



## Original article

# Feasibility of the subgroup criteria included in the treatment-strategy-based (TREST) classification system (CS) for patients with non-specific low back pain (NSLBP)



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## ABSTRACT

**Background:** The new treatment-strategy based (TREST) classification system (CS) is in its exploratory phase with potential to impact clinical decision-making in the management of non-specific low back pain (NSLBP).

**Objective:** To evaluate the feasibility of subgroup criteria included in TREST subgroups: *pain modulation, stabilization exercise, mobilization, and training.*

**Methods:** An observational cross-sectional investigation involving a secondary analysis of data from 128 examinations of NSLBP patients, categorized individually by four examiners into one of the TREST subgroups. Four separate multivariate logistic regression analyses in two models were applied to identify how examiners applied judgments on pain intensity, disability and predetermined signs and symptoms to categorize patients into subgroups.

**Results:** Associations were found between the presence of “neurological signs and symptoms” (OR 5.5, 95% CI 1.9–16), “irritability” (OR 3.0, 95% CI 3.2–20) and disability (ODI) >30 (OR 8.5, 95% CI 3–20) and the subgroup *pain modulation*; between the presence of “bilateral spinal signs” (OR 5.6, 95% CI 1.1–29) and the subgroup *stabilization exercise*; between the presence of “specific segmental signs” (OR 4.0, 95% CI 1.2–14) and ODI ≤30 (OR 0.2, 95% CI 0.1–0.6) and the subgroup *mobilization*; between the presence of “neurological signs and symptoms” (OR 0.2, 95% CI 0.1–0.4) and the subgroup *training.*

**Conclusions:** Findings preliminary support feasibility of TREST subgroup criteria: neurological deficits, irritability, bilateral spinal signs, segmental signs and disability in the categorization of NSLBP patients. Further validation of the TREST classification system is required to establish its value in clinical reasoning and impact on patient outcomes.

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## 1. Introduction

Low-back pain (LBP) is a complex heterogeneous disorder commonly seen at physiotherapy clinics. Up to 85% of LBP cases cannot be attributed to a recognizable or known specific pathology and therefore referred to as non-specific LBP (NSLBP) (Balague et al., 2012). Classifying NSLBP into meaningful physiotherapy intervention subgroups is suggested to have potential to facilitate clinical reasoning and guide treatment (Kent et al., 2010; Apeldoorn et al., 2012; Henry et al., 2014), but as of yet not convincingly been

shown to improve patient outcome (Kent and Keating, 2005; Hebert et al., 2011). Various classification systems (CSs) have been presented (Karayannis et al., 2012) and include dimensions that are patho-anatomical (Ford et al., 2011a,b), biomechanical (Delitto et al., 1995; Fritz et al., 2007), and bio-psychosocial (O’Sullivan, 2005). Examples of CS that target treatments and supposedly a potential to impact patient outcome (Fairbank et al., 2011) are movement system impairment (MSI) classification (Sahrmann, 2000; Van Dillen et al., 2003), treatment-based classification (TBC) (Delitto et al., 1995), and the McKenzie approach (McKenzie and May, 2003), all of which have support in the literature with regard to inter-examiner reliability (Clare et al., 2005; Fritz et al., 2006; Harris-Hayes and Van Dillen, 2009) and aspects of validity (Child et al., 2004; Clare et al., 2007; Van Dillen et al., 2003).

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Overall, there is limited evidence for the effectiveness of most NSLBP physical treatments and the mechanisms attributable to their therapeutic effects are not fully understood (Balague et al., 2012; Mannion et al., 2012). Nonetheless, quality of care can be guided by available summaries of the evidence in clinical guidelines (Airaksinen et al., 2006; Chou et al., 2007; Savigny et al., 2009; Koes et al., 2010; van Middelkoop et al., 2011; Delitto et al., 2012). These guidelines are based on assessments of study-level averages and give advice on approaches that invariably applies to populations of patients with LBP. To avoid “one size fits all” and effective practice, it is necessary to interpret evidence in relation to the individual patient (Elwyn et al., 2015). One clinical practice guideline has been presented in which clinical findings are linked to subgroups of LBP patients according to the International Classification of Functioning, Disability, and Health (ICF) to provide evidence-based guidance for tailored treatment (Delitto et al., 2012). Herein treatment recommendations are made for manual therapy, trunk coordination exercises, directional preference exercises, and progressive physical exercise. Modest effect of improved outcomes of commonly used treatment selections in NSLBP are further supported by the following: specific manual therapy in patients with short symptom duration, lumbar hypo-mobility and no symptoms distal to the knee (Slater et al., 2012; Cook et al., 2014); motor control/stabilization exercises compared to general exercise (Bystrom et al., 2013) and in patients demonstrating lumbar motor control impairments (Brennan et al., 2006; Macedo et al., 2012); directional preference exercises in patients with radiating pain (Long et al., 2004; Browder et al., 2007; Surkitt et al., 2012); and general physical exercise in the management of NSLBP (Savigny et al., 2009; van Middelkoop et al., 2011; Smith et al., 2014; Saner et al., 2015). Moreover, there is moderate evidence that acupuncture is a useful adjunct to other therapies and can achieve short-term improvement in pain outcome (Furlan et al., 2005, 2010; Yuan et al., 2008).

It has been observed that physiotherapists would appreciate having uncomplicated clinical tools that can identify likely treatment responders and non-responders (Haskins et al., 2014, 2015). Other investigators have highlighted CS limitations such as patients meeting none or several criteria of the classification subgroups (May and Rosedale, 2009; Stanton et al., 2011), the lack of consideration of all NSLBP dimensions (Rabey et al., 2015) or lack of autonomy and flexibility in clinical reasoning (Davies and Howell, 2012; Delitto et al., 2012).

A treatment-strategy-based (TREST) classification system for stepwise clinical reasoning in the evaluation and guidance in first-line physiotherapy treatment selection in NSLBP has been suggested and described in detail elsewhere (Widerstrom et al., 2007, 2012). In short, this CS has been designed for physiotherapy treatment decision-making in primary care and aims to be flexible for users and to consider the recourses and time constraints associated with this context. It aims to be easy to understand and apply by physiotherapists not requiring extensive training or additional qualifications. It is physiotherapy treatment-based with a biomedical approach, considering mainly impairments (movement patterns, mobility deficits, motor control impairment, and pain mechanism) but also considering activity/participation limitations (disability). The TREST CS has four subgroups; *pain modulation*, *stabilization exercise*, *mobilization*, and *training*. These descriptive labels derive from commonly used treatments in the management of NSLBP (Mikhail et al., 2005; Bernhardsson et al., 2015) and refer to potential treatment responders to tailored treatments. The subgroups theoretical construct (Ford et al., 2007) is defined by the judgmental determination of the presence or absence of clinical signs and symptoms as criteria, presented in Appendix 1.

It has been recommended that the development and validation of a classification system should follow a research method

framework (Kent et al., 2010), and its derivation phase should include explorative and confirmative studies (i.e. analyses of reliability and validity). A previous inter-examiner reliability study (Widerstrom et al., 2012) found that examiners novice to the TREST and given a short familiarization had substantial chance-adjusted agreement on subgroup membership but had varied agreement on the signs and symptoms theoretically suggested as criteria of the subgroups. Agreement was fair for judgments on spinal segmental mobility and movement pattern, moderate for uni/or bilateral spinal signs and disorder irritability and almost perfect for peripheral neurological deficit. These results questioned to what extent examiners adhered to the criteria in each subgroup and whether these criteria were valid in the classification process. Inter-examiner reliability studies that use examiners involved in the CS development (Fritz et al., 2006; Harris-Hayes and Van Dillen, 2009) or use highly trained examiner in the investigated CS (Kilpikoski et al., 2002; Dankaerts et al., 2006; Vibe Fersum et al., 2009), may assume that examiners applied included criteria as requested. However, to explore whether this is the case when examiners are novice to the investigated CS is important for future CS utilization.

The TREST CS is in its derivation/exploratory phase with potential to impact clinical decision-making at the physiotherapist–patient level. In its continued development we aimed to explore the feasibility of the TREST CS subgroup criteria. The aim of this study was therefore to identify how individual examiners novice to the TREST CS applied judgments on pain intensity, disability and predetermined signs and symptoms to categorize patients with NSLBP into one of the four subgroups *pain modulation*, *stabilization exercise*, *mobilization*, and *training*.

## 2. Methods

### 2.1. Study design

This was an observational cross-sectional investigation involving a secondary analysis of data from 128 examinations performed in an inter-examiner reliability study (Widerstrom et al., 2012), where NSLBP patients were examined by two pairs of physiotherapists who individually assigned each patient to one of the four TREST subgroups.

### 2.2. Participants and settings

The 64 patients represented a convenience sample of consenting adults with NSLBP, regardless of symptom duration and pain intensity, with or without radiating pain to the lower extremity, at two different outpatient physiotherapy settings in primary care in Stockholm, Sweden (Table 1). Self-reported pain on the day of examination was assessed using Borg's CR 10 pain intensity scale (Borg, 1998), and perceived disability was assessed by the Oswestry low back pain disability index (ODI) (Fairbank et al., 1980). Pregnancy, neurological or rheumatic disease, and previous spinal surgery were exclusion criteria.

**Table 1**  
Patient characteristics.

Variables	Sample (n = 64)
Gender: men/women	27/37
Age (years): mean (min–max)	46.5 (17–77)
Symptom duration (weeks): median (min–max)	12 (1–572) <sup>a</sup>
Disability <sup>b</sup> : median (min–max)	30(2–60)
Pain intensity <sup>c</sup> : median (IQR) <sup>d</sup>	3.5 (3)

<sup>a</sup> Not normally distributed.

<sup>b</sup> Oswestry low back pain disability index (ODI); higher score = greater disability.

<sup>c</sup> Borg CR 10: higher score = higher pain intensity.

<sup>d</sup> IQR = interquartile range.

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