

Definitions of Recurrence of an Episode of Low Back Pain

A Systematic Review

Tasha R. Stanton, MScRS,* Jane Latimer, PhD,* Chris G. Maher, PhD,*
 and Mark Hancock, PhD†

Study Design. Systematic review.

Objective. To identify the definitions of recurrence (and related recovery definitions) currently used in the literature.

Summary of Background Data. Recurrence of low back pain (LBP) is a common and costly problem and the goal of many treatments is to prevent future recurrences. However, it is unclear whether standardized recurrence definitions are being used in the research literature evaluating the risk of recurrence and the effectiveness of treatments to prevent recurrence.

Methods. A literature search was performed of MEDLINE, EMBASE, CINAHL, AMED, and PEDro, and from chosen systematic reviews investigating treatments that could plausibly affect recurrence of LBP. Studies were considered eligible if they investigated recurrence of LBP in a cohort of patients with LBP. Inclusion was assessed by 2 reviewers and definitions of recurrence (and related recovery) were extracted.

Results. Fifty-three studies were identified by the review. Only 32% of studies gave explicit definitions of recurrence and only 10% gave a definition for both recurrence and recovery. Less than 10% of studies shared a common definition of recurrence.

Conclusion. Because of a lack of an agreed terminology it is very difficult to compare results between studies reporting recurrence rates or evaluating strategies to prevent recurrence. Steps to achieve consensus on recurrence and recovery definitions are required. In the interim, it is recommended that a minimum pain duration of 24 hours with a minimum pain intensity equivalent to the appropriate minimal important change for the chosen scale, be used for defining a recurrence. If disability measures are used, it is also recommended that the appropriate minimal important change be used. For recovery, a minimum duration of 1 month pain-free should be used.

Key words: recurrence, recovery, low back pain, definition. **Spine 2009;34:E316–E322**

Not only is low back pain (LBP) common and costly, but also an episode of back pain can be seriously disabling and distressing for an individual. Consequently many treatments for LBP aim to prevent recurrences of back

pain.^{1–8} Research suggests that LBP is typically recurrent^{9–12}; 24% to 87% of individuals who have an episode of LBP will suffer a recurrence within 1 year.^{13–17} This often necessitates the individual paying for further costly treatment and experiencing time-loss from work. Identifying treatments that reduce the risk of LBP recurrence is extremely important if we are to relieve the suffering and distress this condition can cause.

To determine the most effective treatment for prevention of recurrence, we must be able to directly compare recurrence rates for each treatment. This requires that recurrence be defined and measured in the same manner in each study. Without standardized definitions of recurrence, we are unable to make any sensible recommendations on how best to reduce LBP recurrence.

Recurrence of LBP is a deceptively difficult concept to define as it needs to be differentiated from both persistence of the original episode of pain and/or a flare-up of the original episode (a period where LBP is markedly more severe than is usual for the patient). True recurrence requires that the patient has firstly recovered from the original episode and then experiences a new episode of LBP. Logically a definition of recurrence needs to include operational definitions for the conclusion of an episode and the commencement of a new episode.¹⁸ In 2002, de Vet *et al* proposed a minimum recovery period of 30 days pain-free and a minimum of at least 24 hours of pain to denote the beginning of a new episode.¹⁸

It is not clear if studies investigating recurrence of LBP use standardized definitions of recurrence or what features are incorporated into definitions of recurrence (*e.g.*, pain intensity, duration, frequency). Without knowledge of the types, frequencies of use, and quality of recurrence definitions, it is impossible to make recommendations for standardized definitions. More importantly, this leads to great difficulty when trying to compare the effect of different treatments on recurrence.

The aim of this study is to systematically review the literature on recurrence of LBP, to identify the definitions of recurrence (and related recovery definitions) that are used, and where possible, make recommendations for a standardized definition of recurrence.

Materials and Methods

Search Strategy

Identification of potential studies for inclusion was performed in 2 ways. First, studies were identified through a general search of Medline (1950 to beginning of 2008), EMBASE (1974 to beginning of 2008), CINAHL (1982 to beginning of 2008), AMED (1985 to beginning of 2008), and PEDro (1929 to be-

From the *The George Institute for International Health, The University of Sydney, Sydney, Australia; and †Discipline of Physiotherapy, Back Pain Research Group, The University of Sydney, Sydney, Australia.

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Address correspondence and reprint requests to Tasha Stanton, MScRS, The George Institute for International Health, PO Box M201, Missenden Rd, Sydney, NSW Australia 2050; E-mail: tstanton@george.org.au

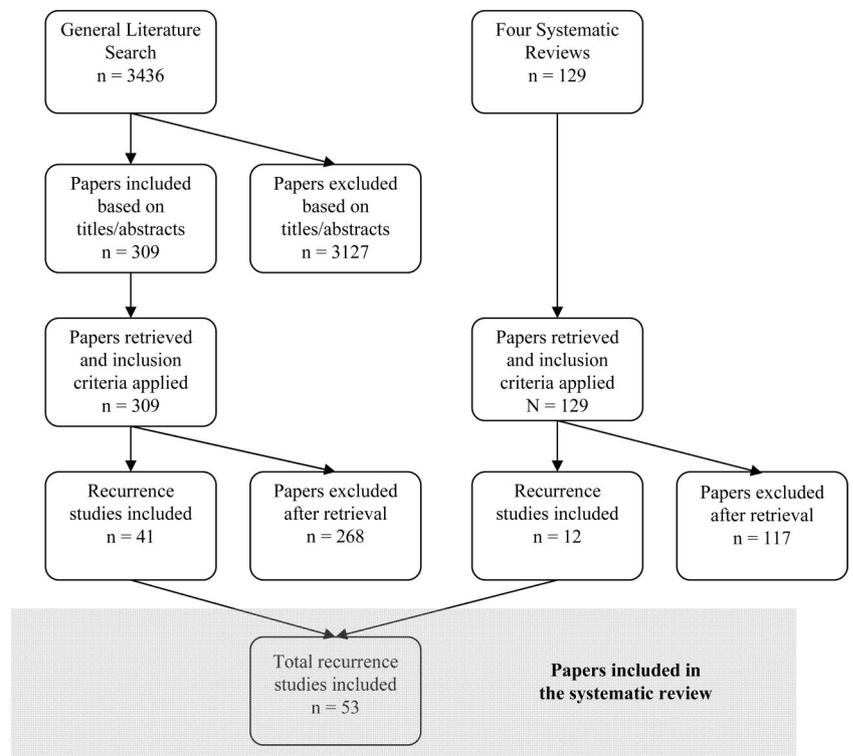


Figure 1. Flow chart describing the results of the literature search.

ginning of 2008). Keywords describing LBP (low back pain OR back pain OR backache OR low back injury OR sciatica OR lumbago) AND recurrence (recurren\$) were used to identify articles in which one of the main outcome measures was recurrence of LBP.

The second method of identification of potential studies was via a search of the Cochrane Database of Systematic Reviews using the key word “low back pain.” A systematic review was considered relevant if it was performed within the last 3 years (2005–2007) and if it addressed interventions that had a theoretical basis for reducing the risk of recurrence of LBP. Once relevant systematic reviews were identified, trials from the included references lists were retrieved. Four systematic reviews (Hayden *et al*,¹⁹ Heymans *et al*,²⁰ Martimo *et al*,²¹ and Ostelo *et al*²²) were considered eligible. These 4 reviews considered a total of 129 discrete trials that were then screened for possible inclusion in the review.

The reference lists of all 129 trials were examined to ensure that all studies citing recurrence were included. No additional studies were included based on this hand-search process.

Inclusion Criteria

To be included studies needed to meet all of the following criteria:

- A prospective, cohort study and/or randomized controlled trial.
- Study population of patients with nonspecific LBP. Nonspecific LBP was defined as pain or discomfort, localized below the costal margin and above the inferior gluteal folds, with or without leg pain.
- The study reports that it measures “recurrence” of pain or symptoms in the low back.
- Follow-up period of at least 1 month.

Exclusion Criteria

- Articles written in non-English languages where a translation could not be arranged.
- Articles addressing surgical management of LBP.

Article Inclusion

For the electronic database search results, one reviewer (T.S.) scanned the titles, abstracts, and key words of records and excluded clearly ineligible studies. Full reports of the remaining records were obtained and assessed for inclusion by 2 reviewers (T.S. and J.L.).

For studies retrieved from the Cochrane systematic reviews, the same 2 reviewers (T.S. and J.L.) independently applied the inclusion criteria to all potentially relevant trials. Any disagreements were resolved through consensus and if not possible, through consultation with a third party (C.M.).

Data Extraction

From each of the included studies, the definitions of recurrence (including the definition of recovery), were extracted.

Results

Search

Figure 1 presents the numbers of articles screened and included in the review. From the electronic database search, a total of 3436 articles were identified of which 41 articles met the inclusion criteria.^{9,15,16,23–61} From the 129 RCTs cited in the 4 Cochrane systematic reviews, 12 additional articles met the inclusion criteria.^{2,7,8,13,14,62–68} In total, this resulted in the inclusion of 53 articles.

Table 1. Features of Recurrence Definitions Present in Included Studies

Included Studies	How Measured?		Threshold		Additional Problems due to Pain		Other
	Preceded by a Pain-Free Period?	Pain Persistence?	Duration of Pain	Intensity of Pain	Pain-Related Disability	Care-Seeking	
Belart ²⁵		✓					
Bergquist-Ullman and Larsson ¹³	✓		✓				
Biering-Sorensen and Biering-Sorensen ²⁹	✓						
Biering-Sorensen ²⁷		✓					
Biering-Sorensen ²⁸		✓					
Biering-Sorensen and Thomsen ³⁰		✓					
Biering-Sorensen <i>et al</i> ³¹		✓					
Burdorf <i>et al</i> ³²	✓						
Carey <i>et al</i> ⁹	✓		✓		✓		
Cassidy <i>et al</i> ³⁴	✓			✓			
Elders and Burdorf ³⁶		✓	✓				
Enthoven <i>et al</i> ³⁷		✓	✓				
Faas <i>et al</i> ¹⁴		✓	✓	✓			✓
Ijzelenberg and Burdorf ⁴³		✓	✓	✓			
Marras <i>et al</i> ¹⁵		✓					✓
McGorry <i>et al</i> ⁵⁰		✓	✓	✓			
McGuirk <i>et al</i> ⁵²	✓		✓	✓			
Papageorgiou <i>et al</i> ⁵⁵	✓		✓	✓		✓	✓
Skargren <i>et al</i> ¹⁶		✓	✓	✓			✓
Taimela <i>et al</i> ⁵⁷		✓	✓	✓			

Definitions of Recurrence and Recovery

Only 38% of studies (20/53) provided an explicit definition of recurrence.^{9,13-16,25,27-32,34,36,43,50,52,55,57} The remaining 62% of studies only stated that recurrence was measured.^{1,2,7,8,23,24,26,33,35,38-42,44-49,51,53,54,56,58-68}

The definitions of recurrence used in the 20 studies varied greatly (Table 1). The most frequently used feature included in the definition of recurrence was the duration of pain (*e.g.*, specifying the minimum duration of pain required to be considered a recurrence).

The majority of studies did not provide any definition of recovery as part of the definition of recurrence. Only

13% of studies (7/53) provided an explicit definition of recovery.^{9,13,25,34,36,52,55}

In only 10% (5/53) of studies was a clear definition of recurrence given that included a definition of recovery (Table 2).^{9,13,34,52,55} Two studies used recovered subjects when measuring recurrence of LBP, but did not supply a definition of recovery.^{29,32} Conversely, 87% (46/53) did not consider recovery at all when measuring recurrence.^{1,2,7,8,14-16,23-28,30,31,33,35-51,53,54,56-68}

Only 4 studies used the same definition for recurrence,^{27,28,30,31} all of which were by the same author. No studies used previously recommended definitions (*e.g.*,

Table 2. Features of Recovery Definitions Present in Included Studies That Gave a Definition for Recurrence

Included Studies	Threshold		Additional Problems due to Pain	Other
	Minimum Duration Free of Pain	Maximum Pain Intensity		
Belart ²⁵		✓		
Bergquist-Ullman and Larsson ¹³			✓	
Biering-Sorensen and Biering-Sorensen ²⁹				✓
Biering-Sorensen ²⁷				
Biering-Sorensen 1984 ²⁸				
Biering-Sorensen and Thomsen ³⁰				
Biering-Sorensen <i>et al</i> ³¹				
Burdorf <i>et al</i> ³²				✓
Carey <i>et al</i> ⁹				✓
Cassidy <i>et al</i> ³⁴		✓		
Elders and Burdorf ³⁶		✓		
Enthoven <i>et al</i> ³⁷				
Faas <i>et al</i> ¹⁴				
Ijzelenberg and Burdorf ⁴³				
Marras <i>et al</i> ¹⁵				
McGorry <i>et al</i> ⁵⁰				
McGuirk <i>et al</i> ⁵²		✓		
Papageorgiou <i>et al</i> ⁵⁵	✓	✓		
Skargren <i>et al</i> ¹⁶				
Taimela <i>et al</i> ⁵⁷				

the definition of an episode of pain recommended de Vet *et al*¹⁸) as the basis for their definitions of a recurrence of LBP.

■ Discussion

This systematic review found extreme diversity and very poor reporting of definitions used for recurrence of LBP. The majority of studies investigating recurrence did not report or use explicit definitions. An important problem also identified with many studies was the lack of a definition of recovery as part of the definition of recurrence. Only 10% of articles provided an explicit definition of recurrence that included a definition of recovery. Finally, this review found that no studies refer to previous definitions suggested for recurrence; rather, researchers are creating their own definitions of recurrence for each study.

Definition of Recurrence of LBP

Many different features were used to define recurrence of an episode of LBP. Most commonly, a minimum duration of LBP was used to denote the presence of a recurrence (*e.g.*, an episode of LBP lasting at least a couple of hours was defined as a recurrence).⁵⁵ Other features such as a minimum intensity of pain (an episode of pain >10 mm on an 100 mm pain scale),⁵² the additional problems associated with pain (*e.g.*, an episode of pain affecting the ability to perform normal activities,⁹ and/or patient seeking additional care for LBP⁵⁵), and location of pain⁵⁵/self-report of recurrence¹⁵ were also used. Immediately this creates many different types of recurrence definitions. Unfortunately, even studies that used the same feature to define recurrence did not use the same cut-off for that feature. For example, 8 studies used a minimum duration of pain to define recurrence,^{9,13,14,36,43,50,55,57} however, not 1 used the same cut-off point. The minimum duration of pain ranged from a few hours³² to 15 days¹⁴ in these studies. Obviously, this makes comparisons difficult. Further, many studies used a combination of features to define recurrence^{9,14,15,36,43,50,52,55,57} creating a huge range of possible definition choices for recurrence.

This wide variation in definitions of recurrence makes it impossible/invalid to compare or combine results from different studies. For example, Elders *et al*,³⁶ defined a recurrence as consecutive years of pain identified using a yearly follow-up. In contrast, Faas *et al*¹⁴ divided the follow-up year into 15 day blocks (*e.g.*, total of 24, 15-day blocks over the year) and defined recurrence as every 15-day pain episode (where pain is >11 mm on an 85-mm pain scale) after an initial 15-day pain episode. In a 1-year period, subjects could have a maximum of 1 recurrence using the Elders *et al*³⁶ definition (*e.g.*, pain at baseline and at the 1 year follow-up), where as subjects could have up to 23 recurrences using the Faas *et al*¹⁴ definition (*e.g.*, the first 15-day block is the initial episode, leaving the possibility of 23 recurrences). Not only is the definition by Faas *et al*¹⁴ extremely complex, but

clearly these findings on recurrence cannot be meaningfully compared.

The lack of a definition of recovery as part of the definition of recurrence in most studies included in this review^{2,7,8,14–16,23–33,35–51,53,54,56–68} has important consequences for the interpretation of findings presented in these studies. It is highly likely that these studies include a proportion of patients who have never actually recovered from the original episode and as such these studies are measuring persistence of pain not recurrence. Importantly, in these studies, we have no way of differentiating those patients who had a true recurrence from those that had persistent pain. This makes us unable to specifically comment on an intervention's effect on recurrence and makes comparison between recurrence rates of studies not including recovery and studies using recovered subjects illogical and invalid. Intuitively, it does not make sense to consider a person who has recovered from back pain and experienced a further episode to be the same as a person whose back pain has never resolved.

Some studies specifically define recurrence as the persistence of pain (pain reported both at baseline and at a follow-up assessment with no recovery).^{14,27,28,30,31,36,43,57} These studies are confusing to the reader. The use of recurrence terminology should be avoided when referring to persistent pain where clear, demarcated pain episodes are not present.

Although 5 studies did provide definitions for both recurrence and recovery,^{9,13,34,52,55} very dissimilar definitions were used. For example, McGuirk *et al*⁵² used a pain score >10 mm on a 100 mm VAS scale to denote recurrence while Carey *et al*⁹ specified that recurrence involved pain for more than a day and divided recurrences into mild/nonfunctionally disabling, or severe/functionally disabling. Therefore, even in the studies where true recurrence is being measured (*e.g.*, not persistence of pain) we are unable to compare recurrence data.

A key finding of this review was that no studies used recurrence (and related recovery) definitions consistent with previous recommendations and less than 10% of studies shared the same definition of recurrence.^{31,32} This means that researchers are continuing to create new definitions for recurrence of LBP, which is only adding to the confusion. As the number of randomized controlled trials on a particular treatment increases, systematic reviews are invaluable for providing summary statements and developing clinical guidelines, yet the diversity in recurrence definitions makes systematic reviews evaluating the effects of therapy on recurrence impossible.

Researchers may continually create new definitions of recurrence for numerous reasons. First, recurrence is often a secondary outcome of a study, and therefore, may undergo less extensive planning than a primary outcome. It is possible researchers may use whatever data they have available from follow-up to classify recurrences, causing diverse definitions to occur. Second, recurrence may seem a very simple construct to measure—does a patient's pain return? If this thinking is used, comprehen-

sive planning of how to measure recurrence (*e.g.*, consideration of how to define recovery) may not occur.

The suggestions of de Vet *et al*¹⁸ for defining an episode of LBP can be used to precisely define recovery and recurrence. A period of at least 1 month without LBP signifies recovery from the original episode and if subsequent to this pain-free month the pain returns and persists for more than 24 hours a recurrence has occurred. Other aspects, however, may also be important to include in a definition of recurrence. A recent modified Delphi study by Dionne *et al*⁶⁹ stressed the importance of having a severity criterion to define an episode of LBP (*e.g.*, pain bad enough to limit your usual activities or change your daily routine for more than 1 day).

Recommendations

There is an urgent need to improve the reporting of definitions for a recurrence of LBP. The key features that should be defined include the minimum duration of pain, the minimum intensity of pain and/or pain-related disability, and a definition of recovery all of which are necessary to determine the conclusion of a previous episode and the commencement of a new episode. Further, recent evidence suggests that not all changes in pain and disability are clinically significant. Studies have identified the minimal clinically important difference,⁷⁰ minimal clinically important change,⁷¹⁻⁷³ or minimal important change (MIC)⁷⁴ for pain and disability all of which correspond to how large a change in pain/disability has to be in order to be meaningful. It makes sense then to incorporate this research into the definitions of recurrence where we are primarily trying to capture the return of a meaningful level of pain.

It is imperative to get consensus among experts on standardized recurrence definitions. However, in the interim we would advocate the adoption of definitions based on those of de Vet *et al*.¹⁸ For recurrence definitions, we suggest a minimum pain duration criterion of 24 hours be used to signify the commencement of a new episode.¹⁸ For a minimum level of pain we would encourage researchers to use the MIC of 2 units on a 0 to 10 units pain intensity numerical rating scale⁷⁴ as the minimum threshold and to report recurrence rates for this and higher thresholds. Similarly, if a disability criterion is used, the MIC should act as the minimum threshold level required for a recurrence to occur (*e.g.*, if Roland Morris Disability Questionnaire is used, 5 points is reported as the MIC⁷⁴) (Table 3). To provide interpretable information on the risk of recurrence, authors also need to specify the duration of time at risk subjects were followed. For recovery definitions, we recommend using de Vet's previous work specifying a minimum duration of 30 days free of pain to signify the conclusion of an episode.¹⁸

Limitations

Our search strategy yielded a large number of potential studies discussing recurrence. Further, our use of studies taken from systematic reviews that were not identified by

Table 3. Recommendations for Definitions of Recurrence (and Recovery) of an Episode of LBP

Recurrence of LBP
Preceded by a period of recovery from LBP ¹⁸ as defined below
Minimum duration of LBP of at least 24 h for new episode ¹⁸
Intensity \geq MIC ⁷⁴ for chosen scale (VAS/NRS or equivalent) and/or
Functional limitation ⁶⁹ \geq MIC ⁷⁴ for chosen functional limitation/disability scale
Recovery from LBP
Minimum duration of pain-free for at least 1 mo ¹⁸
Intensity: pain-free ¹⁸ (on applicable pain rating scale)

the general literature search helped include those articles for which recurrence was not a primary outcome measure. However, it is possible that our search did miss articles using explicit definitions of recurrence. It is even more likely that other articles, such as randomized controlled trials, which implicitly defined recurrence of LBP were not included; nonetheless, it is clear that this would not change the key findings of this article.

Conclusion

We found that the majority of studies use implicit definitions of recurrence and that less than 10% of studies share common recurrence definitions. Further, the majority of studies do not include recovery into a recurrence definition making us unable to comment specifically on recurrences *versus* persistent pain. Unfortunately, this impedes our knowledge of the true course of LBP and of the effectiveness of treatments aimed at secondary prevention of LBP. Therefore, it is imperative that standardized definitions relating to recurrence and recovery are implemented. We have suggested de Vet's definitions for an episode of LBP¹⁸ be adopted for recurrence measurement.

Although general criteria important to reporting a definition of recurrence are suggested in this article, further research is necessary to achieve a consensus between researchers in the area of LBP on the definitions related to recurrence of LBP. We are currently undertaking a modified Delphi study to achieve this goal.

Key Points

- Only 32% of studies gave an explicit definition of recurrence of LBP with only 10% of studies defining both recovery and recurrence.
- Less than 10% of studies shared a common definition of recurrence meaning that miscommunication in this field is highly likely.
- Standardization of recurrence definitions is vital to validly compare results between different studies and to determine which treatment(s) best prevent recurrence of LBP.

- For measurement of recurrence, it is recommended to use a minimum pain duration of the new episode of 24 hours and a minimum pain intensity equivalent to the appropriate MIC for the chosen scale. If disability measures are used in conjunction with pain measures, it is also recommended that the appropriate MIC be used.
- For recovery, a minimum duration of pain-free status of 1 month is recommended.

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