Manual Therapy 20 (2015) 157–165

Contents lists available at ScienceDirect

Manual Therapy

journal homepage: www.elsevier.com/math

Original article

The clinical utility of pain classification in non-specific arm pain

Niamh A. Moloney [a, b, *], Toby M. Hall [c, d], Andrew M. Leaver [b], Catherine M. Doody [a]

[a] UCD School of Public Health, Physiotherapy and Population Science, University College Dublin, Belfield, Dublin 4, Ireland
[b] Discipline of Physiotherapy, Faculty of Health Sciences, The University of Sydney, PO Box 170, Lidcombe, NSW 1825, Australia
[c] School of Physiotherapy, Curtin Health Innovation Research, Curtin University of Technology, G.P.O. Box U1987, Perth, WA 6845, Australia
[d] Manual Concepts, P.O. Box 1236, Booragoon, WA 6954, Australia

ARTICLE INFO

Article history:
Received 18 February 2014
Received in revised form
4 August 2014
Accepted 26 August 2014

Keywords:
Pain classification
Non-specific arm pain
Inter-rater agreement
Neuropathic pain

ABSTRACT

Mechanisms-based pain classification has received considerable attention recently for its potential use in clinical decision making. A number of algorithms for pain classification have been proposed. Non-specific arm pain (NSAP) is a poorly defined condition, which could benefit from classification according to pain mechanisms to improve treatment selection. This study used three published classification algorithms (hereafter called NeuPSIG, Smart, Schafer) to investigate the frequency of different pain classifications in NSAP and the clinical utility of these systems in assessing NSAP.

Forty people with NSAP underwent a clinical examination and quantitative sensory testing. Findings were used to classify participants according to three classification algorithms. Frequency of pain classification including number unclassified was analysed using descriptive statistics. Inter-rater agreement was analysed using kappa coefficients.

NSAP was primarily classified as 'unlikely neuropathic pain' using NeuPSIG criteria, 'peripheral neuropathic pain' using the Smart classification and 'peripheral nerve sensitisation' using the Schafer algorithm. Two of the three algorithms allowed classification of all but one participant; up to 45% of participants ($n = 18$) were categorised as mixed by the Smart classification. Inter-rater agreement was good for the Schafer algorithm ($\kappa = 0.78$) and moderate for the Smart classification ($\kappa = 0.40$). A kappa value was unattainable for the NeuPSIG algorithm but agreement was high.

Pain classification was achievable with high inter-rater agreement for two of the three algorithms assessed. The Smart classification may be useful but requires further direction regarding the use of clinical criteria included. The impact of adding a pain classification to clinical assessment on patient outcomes needs to be evaluated.

1. Introduction

Classification of pain based on pathophysiological mechanisms has received considerable attention (Woolf et al., 1998; Hansson, 2002; Freynhagan et al., 2008; Scholz et al., 2009; Nijs et al., 2010; Kindler et al., 2011; Schafer et al., 2011; Woolf, 2011; Smart et al., 2012) and is increasingly used in diagnosis and management of musculoskeletal conditions. In musculoskeletal conditions, there is often a poor relationship between pathology, pain and disability (Kanayama et al., 2009), as well as high prevalence of undiagnosed disorders (Walker-Bone et al., 2004; Beaudet et al., 2013), suggesting the potential clinical value of mechanisms-based pain classification (Woolf et al., 1998).

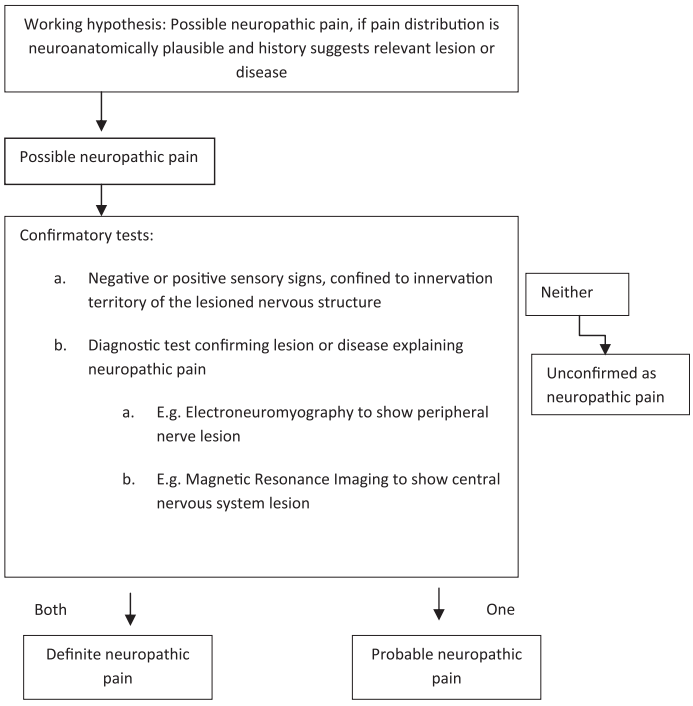
In the absence of a gold standard classification, a number of mechanisms based algorithms have been proposed (Schafer et al., 2009; Haanpää et al., 2011; Smart et al., 2012). The classification algorithm endorsed by the Neuropathic Pain Special Interest Group (NeuPSIG) of the International Association for the Study of Pain (Treede et al., 2008; Haanpää et al., 2011) classifies patients into one of four groups; Definite-, Probable-, Possible-, and Unconfirmed-Neuropathic pain, based on the number of corroborative signs (Fig. 1). The '*NeuPSIG algorithm*' is a consensus document of NeuPSIG and its reliability or validity have not been formally tested.

Classification criteria outlined by Smart et al. (2012), for chronic low back pain (± leg pain), classifies patients into three groups (nociceptive-, peripheral neuropathic- and central sensitisation pain) (Fig. 2). There is preliminary evidence for the validity of the '*Smart classification*' when used in a low back pain population (Smart et al., 2012).

The algorithm of Schafer et al. (2009) for classification of low-back related leg pain classifies patients into four groups

* Corresponding author. Discipline of Physiotherapy, Faculty of Health Sciences, The University of Sydney, PO Box 170, Lidcombe, NSW 1825, Australia. Tel.: +61 2 9351 9266; fax: +61 293519278.
E-mail address: niamh.moloney@sydney.edu.au (N.A. Moloney).

http://dx.doi.org/10.1016/j.math.2014.08.010
1356-689X/



Diagnostic algorithm for the diagnosis of possible, probable or definite neuropathic pain

Fig. 1. Guidelines for the classification of neuropathic pain.
Haanpää et al., 2011

(neuropathic sensitisation, denervation, peripheral nerve sensitisation and musculoskeletal pain) (Fig. 3). The '*Schafer algorithm*' has good inter-rater reliability (Schäfer et al., 2009) and good discriminative validity for the group 'peripheral nerve sensitization' (Schafer et al., 2011).

All three algorithms aim to distinguish patients who have pain with demonstrated painful neuropathy from those with non-neuropathic pain. The *Smart classification* and *Schafer algorithm* aim to further distinguish patients who have central/neuropathic sensitisation from those with nociceptive pain or peripheral nerve mechanosensitivity. The *NeuPSIG algorithm* does not make this distinction.

Clinically, differentiation of pain mechanisms may influence decision making about potential interventions, for example, musculoskeletal pain and neuropathic pain would warrant different treatment approaches with manual therapy and therapeutic exercise likely more useful in musculoskeletal pain than in people with neuropathic pain. The clinical utility of classification algorithms is dependent on the ability of the algorithm to influence clinical decision making. To do this an algorithm must have the capacity to reliably and correctly assign patients without there being too many 'unclassifiable' cases (Merskey and Bogduk, 1994).

The use of a mechanisms-based pain classification system holds potential for non-specific arm pain (NSAP). NSAP is a common upper limb disorder (Huisstede et al., 2006), that is frequently associated with poor outcomes (van Eijsden-Besseling et al., 2010). Whilst NSAP is a diagnosis of exclusion (Boocock et al., 2009), the high prevalence of weakness and paraesthesia in NSAP (Harrington et al., 1998) suggests a neural tissue disorder might underpin some presentations of NSAP. This hypothesis is supported by findings of altered vibration thresholds (Greening et al., 2003; Tucker et al., 2007) and neural tissue sensitivity (Elvey and Quintner, 1986; Greening et al., 2003). However, data also exist suggesting that a muscle tissue disorder (Calder et al., 2008, 2009) might be a prevalent pathology in NSAP. Recently, we presented data that widespread sensory hypersensitivity along with localised neural tissue sensitivity were characteristic features in this condition (Moloney et al., 2013b). Given these findings, it is not clear whether identification of a single specific pain classification can be achieved in NSAP.

The purpose of this study was to (1) investigate the frequency of different pain classifications in NSAP and (2) to investigate the clinical utility of three pain mechanism classification algorithms for NSAP. Specifically, we aimed to examine the completeness of classification and the inter-rater agreement for each classification algorithm.

2. Methods

2.1. Study design

A cross-sectional observational study was conducted. Participants with NSAP underwent standardized assessment by a physiotherapist (NM). Assessment findings were then used by two physiotherapists (NM and TH) to classify participants according to three pain classification algorithms. The clinical utility of each algorithm was evaluated according to its capacity to completely classify all participants and by assessment of inter-rater agreement.

2.2. Setting

This study was set in a university laboratory. Participants were recruited from metropolitan hospitals, medical and physiotherapy practices and the general population. The study was approved by the Human Research Ethics Committee for Life Sciences, University