# Clinical course and prognostic factors in acute low back pain: an inception cohort study in primary care practice

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**Abstract**

***Objective*—To describe the natural course of recent acute low back pain in terms of both morbidity (pain, disability) and absenteeism from work and to evaluate the prognostic factors for these outcomes.**

***Design*—Inception cohort study.**

***Setting*—Primary care.**

***Patients*—103 patients with acute localised non-specific back pain lasting less than 72 hours.**

***Main outcome measures*—Complete recovery (disappearance of both pain and disability) and return to work.**

***Results*—90% of patients recovered within two weeks and only two developed chronic low back pain. Only 49 of 100 patients for whom data were available had bed rest and 40% of 75 employed patients lost no time from work. Proportional hazards regression analysis showed that previous chronic episodes of low back pain, initial disability level, initial pain worse when standing, initial pain worse when lying, and compensation status were significantly associated with delayed episode recovery. These factors were also related to absenteeism from work. Absenteeism from work was also influenced by job satisfaction and gender.**

***Conclusions*—The recovery rate from acute low back pain was much higher than reported in other studies. Those studies, however, did not investigate groups of patients enrolled shortly after the onset of symptoms and often mixed acute low back pain patients with patients with exacerbations of chronic pain or sciatica. Several sociodemographic and clinical factors were of prognostic value in acute low back pain. Factors which influenced the outcome in terms of episode recovery (mainly physical severity factors) were only partly predictive of absenteeism from work. Time off work and return to work depended more on sociodemographic and job related influences.**

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## Introduction

Low back pain is a common disorder with major consequences for health care resources.[1,2] Though the prognosis of acute low back pain is considered to be good,[3] chronic low back pain is very frequent. Identifying factors for chronicity and disability is required to allow adequate care[4] and may also be useful for assessing treatments.[5,6] No satisfactory indicators for prognosis have been identified in studies in occupational settings which used lost work time to evaluate outcome.[4] Moreover, 16-40% of patients lose no time from work after a back injury, even if work related.[7,8] Studies from general practice are few.[9-11] Definitions of acute attacks of pain in these studies lacked precision: patients with pain lasting 7-30 days or associated with sciatica were not excluded. Outcome indicators were also crude (for example, lost work time) and psychosocial factors were not addressed.

We studied acute low back pain patients in primary care (*a*) to investigate the natural course in terms of morbidity and absenteeism from work, and (*b*) to identify the clinical, psychological, and sociodemographic factors with prognostic value.

## Patients and methods

All consecutive patients aged 18 and over, self referring to participating doctors (n=39) for a primary complaint of back pain between 1 June and 7 November 1991 were eligible. Only patients with pain lasting less than 72 hours and without radiation below the gluteal fold were included. Patients with malignancies, infections, spondylarthropathies, vertebral fractures, neurological signs, and low back pain during the previous three months were excluded, as were non-French speaking and illiterate patients. The resulting study group was 103 subjects.

Doctors received training in clinical and psychiatric evaluation before the study. Clinical data collected at the time of the first visit included sociodemographic and occupational characteristics, compensation status (which is temporarily but invariably awarded in France for any pain episode occurring in the workplace), medical and surgical histories, pain intensity (on a visual analogue scale), type of onset and duration, aggravating and relieving factors,[12] assessment of lumbar movements, and the straight leg raising test.[13] Current psychiatric symptoms were investigated by using a structured psychiatric interview based on DSM-III-R (*Diagnostic and Statistical Manual of Mental Disorders*, Third Edition, Revised) classification flowsheets.[14,15] Patients who could stand (ambulant patients; n=85) filled in a validated French translation[16] of the Roland and Morris disability questionnaire.[17,18]

We did not include any radiological investigations because of the unreliability of interpretation[19,20] (radiographs helped only in diagnosing "specific" low back pain).

To optimise description of the natural course of the low back pain episode doctors prescribed oral analgesics containing only paracetamol. Prescription of bed rest and sick leave was left to the discretion of the doctors.

Patients completed a diary every evening from day 1 to day 7. It included a visual analogue score for mean back pain for the day, the disability questionnaire, and the time spent in bed. Follow up visits were scheduled on day 8 and, while back pain or disability persisted, on days 15, 30, 60, and 90. The data collected at each visit included the patient's evaluation of pain and disability. The dates of recovery, defined as the disappearance of both pain and disability, and return to work (in cases with sick leave) were recorded.

Evolution of pain and functional disability were described by using means and standard errors. The two main outcomes of the study—recovery and return

to work—were assessed by life table analysis according to Kaplan-Meier. The prognostic values of factors on these outcomes were tested by log rank methods. Proportional hazards models were fitted to study factors simultaneously and to adjust for the potential confounding effect of pain duration at entry by using a forward stepwise procedure (enter P value=0·05, remove P value=0·10).[21] For each factor in the final model the hazard ratio and 95% confidence interval were calculated. (The hazard ratio may be interpreted as the relative risk of recovery at any measurement within three months.) Assumptions of proportional hazards were checked from plots of log minus log (survival) functions against time.

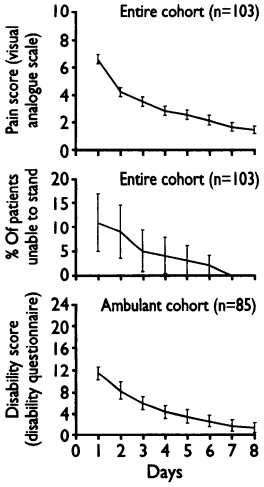


FIG 1—*Evolution of pain (visual analogue scale scores) and disability (proportion of patients unable to stand, Roland and Morris disability scale scores) during first week of follow up. Plots shown as means and 95% confidence intervals*

TABLE I—*Baseline characteristics of subjects (n=103) at entry to study. Except where stated otherwise, values are numbers (percentages) of subjects*

| | Value |
|---|---|
| Sociodemographic variables: | |
| Mean (SD) age (years) | 46·5 (14·3) |
| Male sex | 62 (60) |
| French nationality | 92 (89) |
| Manual worker | 29 (28) |
| Employed at entry | 75 (73) |
| Back pain history: | |
| One or more previous acute episodes | 63 (61) |
| Previous chronic (>3 months) episode of low back pain | 8 (8) |
| Prior back surgery | 0 |
| Median (minimum, maximum) duration of index episode (hours) | 26 (1·5, 70) |
| Sudden onset (<2 minutes) | 36 (35) |
| Pain and disability variables: | |
| Mean (SD) initial visual analogue scale score | 6·6 (1·8) |
| Constant pain at night | 16 (16) |
| Pain aggravated by impulsion | 44 (43) |
| Pain aggravated by moving back | 99 (96) |
| Pain worse on standing | 67 (65) |
| Pain worse on lying | 27 (26) |
| Unable to stand even briefly | 18 (17) |
| Mean (SD) initial disability questionnaire score† | 12·1 (5·6) |
| Physical findings: | |
| Limited passive movements | 72 (70 |
| Catch | 61 (59) |
| Straight leg raising <75° | 31 (30) |
| Psychosocial variables: | |
| DSM-III-R diagnosis | 12 (12) |
| Depression | 5 (5) |
| Generalised anxiety | 7 (7) |
| Compensation status‡ | 9 (9) |
| Job difficulty (heavy labour) | 16 (16) |
| Poor job satisfaction | 34 (33) |

†If able to stand.
‡Invariably awarded in France for pain occurring at work.

TABLE II—*Distribution of reported numbers of days of bed rest*

| | Reported days of bed rest | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | >8 | Total |
| No of patients | 51 | 3 | 9 | 8 | 3 | 1 | 3 | 8 | 7 | 7 | 100† |

†Data not available in three cases.

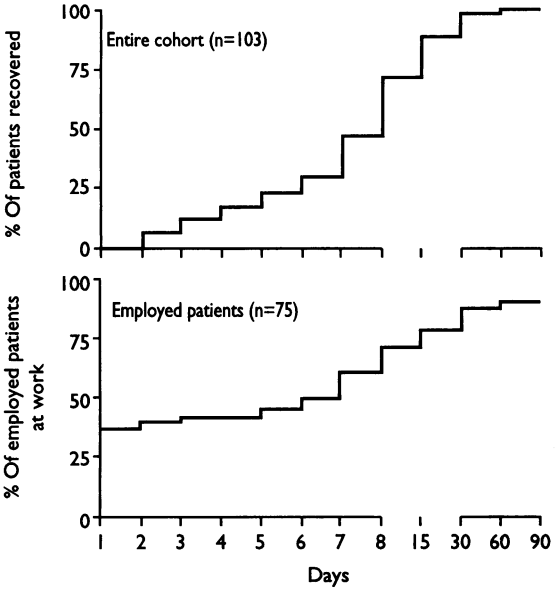


FIG 2—*Life table analysis showing cumulative rates of recovery and attendance at work (for employed patients) over three month follow up (Kaplan-Meier method)*

## Results

Baseline characteristics of the 103 patients are shown in table I. There were 11 drop outs, who were similar as a group to the 92 patients remaining for follow up with regard to all characteristics (data not shown).

The evolution of pain and disability during the first week is shown in figure 1. There was a large decrease in pain every day until day 4 and smaller decreases thereafter. The proportion of subjects unable to stand and the disability score followed similar patterns.

Figure 2 shows the cumulative rates of recovery and attendance at work among employed patients. The median duration of episodes was 7 days, and 90% of patients recovered within the first two weeks (95% confidence interval 84% to 96%). Only two patients (1·9%; 0 to 4·7%) did not recover during the three month period and developed chronic low back pain. One other patient presented with sciatica at day 15 (1·0%; 0 to 2·7%). Only 49 of 100 patients for whom data were available had bed rest (table II). The distribution of numbers of days in bed was trimodal, with maxima at no days, 2-3 days, and 7-8 days. Forty per cent of employed patients lost no time from work. Return to work was slower than recovery (fig 2).

Associations between various factors and recovery were tested (table III) and a prognostic recovery model constructed (table IV). Previous chronic low back pain was associated with a fourfold lower probability of recovery; pain worse when standing or lying, disability at entry, compensation status, and employment status were also predictive.

Factors were tested for association with lost work time (table V). The same set of variables (previous chronic low back pain, pain worse when standing or lying, disability at entry, and compensation status) plus male sex and low job satisfaction were predictive (table VI).

## Discussion

Data on the natural course of low back pain are fragmentary.[22 23] Other studies did not investigate

TABLE III—*Prognostic factors for recovery among subjects with acute low back pain (n=103)*

| Factor | Value† | P‡ |
|---|---|---|
| Age | 0-4 | 0·45 |
| Male sex | 0 *v* 1 | 0·84 |
| French nationality | 0 *v* 1 | 0·06 |
| Manual worker | 0 *v* 1 | 0·49 |
| Employed at entry | 0 *v* 1 | 0·65 |
| Previous acute episodes | 0 *v* 1 | 0·48 |
| Previous chronic episode of low back pain | 0 *v* 1 | <0·0001 |
| Duration of index episode | 0-2 | 0·87 |
| Sudden onset | 0 *v* 1 | 0·42 |
| Pain intensity at entry | 0-4 | 0·26 |
| Constant pain at night | 0 *v* 1 | 0·33 |
| Pain aggravated by impulsion | 0 *v* 1 | 0·02 |
| Pain aggravated by moving back | 0 *v* 1 | 0·10 |
| Pain worse on standing | 0 *v* 1 | 0·006 |
| Pain worse on lying | 0 *v* 1 | 0·03 |
| Disability status at entry | 0-2 | 0·03 |
| Limited passive movements | 0 *v* 1 | 0·50 |
| Catch | 0 *v* 1 | 0·35 |
| Straight leg raising <75° | 0 *v* 1 | 0·30 |
| DSM-III-R diagnosis | 0 *v* 1 | 0·65 |
| Compensation status | 0 *v* 1 | 0·05 |
| Job difficulty | 0 *v* 1 | 0·48 |
| Job satisfaction | 0 *v* 1 | 0·007 |

†For 0 *v* 1 values 0=no, 1=yes. For age 0=<30 years, 1=30-39 years, 2=40-49 years, 3=50-59 years, 4=≥60 years. For duration of index episode 0=<24 hours, 1=24-48 hours, 2=>48 hours. For pain intensity at entry (100 mm visual analogue scale) 0=≤20 mm, 1=≤40 mm, 2=≤60 mm, 3=≤80 mm, 4=>80 mm. For disability status at entry 0=able to stand and disability questionnaire score ≤16, 1=able to stand and disability questionnaire score >16, 2=unable to stand even briefly.
‡Log rank test.

TABLE IV—*Final prognostic model for epidose recovery: hazard ratios† by proportional hazards model‡*

| Variable | Hazard ratio (95% confidence interval) | P |
|---|---|---|
| Not employed at entry | 0·63 (0·38 to 1·05) | 0·07 |
| Previous chronic episode of low back pain | 0·21 (0·07 to 0·60) | 0·0004 |
| Pain worse on standing at entry | 0·49 (0·30 to 0·77) | 0·003 |
| Pain worse on lying at entry | 0·62 (0·38 to 1·02) | 0·06 |
| Disability status at entry§ | 0·59 (0·31 to 1·12) | 0·09 |
| Compensation status | 0·49 (0·23 to 1·05) | 0·06 |

†Hazard ratio may be interpreted as relative risk of recovery at any measurement within three months. Hazard ratio greater than 1·0 indicates that higher percentage of patients with characteristic than without recovered. Hazard ratio less than 1·0 indicates that lower percentage of patients with characteristic than without recovered.
‡Final model included all listed variables and delay (hours) between beginning of attack of low back pain and entry to study.
§Disability status categorised as: unable to stand even briefly, able to stand and disability questionnaire score >6, able to stand and disability questionnaire score ≤16.

TABLE V—*Prognostic factors for attendance at work among employed subjects with acute low back pain (n=75)*

| Factor | Value† | P‡ |
|---|---|---|
| Age | 0-4 | 0·20 |
| Male sex | 0 *v* 1 | 0·08 |
| French nationality | 0 *v* 1 | 0·01 |
| Manual worker | 0 *v* 1 | 0·09 |
| Previous acute episodes | 0 *v* 1 | 0·40 |
| Previous chronic episode of low back pain | 0 *v* 1 | 0·01 |
| Duration of index episode | 0-2 | 0·79 |
| Sudden onset | 0 *v* 1 | 0·56 |
| Pain intensity at entry | 0-4 | 0·11 |
| Constant pain at night | 0 *v* 1 | 0·93 |
| Pain aggravated by impulsion | 0 *v* 1 | 0·01 |
| Pain aggravated by moving back | 0 *v* 1 | 0·01 |
| Pain worse on standing | 0 *v* 1 | 0·007 |
| Pain worse on lying | 0 *v* 1 | 0·01 |
| Disability status at entry | 0-2 | 0·09 |
| Limited passive movements | 0 *v* 1 | 0·55 |
| Catch | 0 *v* 1 | 0·03 |
| Straight leg raising <75° | 0 *v* 1 | 0·19 |
| DSM-III-R diagnosis | 0 *v* 1 | 0·65 |
| Compensation status | 0 *v* 1 | 0·06 |
| Job difficulty | 0 *v* 1 | 0·40 |
| Job satisfaction | 0 *v* 1 | 0·07 |

†For 0 *v* 1 values 0=no, 1=yes. For age 0=<30 years, 1=30-39 years, 2=40-49 years, 3=50-59 years, 4=≥60 years. For duration of index episode 0=<24 hours, 1=24-48 hours, 2=>48 hours. For pain intensity at entry (100 mm visual analogue scale) 0=≤20 mm, 1=≤40 mm, 2=≤60 mm, 3=≤80 mm, 4=>80 mm. For disability status at entry 0=able to stand and disability questionnaire score ≤16, 1=able to stand and disability questionnaire score >16, 2=unable to stand even briefly.
‡Log rank test.

patients enrolled shortly after the onset of symptoms and often mixed acute low back pain patients with patients with recent exacerbations of chronic low back pain or sciatica. In our inception cohort avoiding these selection and left truncation biases,[24] 90% of patients recovered within two weeks. This is a much higher rate of recovery than the 60-80% observed in otherwise similar studies.[9 11] Most patients had no bed rest. Prolonged bed rest thus seems unnecessary for most patients with acute low back pain.[22] We also examined the relation between pain, disability, and physical impairment and social consequences. Consistent with a previous study,[8] 40% of employed patients did not stop working during the pain episode. Moreover, curves of recovery and return to work, and factors associated with these outcomes, were not identical. This implies that these outcomes should be differentiated.

We identified several factors that may be of prognostic value for recovery from acute low back pain. In particular, previous chronic low back pain was a strong predictor of poor recovery, as previously suggested.[10 11 25 26] This is consistent with certain people being highly prone to develop chronic pain. Initial disability rather than initial pain intensity seemed predictive of poor recovery, as reported.[11] Pain worse on standing or lying was also predictive of poor recovery; these variables may identify different aetiological subgroups. There was no association between physical examination findings and recovery, in contrast with studies which included sciatica

## Clinical implications

- The prognosis of acute low back pain is generally thought to be good, but chronic low back pain is common
- Data on the natural course and prognostic factors in acute low back pain are fragmentary
- In this inception cohort study recovery from episodes of acute low back pain was more rapid than previously described: 90% of patients recovered within two weeks and fewer than 2% developed chronic low back pain
- Previous episodes of chronic low back pain and factors related to severity seem to strongly influence the recovery from episodes; conversely, absenteeism from work seems to depend more on sociodemographic and job related factors
- These results will be useful in identifying patients at risk of a poor outcome and as an aid to more appropriate randomisation in controlled trials

patients.[11 25] The only psychosocial variable predicting recovery was compensation status, consistent with many studies.[4 10 27 28] Compensation status seemed to correlate with pain and disability among patients with clear signs of organic disease who were not psychologically disturbed. This observation has major implications for public health and work legislation. We found no significant association between psychiatric diagnoses and recovery; whether psychiatric disorders are primary or secondary remains unclear.[15 29]

Factors previously described as influencing recovery were also associated with attendance at work among employed patients. However, two supplementary variables associated with lost work time were male sex and poor job satisfaction. This role of sex on absence from work has been described only once before.[11] Manual work and job difficulty were not related to absenteeism, in contrast with studies[7 27 30-32] in which analyses were not adjusted for job satisfaction or compensation status. Return to work seemed mainly dependent on sociodemographic and job related factors and only partly dependent on physical severity factors. This has implications for the interpretation of studies in occupational settings and those analysed in terms of work absenteeism alone.

This study has limitations. Firstly, the population studied cannot be considered representative of the general population of acute low back pain patients, despite being unselected primary care patients. All the subjects sought medical care, which may bias various

TABLE VI—*Final prognostic model for attendance at work (for those patients with occupation; n=75): hazard ratios† by proportional hazards model‡*

| Variable | Hazard ratio (95% confidence interval) | P |
|---|---|---|
| Male sex | 0·62 (0·35 to 1·06) | 0·09 |
| Previous chronic episode of low back pain | 0·30 (0·08 to 1·02) | 0·03 |
| Pain worse on standing at entry | 0·52 (0·30 to 1·03) | 0·05 |
| Pain worse on lying at entry | 0·56 (0·29 to 0·93) | 0·03 |
| Disability status at entry§ | 0·65 (0·36 to 1·14) | 0·10 |
| Compensation status | 0·53 (0·30 to 0·94) | 0·08 |
| Poor job satisfaction | 0·57 (0·24 to 1·13) | 0·02 |

†Hazard ratio may be interpreted as relative risk of recovery at any measurement within three months. Hazard ratio greater than 1·0 indicates that higher percentage of patients with characteristic than without recovered. Hazard ratio less than 1·0 indicates that lower percentage of patients with characteristic than without recovered.
‡Final model included all listed variables and delay (hours) between beginning of attack of low back pain and entry to study.
§Disability status categorised as: unable to stand even briefly, able to stand and disability questionnaire score >6, able to stand and disability questionnaire score ≤16.

socioeconomic factors.[33] Moreover, the exclusion criteria may have led to an underrepresentation of poorly educated and foreign origin patients. Secondly, data were mainly obtained from interview and physical examination and their quality may therefore be questioned; to minimise this we used DSM-III-R criteria for psychiatric assessment and standardised techniques for pain and physical assessment. Finally, our sample size was small when the low prevalence of some exposure factors is considered.

This study suggests that recovery from acute low back pain is more rapid than previously described and identifies several prognostic factors for poor outcome of interest for medical care and clinical research.


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## A PAPER THAT CHANGED MY PRACTICE

### Treating hypertension in the elderly

A Medical Research Council working party has published two large randomised trials on treating mild hypertension in middle aged people (35-64) and elderly people (65-74).[1,2] The paper on elderly people changed my practice in that I stopped prescribing β blockers as first line treatment for patients with mild hypertension, especially if they smoked and provided that they had never had a myocardial infarction. In each trial the randomisation included two different active treatments, a diuretic and a β adrenoceptor blocking drug. The diuretics and β blockers differed in the two trials. The interpretation of the results has been controversial, but I should like to consider only one aspect. Should I start treatment with a diuretic or a β blocker? My main concern will be the effect on total mortality. I will also consider subgroup analyses on men and women and smokers and non-smokers.

Women aged 35-64 taking a diuretic had a total mortality of 4·5 per 1000 patient years, taking a β blocker 4·3 per 1000, and taking a placebo 3·5 per 1000. Scarcely any evidence for treating mild hypertension in middle aged women, but women of this age have few episodes of myocardial infarction, low stroke rates, and little potential for benefit. In men the corresponding rates were 7·5 (diuretic), 6·7 (β blocker), and 8·2 (placebo) per 1000 patient years, evidence for the use of either drug but especially a β blocker. This benefit was due to non-smoking men having a reduced incidence of myocardial infarction and stroke. Male smokers received no benefit from β blocker treatment.

In the trial in elderly people, women receiving active treatment (both active treatment groups combined) had a total mortality of 15·6 per 1000 patient years compared with 17·9 per 1000 in the women receiving the placebo. The corresponding results for men were 36·1 per 1000 (active) and 34·7 per 1000 (placebo). As the slightly better outcome for active treatment in women was mainly due to a reduction in deaths from cancer, with the converse in men, these results are not consistent with any prior hypothesis. Smokers (elderly men and women as a total group) did not fare well when taking a β blocker, with a total mortality of 52·3 per 1000 patient years against 30·0 and 36·2 per 1000 for diuretic and placebo groups respectively. The corresponding rates for non-smokers were 19·1 (diuretic), 19·7 (β blocker), and 21·6 (placebo). Overall the β blocker did not reduce total mortality, stroke, or coronary events.

Other trials have reported benefits from β blockers in elderly people, but these trials more often studied a β blocker in combination with a diuretic. The trials of secondary prevention of myocardial infarction prove a benefit for β blockade, so why are there no advantages in elderly people, many of whom have pre-existing coronary disease? The trials suggest that smokers with hypertension do not benefit from the use of β blockers. Both elderly people and smokers are more likely to have a tendency to obstructive airways disease, in which case β blockers are contraindicated. But if a serious adverse effect occurred why did the authors not report an excess of respiratory deaths? "Small numbers, subgroup analyses, biased viewpoint, selective quotes, lipid solubility or lack of it in the β blocker used in the trial in elderly people, lack of intrinsic sympathomimetic activity, cardioselectivity," I hear you say. But I changed my practice and now prescribe a diuretic as first line treatment for elderly people with mild hypertension.—CHRISTOPHER BULPITT *is a professor of geriatric medicine in London*


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