiety disorder are disorders that occur frequently and are often disabling. Loss of work productivity and sickness absence are two of the negative consequences of these common mental disorders. In the United Kingdom, common mental disorders were found to be the second major cause of sickness absence spells longer than 21 days.7

An early estimate of the prognosis in patients with common mental disorders could serve as a point of departure for both the identification of high-risk cases and an instrument to monitor the course of the disorder. Whereas this use applies to all areas of health care, the need for accurate prognoses is even more pronounced in occupational health care. Occupational physicians are involved in rehabilitation and management of return to work and giving correct advice about prognosis is therefore an important aspect of their activities.

A recent study on common mental disorders in primary care identified several predictors of symptom recovery.76 However, a restoration of work functioning does not always follow symptom recovery in common mental disorders. 19,26,73 This contradiction is in concordance with the assumptions of the International Classification of Functioning, Disability and Health (ICF) model.23 This model acknowledges that environmental factors, such as work characteristics, and personal factors, such as demographic and motivational factors, may influence health. Therefore, not only do disorder-related factors need to be considered as possible predictors of return to work, but also environmental and personal factors.

In order to have any practical value, only predictive factors that are potentially available to the occupational physician during the first consultations are taken into account. Consequently, information that would require more effort than interviewing the patient or administering a simple questionnaire is disregarded. To our knowledge, no comprehensive review on factors that influence return to work in employees with common mental disorders has been published. Therefore, we selected potential predictor variables from studies on either recovery from work disability in patients with common mental disorders31,80,81, or duration of sickness absence in general.5,82-83 The objective of our study was to determine which factors best predict the duration of absence from work due to common mental disorders.
Chapter 4 Predicting return to work in common mental disorders

Methods

Participants and procedure
As part of a longitudinal cohort study of employees with mental health problems, 30 occupational physicians from nine occupational health services provided data on consecutive patients. Eligible employees had to have been on full sick leave for less than six weeks due to mental health problems. Mental health problems were defined as psychological symptoms that were not caused by a somatic disorder. Any previous consultation with the occupational physician had to be more than three months previously. The occupational physicians reported 277 employees as being eligible for participation. Of these patients, 66 (24%) refused to participate. Ultimately, 198 employees filled out the baseline questionnaire. For the purpose of this study, only data from participants with common mental disorders were used (n=188).

Each participant was interviewed by the researchers by telephone. Subsequently, four questionnaires were sent to the participants by mail at baseline (t0), three (t1), six (t2) and twelve months (t3). One reminder was sent to each participant who did not return the questionnaire within two weeks.

Measures

Diagnostic Interview
Participants were diagnosed by means of a telephone version of the structured Composite International Diagnostic Interview (CIDI\(^5\)). Details of this interview have been described earlier.\(^7\) Common mental disorder was operationalised as meeting the criteria for a depression (major depressive disorder), anxiety disorder (panic disorder, social phobia, somatoform disorder, obsessive-compulsive disorder, or post-traumatic stress disorder), or adjustment disorder. The latter was defined as being on sick leave due to psychological symptoms, but without meeting the criteria for one of the other disorders.

Outcome
Return to work was measured by calculating the time to full return to work during the follow-up period. The follow-up period could exceed 365 days due to the time between the first day of absence and the time of baseline measurement. Full return to work was operationalised as working the same number of hours as prior to the sickness absence episode.
Predictors

Disorder-related factors
We selected the following disorder-related factors from the literature: diagnosis (adjustment disorders vs. depressive and/or anxiety disorders according to the interview), level of depressive symptoms (DASS-Depression, using the cut-off point of >12), work-relatedness of the disorder (self-report: work-related vs. not work-related), the pre-baseline duration of the disorder (<3 months vs. >3 months), and pre-baseline days of sickness absence (0 days vs. ≥1 day). Diagnosis was dichotomised into adjustment disorders on the one hand and depressive disorders and/or anxiety disorders on the other hand, because the latter two are considered more severe.

Personal factors
Personal factors found to be potential predictors were: gender (m/f), age (<50/ ≥50), marital status (married or living together/ single/ widowed or divorced), recovery expectations (expected duration ≤3 months vs. >3 months), and educational level (low vs. medium and high). Educational level was estimated based upon job title using a standard classification of occupations. Low educational level included primary school, lower vocational education, and lower secondary school. Medium or high level included intermediate vocational education, upper secondary school, upper vocational education, and university.

Environmental factors
Environmental factors included were job demands, supervisory support, and co-worker support. Perceived job demands, supervisor support, and co-worker support were assessed with one-item questions using 4-point Likert scales (range 1-4). A higher score on one of those items reflects either more workload or more support.

Statistical analysis
First, we constructed a linear regression model of the duration of sickness absence in order to test the collinearity of the variables.

To establish predictors of return to work, a Cox’s regression analysis was conducted. A backward stepwise procedure was used to identify relevant predictors. Elimination of non-significant predictors was based upon the Wald statistic (<0.05), with the factor with the highest P-level being removed first. After this, the -2 log likelihood ratio test was used to assess whether this removal led to a significant decrease in the predictive power of the
model. If not, then the predictor was removed from the model. The proportional hazards assumption of the predictors in the final Cox’s regression model was tested by visual inspection of the log minus log graphs. We estimated survivor functions at three, six, nine, and twelve months for two hypothetical workers with

\[ S(t,z) = (S_0(t))^{\exp(\beta_1 z_1 + \ldots + \beta_4 z_4)} \]

where \( S_0(t) \) is the baseline survivor function, \( \beta_1 \ldots \beta_4 \) are the regression coefficients estimated by the model, and \( z_1 \ldots z_4 \) represent the score for each predictor (0 or 1).

Because the formula is too complicated for swift use by clinicians, the b-coefficients from the final proportional hazards model were used to construct a simple clinical prediction rule. Therefore, we transformed the regression equation by assigning a score to each predictor in proportion to the magnitude of the b-coefficients from the equation. The scores of the four predictors were then added to a prognostic sum score.

In order to test its discriminative ability, this simple sum score was then used to predict the probability of still being on sickness absence at three, six, and twelve months. From the ROC curve, the 'area under the curve' (AUC) was calculated to evaluate the discrimination of the prediction rule.95

Results

Participant characteristics

Two of the 188 original participants did not return any of the follow-up questionnaires (lost to follow-up). Overall, 53 (7%) of the four questionnaires sent to each of the remaining 186 participants were missing. A non-response analysis revealed no statistically significant differences in all but one possible predictor and none in outcome. Compared to participants without missing questionnaires, participants with one or more questionnaires missing had more often a low level of education (30% vs. 18%, \( \chi^2 = 3.9, p < 0.05 \)). Table 1 presents the baseline value of potential predictors of the employees. Time to return to work ranged from 7 to 476 days with a median of 234 days. At the end of follow-up, 133 (71%) employees had fully returned to work.
Chapter 4 Predicting return to work in common mental disorders

Table 1 Percentage (n) or mean (SD) of potential predictors of time until return to work in common mental disorders (due to missing values, n ranges from 170 to 186).

<table>
<thead>
<tr>
<th>Potential predictor</th>
<th>% (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Disorder-related factors</strong></td>
<td></td>
</tr>
<tr>
<td>Diagnosis, anxiety disorder and/or depression</td>
<td>36 (66)</td>
</tr>
<tr>
<td>Severity of depressive symptoms, &gt; cut-off score 12</td>
<td>63 (118)</td>
</tr>
<tr>
<td>Cause of common mental disorder, work-related</td>
<td>67 (125)</td>
</tr>
<tr>
<td>Pre-baseline duration of symptoms, ≥ 3 months</td>
<td>78 (144)</td>
</tr>
<tr>
<td>Pre-baseline days of sickness absence, &gt; 0 days in previous year</td>
<td>67 (122)</td>
</tr>
<tr>
<td><strong>Personal factors</strong></td>
<td></td>
</tr>
<tr>
<td>Age, ≥ 50 years</td>
<td>30 (56)</td>
</tr>
<tr>
<td>Gender, male</td>
<td>40 (74)</td>
</tr>
<tr>
<td>Marital status</td>
<td></td>
</tr>
<tr>
<td>Married or living together</td>
<td>80 (147)</td>
</tr>
<tr>
<td>Single</td>
<td>11 (20)</td>
</tr>
<tr>
<td>Divorced or widowed</td>
<td>9 (16)</td>
</tr>
<tr>
<td>Educational level, medium or high</td>
<td>80 (146)</td>
</tr>
<tr>
<td>Recovery expectation, duration &gt; 3 months</td>
<td>26 (45)</td>
</tr>
<tr>
<td><strong>Environmental factors</strong></td>
<td></td>
</tr>
<tr>
<td>Job demands, mean (SD)</td>
<td>2.8 (0.9)</td>
</tr>
<tr>
<td>Supervisor support, mean (SD)</td>
<td>2.4 (0.9)</td>
</tr>
<tr>
<td>Co-worker support, mean (SD)</td>
<td>3.0 (0.7)</td>
</tr>
</tbody>
</table>

SD: Standard deviation

**Prediction model**

The smallest Eigenvalue in the collinearity diagnostic was 0.16, whereas an Eigenvalue of less than 0.10 suggests collinearity. Table 2 presents the variables that were retained in the final Cox's regression model after the backward elimination process. This process yielded four statistically significant predictors of a longer time to return to work: age ≥ 50, patient expectation of duration absence > 3 months, education level medium or high, and diagnosis depression and/or anxiety disorder. The following factors were not predictive of time to return to work: level of depressive symptoms, work-relatedness of the disorder, pre-baseline duration of symptoms, pre-baseline days of sickness absence, gender, marital status, job demands, supervisor support, and co-worker support.
Chapter 4 Predicting return to work in common mental disorders

Table 2  Final model of stepwise backward Cox’s regression of predictors of time to return to work (n =168 due to missing cases in predictors)

<table>
<thead>
<tr>
<th>Predictor</th>
<th>b</th>
<th>HR</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, ≥ 50 years</td>
<td>-.70</td>
<td>0.5</td>
<td>(0.3-0.8)</td>
</tr>
<tr>
<td>Patient’s recovery expectation, duration &gt; 3 months</td>
<td>-.71</td>
<td>0.5</td>
<td>(0.3-0.8)</td>
</tr>
<tr>
<td>Educational level, medium or high</td>
<td>-.72</td>
<td>0.5</td>
<td>(0.3-0.8)</td>
</tr>
<tr>
<td>Diagnosis, anxiety disorder and/or depression</td>
<td>-.42</td>
<td>0.7</td>
<td>(0.4-0.9)</td>
</tr>
</tbody>
</table>

This table only presents results with p <0.05

A hazard ratio of less than 1 indicates the risk of a longer time to return to work compared to the reference group.

As can be seen from Table 3, patient A had substantially higher probabilities of not returning to work at 3, 6, 9, and 12 months than patient B.

Table 3  Survivor functions and estimated probabilities of not returning to work based upon the final Cox’s regression model for two hypothetical patients (n =168 due to missing cases in predictors)

<table>
<thead>
<tr>
<th>Time</th>
<th>Survivor function</th>
<th>Patient A</th>
<th>Patient B</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 months</td>
<td>.88</td>
<td>.97</td>
<td>.64</td>
</tr>
<tr>
<td>6 months</td>
<td>.63</td>
<td>.89</td>
<td>.23</td>
</tr>
<tr>
<td>9 months</td>
<td>.48</td>
<td>.83</td>
<td>.10</td>
</tr>
<tr>
<td>12 months</td>
<td>.32</td>
<td>.76</td>
<td>.03</td>
</tr>
</tbody>
</table>

Patient A is older than 50, expects to be off work longer than three months, has a high educational level and a depressive disorder. Patient B is younger than 50, expects to return to work within 3 months, has lower education and suffers from an adjustment disorder.

Clinical prediction rule

The magnitude of the b-coefficients of the four predictive factors was almost identical. This enabled us to compute the sum score by simply adding one point for each predictive factor present. The clinical prediction rule stated that one point should be assigned for each of the following employee characteristics: being older than 50, expecting to be off
work longer than three months, having a middle or high educational level, and having either a depressive or anxiety disorder. Consequently, the prognostic sum score ranged from 0 (no predictors with a score of 1) to 4 (four predictors with a score of 1). As can be seen from Figure 1, the median days of sickness absence increased with higher prognostic scores. A prognostic score of 4 has a slightly lower median number of days, but that group was very small (n=8).

The discriminative ability of the prognostic sum score was found to be acceptable. The ROC analysis revealed that the AUC for the rate of return to work after 6 months was 0.71 (CI: 0.63-0.78), while it was 0.73 (CI: 0.65-0.81) after 12 months and 0.68 (CI: 0.59-0.77) after 3 months.

Discussion

This study examined which factors were predictive of a longer time to return to work in employees with common mental disorders. Only age, recovery expectations, education level, and diagnosis were found to predict the duration of the sickness absence. The
hazard ratios from the multivariate model were utilized to devise a simple prediction rule, which showed acceptable discrimination.

The prospective design of this study has the advantage that all predictors were assessed at baseline while outcome was measured during follow-up. Consequently, assessment of predictors was conducted without knowledge of outcome for either the employees or the researchers. Furthermore, the outcome event was clearly defined and clinically important and the misclassification rate was tested by calculating the area under the curve (AUC). These aspects of our study meet the methodological criteria for prediction rules formulated by previous authors.99

Ideally, the prediction rule should have been derived from one cohort of employees and tested on another to establish adequate external validity. Furthermore, even though our cohort comprised of employees with diverse occupations, teachers constituted a relatively large proportion of the sample. This resulted in an overrepresentation of employees with higher levels of education. Even though common mental disorders are of particular concern within the teaching profession80,100, caution is required when generalising these results to more heterogeneous populations.

Negative recovery expectations were found to be predictive factors of return to work in previous studies with employees with soft tissue injuries.83,84 Our study seems to corroborate those findings. One possible mechanism is that positive outcome expectancies represent the self-efficacy expectations of the employees. Self-efficacy in illness refers to one’s confidence or belief that one can achieve a specific behaviour despite one’s illness.101,102 Return to work may be enhanced by a positive perception of the likelihood to return to work. On the other hand, employees may be best capable of predicting the duration of the sickness absence by taking into account their past experiences and their work and home environments. Therefore, we recommend that further research should include the experimental manipulation of self-efficacy in order to establish the effect of self-efficacy on return to work.

Among the predictive factors of the final model, the work-related variables were absent. This is intriguing since return to work was the outcome measure. A possible explanation may be that these types of work characteristics may be too complicated to be completely covered by one-item questions. A low educational level proved to be predictive of long-term sickness absence in a cohort of Danish employees.93 Surprisingly, we found that a high level of education was predictive of a longer time to return to work. This unexpected
finding corresponds with a recent unpublished study on work resumption in employees with adjustment disorders.\textsuperscript{9} One possible explanation may be that highly educated employees have more complex jobs, which may be especially hard to return to if one has developed a mental problem.

We recommend that occupational physicians assess information on the patient’s expectation of the duration together with the routinely gathered information on age, diagnosis, and educational level to acquire prognostic information. The use of the prediction rule could then help identify potentially unfavourable cases.

Our choice was to include only those variables that were potentially available to an occupational physician during a first consultation. Therefore, information on treatment or on efforts to enhance return to work by employers was disregarded. Such a focus has practical value, but the additional benefit of elaborate treatment of employees with poor prognoses still needs to be established in a RCT study. We further recommend that our prediction rule be validated in another population of employees with common mental disorders.

**Conclusion**

A simple prediction rule based on four baseline variables adequately predicts the duration of sickness absence in employees with common mental disorders. Older age, negative recovery expectations, medium or high level of education, and being diagnosed with a depression or anxiety disorder are related to poor prognosis. Future prospective studies are needed to examine the prospective validity of this prediction rule.