Journal of Physiotherapy 65 (2019) 159–165

Journal of PHYSIOTHERAPY

journal homepage: www.elsevier.com/locate/jphys

Research

Recurrence of low back pain is common: a prospective inception cohort study

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KEY WORDS

Risk
Recurrence
Low back pain
Prognosis
Cohort studies

ABSTRACT

Questions: How commonly and how quickly does low back pain reoccur in a cohort of people who have recently recovered from an episode of low back pain? What are the prognostic factors for a recurrence of low back pain? **Design**: Prospective inception cohort study with monthly follow-up for 12 months. **Participants**: A total of 250 patients who had recovered from an episode of low back pain within the last month. **Outcome measures**: The primary outcome was days to recurrence of an episode of low back pain. Secondary outcomes were: days to recurrence of low back pain severe enough to limit activity moderately, and days to recurrence of low back pain for which healthcare was sought. **Results**: Within 12 months after recovery, 69% (95% CI 62 to 74) of participants had a recurrence of an episode of low back pain, 40% (95% CI 33 to 46) had a recurrence of activity-limiting low back pain, and 41% (95% CI 34 to 46) had a recurrence of low back pain for which healthcare was sought. The median time to recurrence of an episode of low back pain was 139 days (95% CI 105 to 173). Frequent exposure to awkward postures, longer time sitting (> 5 hours per day), and more than two previous episodes were predictive of recurrence of an episode of low back pain within 12 months ($p < 0.01$). **Conclusion**: Recurrence of low back pain is very common, with more than two-thirds of individuals having a recurrence within 12 months after recovery. Prognostic factors for a recurrence include exposure to awkward posture, longer time sitting, and more than two previous episodes. **[da Silva T, Mills K, Brown BT, Pocovi N, de Campos T, Maher C, Hancock MJ (2019) Recurrence of low back pain is common: a prospective inception cohort study. *Journal of Physiotherapy* 65:159–165]**

Introduction

The majority of patients presenting with acute low back pain (LBP) recover quickly;[1] however, recurrences are believed to be common and are likely to be responsible for much of the burden associated with LBP.[2,3] A recent systematic review investigating the risk of a recurrence of LBP in patients who have recovered from a previous episode concluded that it is not yet possible to obtain robust estimates of the risk of recurrence, due to the heterogeneity and generally poor methodological quality of the small number of existing studies.[4] The review also found very little evidence about prognostic factors for recurrence of LBP. The presence of previous episodes of LBP was the only consistent prognostic factor for recurrence.[5,6]

Most previous studies[7–10] investigating recurrence of LBP included survival cohorts of people who recovered from a previous episode of LBP at different times in the past, and may have been recovered for long and variable periods. Studies based on survival cohorts may produce biased estimates because the prognosis of people who have had a condition for a long time is likely to be different from those who recently developed the condition.[11] Inception cohort studies enrol participants at an early and uniform time point in the course of the condition and follow them to observe if an event of interest occurs (eg, death or recurrence).[11,12] Inception cohort studies therefore avoid the bias associated with survival cohorts.[11]

Another limitation of previous studies is the use of different recurrence definitions or the lack of any clear definition of a recurrence.[5–9] Different definitions are likely to produce different estimates of recurrence. A recent consensus document defined a recurrence of an episode of LBP as 'a return of LBP lasting at least 24 hours with a pain intensity of > 2 on an 11-point numerical rating scale following a period of at least 30 days pain-free'.[13] Furthermore, most previous studies[7–10,14,15] do not clearly describe how recovery from the previous episode was defined, so it is unclear whether participants had recovered and were therefore truly at risk of recurrence, or for how long they had recovered prior to entering the study. Therefore, a large, well-designed inception cohort study to provide reliable estimates of the risk of recurrence and to identify prognostic factors is needed.

Therefore, the research questions for this inception cohort study were:

1. How commonly and how quickly does LBP reoccur in a cohort of people who have recently recovered from an episode of LBP?
2. What are the prognostic factors for a recurrence of LBP?

https://doi.org/10.1016/j.jphys.2019.04.010

Table 1
Candidate prognostic factors for a recurrence of LBP.

Candidate prognostic factor	Data format at collection	Coding of data in the model
Age	Age in years (continuous)	Continuous
Body mass index	Calculated as height in m divided by the square of weight in kg (continuous)	Continuous
Smoking history	How would you describe your cigarette smoking? (never, used to smoke but have quit, or current smoker)	Categorical: Never; Used to smoke but have quit; Current smoker
Exposure to heavy loads	How often are you engaged in any manual task involving heavy loads? (never; very rarely, rarely, occasionally, frequently, very frequently)	Categorical: Rarely (rarely, very rarely or never); Occasionally; Frequently (frequently or very frequently)
Exposure to awkward posture	How often are you engaged in any manual task or activity involving an awkward position? (never, very rarely, rarely, occasionally, frequently, or very frequently)	Categorical: Rarely (rarely, very rarely or never); Occasionally; Frequently (frequently or very frequently)
Physical activity	The Active Australia Questionnaire (vigorous, moderate, or low)	Categorical: Vigorous; Moderate; and Low
Time sitting	Could you indicate how many hours you spend sitting on an average weekday, including sitting for travel, work and leisure? (continuous)	Categorical: 0 to 5 hours; > 5 hours
General health	In general, would you say your health is: (excellent, very good, good, fair, or poor)	Categorical: Excellent (excellent or very good); Good; and Poor (fair or poor)
Number of previous episodes	How many previous episodes of low back pain have you had? (continuous)	Categorical: 1 to 2 episodes; 3 to 10 episodes; > 10 episodes
Duration of last episode	How long did your most recent episode of low back pain last (days)? (continuous)	Categorical: < 2 weeks; 2 to 6 weeks; 6 to 12 weeks
Perceived risk of recurrence	In your view, how large is the risk that you will develop a recurrence of low back pain in the following 12 months? Considering a 0-to-10 numerical scale. (Continuous)	Categorical: 0 to 5 points; > 5 points
Depression	DASS21 (normal, mild, moderate, severe, or extremely severe)	Categorical: Normal (normal or mild); ≥ Moderate (moderate, severe or extremely severe)
Anxiety	DASS21 (normal, mild, moderate, severe, or extremely severe)	Categorical: Normal (normal or mild); ≥ Moderate (moderate, severe or extremely severe)
Stress	DASS21 (normal, mild, moderate, severe, or extremely severe)	Categorical: Normal (normal or mild); ≥ Moderate (moderate, severe or extremely severe)
Sleep quality	During the past week, how would you rate your sleep quality overall? (very good, fairly good, fairly bad, or very bad)	Categorical: Good (very good or fairly good); Bad (fairly bad or very bad)

DASS-21 = Depression, Anxiety and Stress Scale - 21 Items, LBP = low back pain.

Methods

Design

This prospective inception cohort study recruited patients who had recovered from an episode of LBP within the past month and who had been discharged from primary care practices in Sydney, Australia, from August 2015 to August 2017. Physiotherapists and chiropractors practising within metropolitan Sydney screened consecutive patients with LBP for eligibility. Patients were informed about the study and invited to either contact the researchers directly or provide their contact details if they were interested in finding out more about the study. Potential participants were then contacted by telephone to discuss the details of the study and assess their eligibility for participation. Participants were followed monthly for 12 months.

Participants

Inclusion criteria were age ≥ 18 years, and recovery within the last month from a previous episode of non-specific LBP with or without associated leg pain or radiculopathy. Non-specific LBP was defined as pain in the area between the 12th rib and buttock crease not attributed to a specific diagnosis (eg, ankylosing spondylitis, vertebral fracture).[16–18] Recovery was defined as a score of 0 or 1 on an 11-point numerical rating scale for 7 consecutive days.[19,20] If individuals were willing to participate when initially contacted but were not yet recovered, they were followed up fortnightly until they were recovered. Individuals were excluded if they met any of the following criteria: previous spinal surgery, spinal surgery scheduled in the following 12 months, or inadequate English comprehension to complete the outcome measures.

Baseline measures

Participants had the option of completing the baseline assessment either by telephone or as an online Qualtrics survey.[21] At baseline, demographic data and a range of potential prognostic factors for recurrence of LBP were collected. Fifteen a priori prognostic factors were chosen based on the existing literature or biological plausibility of a factor being predictive of a recurrence of LBP.[4,22] Table 1 describes all prognostic factors that were investigated, how they were measured, and how they were coded in the analyses. The prognostic factors were measured using previously published[19,22–25] and validated questionnaires.[26,27]

Outcome measures

The primary outcome was days to recurrence of an episode of LBP. Recurrence of an episode of LBP was defined according to the consensus definition as 'return of LBP lasting at least 24 hours with a pain intensity of > 2 on an 11-point numerical rating scale'.[13] Secondary outcomes were: days to recurrence of LBP severe enough to limit activity, and days to recurrence of LBP for which healthcare was sought. Recurrence of activity-limiting LBP was defined as a recurrence of an episode of LBP causing moderate or greater activity limitation measured using an adaptation of Item 8 of the 36-Item Short Form Survey (SF-36).[27] This was measured using the question: 'During the recurrence, how much did low back pain interfere with your normal work (including work both outside the home and housework)?' The response options were: not at all, a little bit, moderately, quite a bit, and extremely. Recurrence of LBP causing care-seeking was defined as recurrence of an episode of LBP resulting in a consultation with a healthcare provider.

Follow-up

Participants were contacted monthly by email or text message (based on the participant's preference) for 12 months. Participants were asked if they had a recurrence of LBP lasting at least 24 hours and with a pain intensity of > 2 on an 11-point numerical rating scale. If a participant reported a recurrence, they were contacted by telephone to obtain a detailed description of the episode. Participants not responding to monthly follow-up within 48 hours were contacted by telephone. If a recurrence was reported, participants were no longer followed monthly, but continued to complete follow-up assesments at 3, 6, 9 and 12 months. Using this approach, the

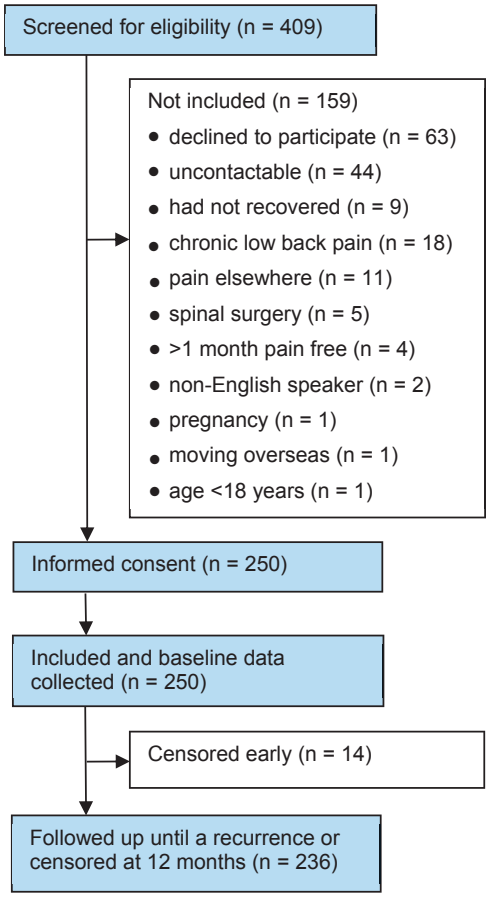

Figure 1. Flow of participants through the study.

number of days to first recurrence was able to be determined for each of the three recurrence definitions.

Data analysis

Sample size calculation was based on the two aims related to recurrence proportions and prognostic factors for a recurrence. For the calculation related to recurrence proportion, considering the recurrence estimate of 33% based on previous studies,[6,28] and a required precision of the sample estimate within 6 absolute percentage points, that is a 95% confidence interval from 27 to 39%, a sample size of 236 was required. With respect to the aim of investigating prognostic factors, previous studies suggest at least 10 events per candidate variable in the multivariate model.[29,30] Based on the recurrence estimate of 33%, a sample of 250 participants would result in 83 events enabling eight candidate predictor variables to be investigated in the model. Therefore, eight predictor variables were pre-specified from the initial list of 15: age, exposure to heavy loads, exposure to awkward posture, physical activity, time sitting, number of previous episodes of LBP, perceived risk of recurrence of LBP, and depression. However, if the recurrence proportion was higher, it was planned to investigate up to 15 variables, depending on the number of events. Therefore, a sample size of 250 was used.

We censored participants for whom follow-up data were missing or who did not have a recurrence at the time of their last follow-up. Censoring allows use of data from people who do not experience the outcome during the time period that they were followed.[31,32]

Survival curves plotting days to recurrence were used to describe the proportion of people who had a recurrence, considering each of the three definitions over 1 year. Time to recurrence was treated in two ways: 'inception time uncorrected', which considered the time of study entry as the reference time; and 'inception time corrected', which transformed the time data by adding the number of days that patients were recovered before entering the study, as this was available for all participants.[1] Inception time uncorrected was considered the primary outcome.

Cox regression was used to investigate prognostic factors for recurrence. First, some of the variables (exposure to heavy loads, exposure to awkward posture, number of previous episodes, depression, general health, duration of previous episodes, anxiety, stress, and sleep quality) were recoded into ordinal categories (Table 1). Visual inspection of survival curves and Cox regression with time as the dependent variable were used to check the proportional hazards assumption for each variable. Linearity of continuous variables was assessed via visual inspection of survival curves. We first ran univariate Cox regression models to test for an association between each individual variable and time to recurrence. These were used to understand univariate associations and help interpretation of the multivariate model eligibility for the multivariate model.[33] Multivariate Cox regression analysis was then conducted using a backward selection procedure with p-values of < 0.05 to enter the model and > 0.10 to exit the model. Completeness of follow-up was calculated using the completeness index.[31] This index indicates the sum of follow-up times divided by the sum of potential follow-up times. A completeness index value of 100% indicates complete follow-up. All analyses were performed with commercial software.

Table 2
Baseline demographic characteristics of the study participants.

Variable	Participants (n = 250)
Age (*y*), mean (SD)	50 (15)
Gender, n male (%)	125 (50)
Primary care clinician, n (%)	
physiotherapist	198 (79)
Education level, n (%)	
primary school	1 (< 1)
some secondary school	1 (< 1)
completed high school	56 (22)
some additional training	51 (20)
undergraduate university	84 (34)
postgraduate university	57 (23)

Results

Flow of participants through the study

A total of 409 consecutive potential participants were referred from 22 primary care practices (19 physiotherapists and nine chiropractors). Of the 409 potential participants, 250 met the inclusion criteria and entered the study (Figure 1). In total, 236 participants (94%) were successfully followed until a recurrence or were censored at the 12-month follow-up. The remaining 14 patients were lost to follow-up during the 12-month follow-up period and were censored early. Completeness of follow-up, according to the completeness index, was 96% of person time.

Characteristics of participants

The mean age of participants was 50 years (SD 15); 50% were male, and 79% were referred from a physiotherapist. The median days from the date of recovery to the date of study entry was 14 days (IQR 7 to 27.5). The median number of previous episodes was five episodes (IQR 2 to 18.5), and the median duration for the previous episode was 14 days (IQR 5 to 40.5). Table 2 presents baseline demographic data for the study participants and Table 3 presents their baseline data for the candidate prognostic factors, with additional details for both sets of data provided in Table 4 (see eAddenda for Table 4).

Table 3
Baseline data of the study participants for the 15 candidate prognostic factors.

Candidate prognostic factor Category	Participants (n = 250)
Age *(y)*, mean (SD)	50 (15)
Body mass index *(kg/m²)*, mean (SD)	26.5 (5.3)
Smoking, n (%)	
Never	166 (66)
Used to smoke but have quit	69 (28)
Current smoker	15 (6)
Exposure to heavy loads, n (%)[a]	
Rarely (rarely, very rarely or never)	100 (40)
Occasionally	84 (34)
Frequently (frequently or very frequently)	66 (26)
Exposure to awkward posture, n (%)[a]	
Rarely (rarely, very rarely or never)	110 (44)
Occasionally	74 (30)
Frequently (frequently or very frequently)	66 (26)
Physical activity, n (%)	
Vigorous	124 (50)
Moderate	56 (22)
Low	70 (28)
Time sitting *(hours)*, n (%)[a]	
0 to 5	111 (44)
> 5	139 (56)
General health, n (%)[a]	
Excellent (excellent or very good)	128 (51)
Good	99 (40)
Poor (fair or poor)	23 (9)
Number of previous episodes of LBP, n (%)[a]	
1 to 2	70 (28)
3 to 10	93 (37)
> 10	87 (35)
Duration of last episode of LBP *(weeks)*, n (%)[a]	
< 2 weeks	146 (58)
2 to 6 weeks	51 (20)
> 6 weeks	53 (21)
Perceived risk of recurrence of LBP *(points)*, n (%)[a]	
0 to 5	125 (50)
> 5	125 (50)
Depression, n (%)[a]	
Normal (normal or mild)	215 (86)
≥ Moderate (moderate, severe or extremely severe)	35 (14)
Anxiety, n (%)[a]	
Normal (normal or mild)	206 (82)
≥ Moderate (moderate, severe or extremely severe)	44 (18)
Stress, n (%)[a]	
Normal (normal or mild)	204 (82)
≥ Moderate (moderate, severe or extremely severe)	46 (18)
Sleep quality, n (%)[a]	
Good (very good or fairly good)	175 (70)
Bad (fairly bad or very bad)	75 (30)

LBP = low back pain.
[a] Coded as used in the analysis of multivariate model.

Recurrence of an episode of low back pain

Using the uncorrected time, the cumulative probability of a recurrence of an episode of LBP was 38% (95% CI 32 to 44) by 3 months, 56% (95% CI 49 to 62) by 6 months, and 69% (95% CI 62 to 74) by 12 months. The median time to recurrence of an episode of LBP was 139 days (95% CI 105 to 173) when calculated using the uncorrected time, and 146 days (95% CI 114 to 178) using the corrected time.

Recurrence of activity-limiting low back pain

Using the uncorrected time, the cumulative probability of a recurrence of activity-limiting LBP was 17% (95% CI 13 to 22) by 3 months, 28% (95% CI 22 to 33) by 6 months, and 40% (95% CI 33 to 46) by 12 months. Less than 50% of participants had a recurrence of activity-limiting LBP by 1 year, so median time to recurrence could not be calculated. The 75th percentile survival times (25% had experienced a recurrence of activity-limiting LBP) was 152 days (95% CI 104 to 201) when calculated using the uncorrected time and 163 days (95% CI 112 to 214) using the corrected time.

Recurrence of low back pain for which healthcare was sought

Using the uncorrected time, the cumulative probability of a recurrence of LBP causing care-seeking was 12% (95% CI 8 to 17) by 3 months, 25% (95% CI 19 to 30) by 6 months, and 41% (95% CI 34 to 46) by 12 months. Less than 50% of participants had a recurrence of LBP causing care-seeking by 1 year, so median time to recurrence could not be calculated. The estimate of 75th percentile survival times (25% had experienced a recurrence) to a recurrence of LBP causing care-seeking was 193 days (95% CI 139 to 247) when calculated using the uncorrected time, and 207 days (95% CI 145 to 269) using the corrected time.

Figure 2 presents the Kaplan-Meier survival curves for the three definitions of recurrence, based on the uncorrected inception time.

Prognostic factors for a recurrence of an episode of low back pain

As the recurrence of an episode of LBP proportion was higher than expected (170 events), we were able to investigate 15 candidate predictors (allowing at least 10 events per predictor). There was no evidence that any of the continuous variables violated the linearity assumption. However, the variables 'time spent sitting' and 'perceived risk of recurrence' violated the proportional hazards assumption. Therefore, both variables were dichotomised using a median split and the proportional hazards assumption was re-tested. The dichotomised variables did not violate the proportional hazards assumption. The results of the univariate analyses are shown in Table 5. Of the 15 variables entered into the multivariate model, exposure to awkward posture, time spend sitting, and number of previous episodes were associated with recurrence of an episode of LBP within 12 months. Participants who reported frequent exposure to awkward posture had an 81% greater risk (HR 1.81, 95% CI 1.22 to 2.68) of having a recurrence than those who were rarely exposed to awkward posture. However, there was no evidence that occasional exposure to awkward posture increases the risk (HR 1.20, 95% CI 0.83 to 1.73) of having a recurrence. Participants who reported time spend sitting > 5 hours had 50% more risk (HR 1.50, 95% CI 1.08 to 2.09) of having a recurrence than those who reported time spent sitting between 0 and 5 hours. Compared with participants who reported one or two previous episodes, participants who reported between three and 10 previous episodes had 63% greater risk (HR 1.63, 95% CI 1.08 to 2.47), and those who reported more than ten previous episodes had 94% greater risk (HR 1.94, 95% CI 1.28 to 2.94) of having a recurrence. The results of the multivariate analyses are shown in Table 6.

Discussion

The estimate of risk of recurrence of LBP in a representative inception cohort from a primary care setting was much higher than previously reported.[4,6,28] By 1 year, 69% of participants had a recurrence of an episode of LBP, 40% of participants had a recurrence of activity-limiting LBP, and 41% of participants had a recurrence of LBP for which care was sought. It was also found that exposure to awkward posture, a longer time spent sitting, and more previous episodes of LBP were independent prognostic factors associated with recurrence of an episode of LBP within 1 year.

This study overcomes many of the important limitations of previous studies. It enrolled a large inception cohort of participants who had recovered from a previous episode of LBP within the previous month. Potential participants who still had low levels of pain were followed until they were recovered, so they could be enrolled soon after recovery. Monthly follow-ups were conducted to avoid recall bias. This also allowed us to describe estimates of a recurrence at different time points (eg, 3 or 6 months) rather than just at 1 year. There was minimal loss to follow-up

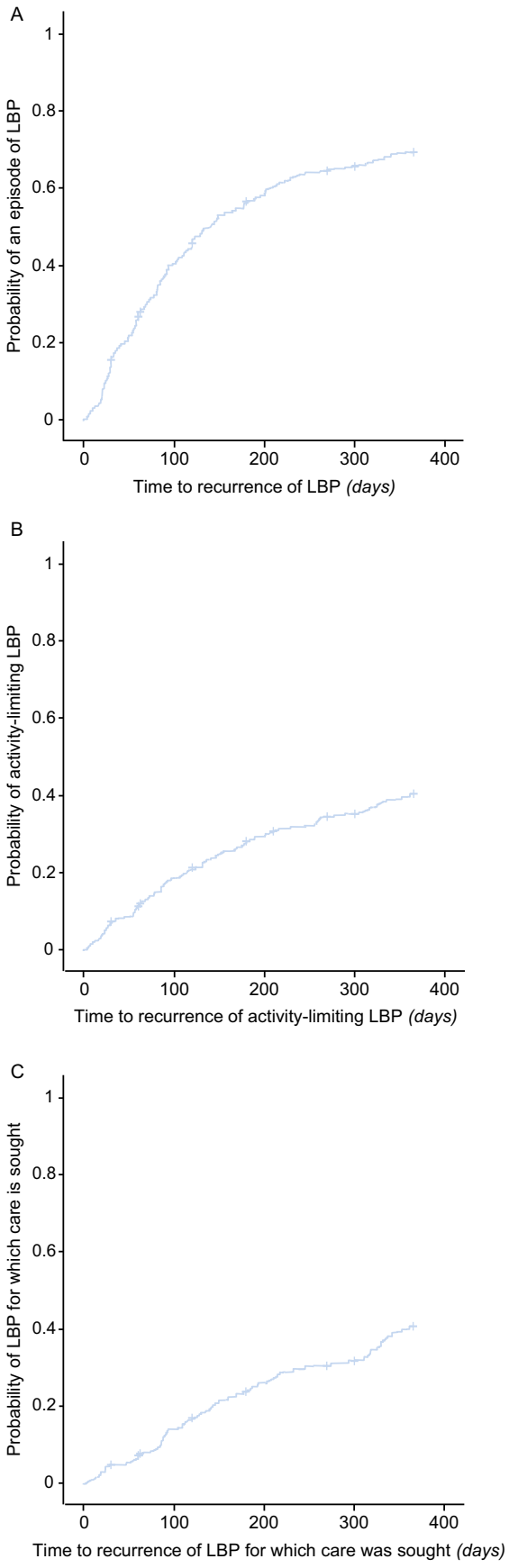

Figure 2. Kaplan-Meier survival curves based on uncorrected inception time of recurrence of: (A) an episode of LBP; (B) activity-limiting LBP; and (C) LBP for which care was sought (all n = 250).
LBP = low back pain.

(completeness index of 96%). To investigate the cumulative probability of a recurrence of LBP, we used a consensus definition for recurrence of an episode of LBP[13] as the primary outcome; however, because it is clear that recurrence estimates are affected by the definition, two other definitions of recurrence were investigated. Finally, a range of predictor variables for a recurrence were chosen a priori and measured using previously published[19,22–25] and validated questionnaires.[26,27]

This study also had some limitations. First, although we enrolled consecutive participants, we acknowledge that some potentially eligible participants might not have been informed about the study by their clinicians, and others could not be contacted. This issue could have precluded potentially eligible individuals from participating in the study. Also, self-reported measures were used to collect information about all prognostic factors. Because the baseline assessment was conducted over the telephone, some objective measures (eg, strength) were not possible to measure and may have predicted recurrence. We did not collect details of interventions that participants received during the previous episode of LBP, which may influence the time to recurrence of future episodes. Finally, the estimates for recurrence were based upon a clinical sample and may not apply to people who do not seek healthcare for an episode of LBP.

A systematic review, published in 2017, investigated the risk of and prognostic factors for a recurrence of LBP in patients who had recovered from a previous episode of LBP within the last year.[4] The systematic review included eight studies; however, only one included study was considered to have an adequately short inception period (< 6 weeks).[6] Stanton et al reported a recurrence of an episode of LBP estimate of 24% (95% CI 20 to 28) within 12 months, based on a 12-month recall period.[6] When recurrence was defined as recall of a recurrence at 12 months or pain reported at the 3-month or 12-month follow-up (even if participants failed to report a recurrence at 12 months), the recurrence estimate increased to 33% (95% CI 28 to 38).[6] That study[6] was a secondary analysis of a cohort study[34] investigating prognosis in patients with recent-onset LBP in Australian primary care, and was therefore not primarily designed to investigate risk of recurrence. Only two studies[5,6] included in the systematic review[4] presented data on prognostic factors for a recurrence of LBP. A history of previous episodes of LBP prior to the most recent episode was the only significant predictor of recurrence of LBP in both included studies. Hancock et al also found that disc degeneration and high intensity zone (from magnetic resonance imaging scans) were predictive of a recurrence of an episode of LBP.[5] Stanton et al[6] found, in a secondary analysis (without the variable previous episodes of LBP in the model), that perceived risk of persistent pain was a significant predictor of recurrence of an episode of LBP at 12 months.

Machado et al reported an estimate of recurrence of an episode of LBP of 33% based on 1-year recall and an estimate of recurrence of LBP causing care-seeking of 18%.[28] That study[28] was a secondary analysis of a case-crossover study[22] investigating triggers of an episode of acute LBP. Using a 1-year recall period likely contributed to the lower rates of recurrence compared with the current findings.

The findings of this study have important implications for clinicians, patients and future research. The results demonstrate that after recovery from an episode of LBP, about 70% of people will experience another episode of LBP within 1 year; however, many of these episodes appear to be relatively minor because when the recurrence occurred, only about 40% of participants reported moderate activity limitation or that healthcare was sought. These results are important for clinicians when providing information to patients about the likely risk and nature of recurrences of LBP. The results also demonstrate the need for effective strategies to prevent a recurrence of LBP. A systematic review investigating the effectiveness of interventions for prevention of LBP found moderate-quality evidence that exercise combined with education reduces the risk of an episode of LBP by 45% (95% CI 26 to 59).[35] This program may be particularly

Table 5
Univariate analyses for a recurrence of an episode of LBP.

Candidate prognostic factor Category	Recurrence *(n/total n)* [a]	Hazard ratio	95% CI	*P*
Age *(y)*	N/A	1.00	0.99 to 1.01	0.38
Body mass index *(kg/m²)*	N/A	1.01	0.98 to 1.04	0.65
Smoking history				
Never smoked	118/166	Reference	–	0.57
Used to smoke but have quit	43/69	0.85	0.60 to 1.21	0.36
Current smoker	9/15	0.80	0.41 to 1.58	0.52
Exposure to heavy loads				
Rarely (rarely, very rarely or never)	64/100	Reference	–	0.22
Occasionally	60/84	1.36	0.96 to 1.93	0.09
Frequently (frequently or very frequently)	46/66	1.26	0.86 to 1.84	0.23
Exposure to awkward posture				
Rarely (rarely, very rarely or never)	70/110	Reference	–	0.07
Occasionally	52/74	1.23	0.86 to 1.77	0.25
Frequently (frequently or very frequently)	48/66	1.54	1.07 to 2.23	0.02
Physical activity				
Vigorous	85/124	Reference	–	0.71
Moderate	35/56	0.90	0.61 to 1.33	0.59
Low	50/70	1.08	0.76 to 1.53	0.68
Time sitting *(hours)*				
0 to 5	66/111	Reference	–	–
> 5	104/139	1.39	1.02 to 1.90	0.04
General health				
Excellent	83/128	Reference	–	0.19
Good	73/99	1.32	0.96 to 1.80	0.09
Poor	14/23	0.96	0.54 to 1.69	0.88
Number of previous episodes of LBP				
1 to 2	36/70	Reference	–	0.002
3 to 10	67/93	1.67	1.11 to 2.50	0.01
> 10	67/87	2.09	1.39 to 3.13	<0.001
Duration of previous episode of LBP *(weeks)*				
< 2	98/146	Reference	–	0.22
2 to 6	39/51	1.33	0.92 to 1.93	0.13
> 6	33/53	0.91	0.62 to 1.36	0.65
Perceived risk of recurrence of LBP *(points)*				
0 to 5	77/125	Reference	–	–
> 5	93/125	1.56	1.16 to 2.12	0.004
Depression				
Normal (normal or mild)	144/215	Reference	–	–
≥ Moderate (moderate, severe or extremely severe)	26/35	1.09	0.72 to 1.65	0.69
Anxiety				
Normal (normal or mild)	140/206	Reference	–	–
≥ Moderate (moderate, severe or extremely severe)	30/44	1.02	0.69 to 1.51	0.92
Stress				
Normal (normal or mild)	136/204	Reference	–	–
≥ Moderate (moderate, severe or extremely severe)	34/46	1.23	0.92 to 1.96	0.27
Sleep quality				
Good (very good or fairly good)	115/175	Reference	–	–
Bad (fairly bad or very bad)	55/75	1.20	0.87 to 1.66	0.26

LBP = low back pain, N/A = not applicable.
[a] Total = number of participants in category.

important in those patients who were identified to be at increased risk. The prognostic factors we identified of exposure to awkward postures and long periods of sitting provide potential targets for the development of more effective prevention strategies, which would need to be tested in future studies. However, our study does not provide evidence of a causal relationship between these variables and recurrences, or evidence on the potential mechanisms that might produce a causal relationship. Further research to understand the mechanisms producing recurrences of LBP is important.

Table 6
Multivariate analysis for a recurrence of an episode of LBP.

Prognostic factor Category	Hazard ratio	95% CI	*P*
Exposure to awkward posture			
Rarely (rarely, very rarely or never)	Reference	–	0.01
Occasionally	1.20	0.83 to 1.73	0.34
Frequently (frequently or very frequently)	1.81	1.22 to 2.68	0.003
Time sitting *(hours)*			
0 to 5	Reference	–	–
> 5	1.50	1.08 to 2.09	0.02
Number of previous episodes of LBP			
1 to 2	Reference	–	0.002
3 to 10	1.63	1.08 to 2.47	0.01
> 10	1.94	1.28 to 2.94	<0.001

LBP = low back pain.

What was already known on this topic: Although most people with low back pain recover quickly, recurrence of low back pain is common. Most previous prognostic studies of recurrence of low back pain have not enrolled participants at a uniform time point after their previous episode of low back pain.
What this study adds: This study enrolled people who had recovered from an episode of low back pain within the past month, and followed them for 12 months. About 70% of people in the study had a recurrence of low back pain during follow-up. Prognostic factors for a recurrence include exposure to awkward posture, longer time sitting, and more than two previous episodes of low back pain.

eAddenda: Table 4 can be found online at https://doi.org/10.1016/j.jphys.2019.04.010.

Ethics approval: The Human Research Ethics Committee, Macquarie University approved this study (#5201500494).

All participants gave verbal informed consent before data collection began.

Competing interests: Nil.

Sources of support: This work was supported by the Department of Health Professions of Macquarie University. Tatiane da Silva has a PhD scholarship from CAPES (Coordenação de Aperfeiçoamento de Pessoal de Nível Superior), Ministry of Education of Brazil. Prof. Chris Maher's fellowship is funded by Australia's National Health and Medical Research Council. Tarcisio de Campos has a PhD scholarship from Macquarie University (Macquarie University Research Excellence Scholarship - MQRES).

Acknowledgements: We thank all the participants, physiotherapists and chiropractors who participated in the study.

Provenance: Not invited. Peer reviewed.

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