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Robert Levy

Marcus Neuroscience Institute


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Persistent Spinal Pain Syndrome: A Proposal for Failed Back Surgery Syndrome and ICD-11

Nick Christelis, MD,* Brian Simpson, MD,[†] Marc Russo , MD,[‡] Michael Stanton-Hicks, MD,[§] Giancarlo Barolat, MD,[¶] Simon Thomson, MD,^{||} Stephan Schug, MD,** Ralf Baron, MD,^{††} Eric Buchser, MD,^{‡‡} Daniel B Carr, MD,^{§§} Timothy R Deer, MD,^{¶¶} Ivano Dones, MD,^{||||} Sam Eldabe, MD,^{***} Rollin Gallagher, MD,^{†††} Frank Huygen, MD,^{‡‡‡} David Kloth, MD,^{§§§} Robert Levy, MD,^{¶¶¶} Richard North, MD,^{|||||} Christophe Perruchoud, MD,^{††††} Erika Petersen, MD,^{‡‡‡‡} Philippe Rigoard, MD,^{§§§§} Konstantin Slavin, MD,^{¶¶¶¶} Dennis Turk, PhD,^{||||||} Todd Wetzel, MD,²⁴ and John Loeser MD^{*****}

*Pain Specialists Australia, Richmond, Victoria, Australia; [†]Department of Neurosurgery, University Hospital of Wales, Cardiff, UK; [‡]Hunter Pain Specialists, Broadmeadow, New South Wales, Australia; [§]Department of Pain Management, Cleveland Clinic, Cleveland, Ohio, USA; [¶]Barolat Neurosciences, Denver, Colorado, USA; ^{||}Basildon and Thurrock University Hospitals, Basildon, UK; ^{**}Anaesthesiology and Pain Medicine, Medical School, University of Western Australia and Royal Perth Hospital, Perth, Western Australia, Australia; ^{††}Department of Neurology, Universitätsklinikum Schleswig-Holstein, Kiel, Germany; ^{‡‡}EHC—Hôpital de Morges, Morges, Switzerland; ^{§§}Department of Public Health and Community Medicine, Tufts University School of Medicine, Boston, Massachusetts, USA; ^{¶¶}Center for Pain Relief, Charleston, West Virginia, USA; ^{||||}Department of Neurosurgery, Fondazione Istituto Neurologico “C. Besta,” Milano, Italy; ^{***}The James Cook University Hospital, Middlesbrough, UK; ^{†††}Department of Psychiatry, University of Pennsylvania School of Medicine, Philadelphia, Pennsylvania, USA; ^{‡‡‡}Center for Pain Medicine, Erasmus MC Pijnbehandelcentrum, Rotterdam, Zuid-Holland, Netherlands; ^{§§§}Department of Anesthesiology, Danbury Hospital, Danbury, Connecticut, USA; ^{¶¶¶}Marcus Neuroscience Institute, Boca Raton, Florida, USA; ^{|||||}Department of Neurosurgery, Anesthesiology and Critical Care Medicine, Johns Hopkins University School of Medicine, Baltimore, Maryland, USA; ^{††††}Clinique de la Douleur, Hôpital de la Tour, Geneva, Switzerland; ^{‡‡‡‡}Department of Neurosurgery, University of Arkansas for Medical Sciences, Little Rock, Arkansas, USA; ^{§§§§}Spine-Neurostimulation Functional Unit, PRISMATICS, Poitiers Hospital University, Poitiers, France; ^{¶¶¶¶}Department of Neurosurgery, University of Illinois at Chicago, Chicago, Illinois, USA; ^{||||||}University of Washington Seattle, Washington, USA; ²⁴Department of Orthopedics, Bassett Medical Center, Coopersown, New York, USA; and ^{*****}Departments of Neurological Surgery & Anesthesiology & Pain Medicine, University of Washington, Seattle, Washington, USA

Correspondence to: Nick Christelis, MD. Pain Specialists Australia, Level 4, 600 Victoria Street, Richmond, VIC, 3121, Australia. Tel: +61-1300-798-682; Fax: +61-1300-798-385; E-mail: n.christelis@painspecialistsaustralia.com.au.

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Abstract

Objective. For many medical professionals dealing with patients with persistent pain following spine surgery, the term Failed back surgery syndrome (FBSS) as a diagnostic label is inadequate, misleading, and potentially troublesome. It misrepresents causation. Alternative terms have been suggested, but none has replaced FBSS. The International Association for the Study of Pain (IASP) published a revised classification of chronic pain, as part of the new International Classification of Diseases (ICD-11), which has been accepted by the World Health Organization (WHO). This includes the term Chronic pain after spinal surgery (CPSS), which is suggested as a replacement for FBSS. **Methods.** This article provides arguments and rationale for a replacement definition. In order to propose a broadly applicable yet more precise and clinically informative term, an international group of experts was established. **Results.** 14 candidate replacement terms were considered and ranked. The application of agreed criteria reduced this to a shortlist of four. A preferred option—Persistent spinal pain syndrome—was selected by a structured workshop and Delphi process. We provide rationale for using Persistent spinal pain syndrome and a schema for its incorporation into ICD-11. We propose the adoption of this term would strengthen the new ICD-11 classification. **Conclusions.** This project is important to those in the fields of pain management, spine surgery, and neuromodulation, as well as patients labeled with FBSS. Through a shift in perspective, it could facilitate the application of the

new ICD-11 classification and allow clearer discussion among medical professionals, industry, funding organizations, academia, and the legal profession.

Key words: Pain Classification; ICD-11; Chronic Pain; Failed Back Surgery Syndrome; Persistent Spinal Pain Syndrome; Pain Taxonomy

Introduction

Mixter and Barr's seminal publication in 1934 described intervertebral disc herniation as a cause of lumbago and sciatica [1]. This description of a treatable lesion brought spine surgery into mainstream surgical practice. As spine surgery flourished, so did reports of unrelieved or even worsened pain following surgery [2]. The first term used to describe these cases was "post-laminectomy syndrome" [3]. This was followed by a series of publications by Burton, who introduced the term Failed back surgery syndrome (FBSS) [4–7]. FBSS was used in subsequent publications by Ross [8–10], Wilkinson [11, 12], and Law [13]. The first published appearance of this English language term in Europe was in 1988 [14–16]. Over time, the use of the term FBSS has increased exponentially (Figure 1) while alternative descriptive labels have declined in use.

Many definitions and revisions of FBSS have been proposed but failed to gain traction:

- FBSS indicates persistent, new, or recurrent low back and/or lower extremity pain following one or more spine surgeries [17].
- The outcome of lumbar spine surgery does not meet the pre-surgical expectations of both the patient and surgeon [18].
- Surgical end stage after one or several operative interventions on the lumbar neuraxis indicated to relieve lower back pain, radicular pain, or the combination of both that has not resulted in improvements [19].
- Lumbar (or cervical) pain of unclear origin either persisting despite surgical intervention or appearing after surgical intervention for spinal (origin) pain originally in the same anatomical distribution [20].
- Chronic radicular pain that persists or recurs in the same distribution despite anatomically satisfactory previous spinal surgery [21].
- Persistent or recurrent pain in the back, neck, or limbs despite surgery or treatment thought likely to relieve pain [22].

Persistent or recurrent pain and other symptoms following spinal surgery are common, affecting between approximately 20% [23, 24] and 40% [25] of patients. It is often severe [26] with most sufferers having tried a range of drugs, particularly opioids, and physical treatments [21, 22]. As many as four out of five are unable to work [21] and the quality of life is reported to be worse than in other common chronic pain conditions [27]. Reoperation is common, and sometimes multiple [21, 28], with diminishing returns [29]. The economic cost is considerable [30, 31] and likely to rise as the incidence of lumbar spine surgery has been increasing substantially, doubling over

10 years in the UK [31]. Lumbar fusions alone nearly trebled over the same period in the USA [32]. Significant and long-term biological, psychological, social, economic, and medico-legal implications can interact in the development and maintenance of postsurgical symptoms.

Proper and precise diagnosis of the cause of a patient's pain is the foundation for both effective treatment and clinical research. Labeling all patients generically as having FBSS fails to incorporate the range of factors that may contribute to the condition and limits understanding of the condition. In an age of value-based care and reimbursement, precise diagnosis is paramount. A potential consequence of the use of the term FBSS is that it may be interpreted to indicate that the surgery was performed incorrectly, when that is usually not the intended meaning. Being labeled a "failed back" may delay or even prevent appropriate diagnosis and treatment. The medicolegal implications of this misunderstanding may be significant.

Medical terms in such common usage should be descriptive, unambiguous, and supported by diagnostic testing (where feasible), leading directly to appropriate diagnosis and therapy. FBSS is none of these. The term FBSS is ambiguous, imprecise, misleading, and pejorative. It provides no useful information as to the potential cause(s), mechanisms, and underlying pathology of the ongoing symptoms; the term FBSS treats causation with disdain. Concerns regarding the unsuitability of FBSS to encompass a diverse and prevalent clinical entity have been raised over at least the past 20 years [33–37].

Our group represents a self-organized FBSS taxonomy steering committee plus a wider group of independent experts in the field. We have undertaken a comprehensive, critical evaluation of this term and propose a more appropriate and clinically informative replacement term, selected via a Delphi process [38] (Appendix 1): Persistent spinal pain syndrome (PSPS).

The IASP has recently published a new classification of chronic pain within the International Classification of Diseases, ICD-11 [24]. This classification is now a part of the new foundation layer which is a subset of all diagnostic entities that make up the content of the ICD-11 [39]. We propose that the clarification introduced by this new classification, which includes the third-level term Chronic pain after spinal surgery [40], may be further enhanced by the incorporation of our proposed new term, and we suggest how this might be accomplished.

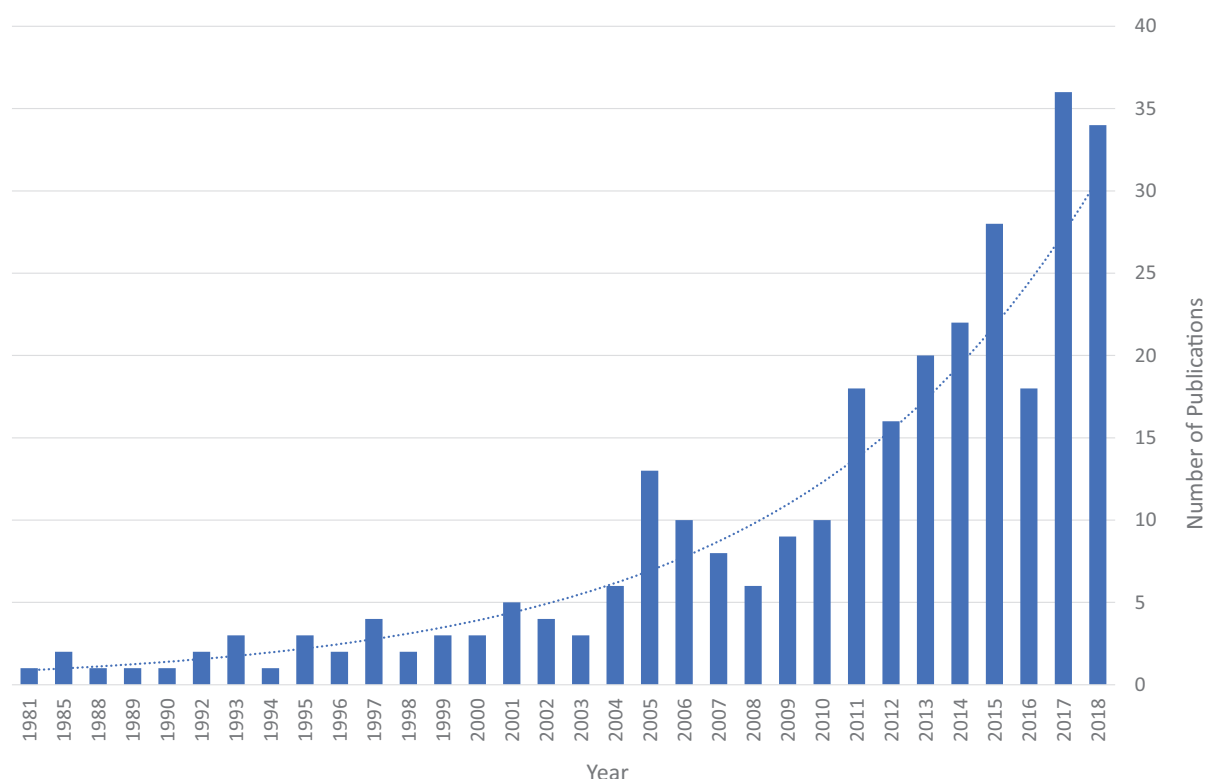


Figure 1. Number of publications indexed in PubMed using the term “Failed back surgery syndrome” in the title.

Components of the Problem

A diagnostic label is of most use when it defines a specific etiology and/or pathophysiological state. FBSS does not provide the necessary clarity and reliability.

Shortcomings of FBSS

- To define a diagnosis by the outcome of a treatment is unusual and unsatisfactory.
- Ambiguously, FBSS implies either that a surgical procedure failed to resolve the chronic pain and other symptoms for which it was performed [41] or that it actually caused the symptoms. The latter will be true only in a subset of patients.
- FBSS does not differentiate symptoms caused by the surgery from those that were simply not relieved by it. They may coexist.
- Pain developing as an indirect consequence of surgery is not addressed; for example, sacroiliac (SI) joint dysfunction due to additional stresses following lumbosacral fusion.
- New pain following a period of relief and not directly related to the previous surgery, e.g., an additional disc protrusion becoming symptomatic, is not addressed; is this an unconnected new condition or a further manifestation of the same process?
- The effects and relevance of a commonly progressive underlying degenerative process are not acknowledged.
- Inappropriately performed surgery is not identified, e.g., wrong-level discectomy, insufficient decompression, or unjustified operation.
- Secondary causes, such as excessive postoperative epidural scar formation, are not specifically identified. These may cause late recurrence or worsening of symptoms.

- There is no reference to the pathophysiological mechanism underlying the persisting pain.
- The operation is not specified.
- Established neuropathological changes including central sensitization, persistent microglial inflammation, and opioid-induced hyperalgesia may underlie the persistence of pain following surgery, through altered pain processing and nociceptive pain.
- Unrealistic expectations, disappointment, anger, distress, depression, and medicolegal action may contribute to the maintenance or worsening of the symptoms after surgery.
- There is no comprehensive definition of “successful back surgery” to provide a point of reference and context.

An equivalent condition occurs in the cervical region [42, 43]: Failed neck surgery syndrome (FNSS) [44].

Requirements of a New Term or Definition

New, defining terminology carries several requirements in order for it to be accurate, robust, and well accepted. It should accommodate the key dimensions of location, mechanism, and etiology; e.g., lower limb pain due to nerve root compression by a recurrent lumbar disc herniation. The organizing principle of a classification system such as ICD-11 reverses the sequence. Biopsychosocial factors are highly relevant to this topic and should be accommodated.

A terminology should be as simple as is appropriate. A pathological diagnosis might be combined with a description of the setting in which it occurs. Recently published alternatives include: postoperative persistent syndrome

(POPS) [36], which includes pain, function, and neurophysiological and psychological components but ignores location; and chronic lumbar and lower limb pain (CLLLP) [34], which ignores the cervical spine, upper limbs, and thoracic spine. Chronic spinal pain after surgery [45] and postsurgical spine syndrome (PSSS) [46] have also been proposed.

The terminology should guide not only diagnosis and treatment but also clinical and public health research. Consistent application of new, more appropriate terminology in clinical trials will contribute to improvements in systematic reviews and meta-analyses of studies evaluating treatment outcomes and enhance the validity of the conclusions drawn.

Mechanisms of Pain of Spinal Origin

Chronic pain of spinal origin is a complex diagnosis which includes several categories of pathophysiology arising from:

- The vertebral column—discogenic pain, recurrent disc herniation, herniation of adjacent disc(s), facetogenic pain, SI joint dysfunction, pseudarthrosis, adjacent level stress and degeneration, foraminal stenosis, spinal stenosis, degenerative spondylolisthesis, spinal instability, osteoarthritis, scoliosis, and kyphosis.
- The nervous system—nerve root compression, adhesion, traction, irritation or injury, chronic radiculopathy, nerve entrapment, neuropathic low back pain, epidural fibrosis, arachnoiditis, dural sac deformity, pseudomeningocele, arachnoid cyst, nociplastic pain, and central sensitization.
- The muscles and fascia—myofascial trigger points, abnormalities of gait, and changes following foot drop.
- Complications of surgery—infection, hematoma, nerve root damage or division, spinal instability, instrumentation-related, and hardware failure.
- Psychosocial factors—depression, anxiety, somatization, poor coping, catastrophizing, personality disorder, preceding traumatic experiences, and persistent litigation. These can contribute significantly or even overwhelmingly to the overall outcome, in line with the biopsychosocial or sociopsychobiomedical construct of chronic pain [47] and are addressed by the “extension codes” of ICD-11 as relevant contributory factors [24]. In many cases these are the predominant issue (and might have contraindicated surgery in the first place), in which case, they can be classified accordingly.

The above factors may interact with each other. Spinal surgery is commonly associated with, and may cause, biomechanical changes that can alter weight distribution, and therefore stresses on, anatomical structures, (e.g., facet joints and their capsular and ligamentous components, causing facet arthropathy). Preexisting degenerative changes in the spine, including spondylolisthesis, may be exacerbated. Facet arthropathy may lead to foraminal stenosis and nerve-root compression. Postsurgical epidural scarring may exacerbate both this and spinal canal stenosis. Surgical lumbar spinal fusion may initiate or exacerbate SI disease. Adjacent-level

disease is twice as likely to develop after a second-level anterior cervical discectomy and fusion as it is after the first operation [43]. Biomechanical changes may lead to myofascial dysfunction causing pain, both within these structures and at their sites of attachment.

These changes are responsible, to a varying degree, for both neuropathic and nociceptive pain and can also occur after both successful and unsuccessful spinal surgery. Neuropathy and central sensitization may already be established prior to surgery. Nociceptive pain is also relevant; these patients do not fulfil the criteria for the new definition of neuropathic pain, which requires the demonstration of a somatosensory lesion [48]. Nociceptive pain is defined as: “*Pain that arises from altered nociception despite no clear evidence of actual or threatened tissue damage causing the activation of peripheral nociceptors or evidence for disease or lesion of the somatosensory system causing the pain*” [49].

Distinguishing pathophysiological mechanisms and understanding etiology might help to predict the response to various treatments; e.g., physical therapy in myofascial mechanical low back pain or neurostimulation in predominantly neuropathic leg pain. The importance of identifying the most appropriate treatment is highlighted by the current international “opioid crisis” [50].

Issues Emerging from ICD-11

The IASP definition in the *Classification of Chronic Pain* for lumbar spinal or radicular pain after Failed Spinal Surgery (XXV1–10), stands as: “*Lumbar (cervical) pain of unknown origin either persisting despite surgical intervention or appearing after surgical intervention for spinal (origin) pain originally in the same topographical distribution*” [17].

The definition covering the recently proposed ICD-11 term Chronic pain after spinal surgery (CPSS), however, specifies: “*Pain that develops or increases in intensity after a surgical procedure or a tissue injury*” [40] This excludes those cases where preexisting pain simply did not resolve after surgery, which may represent 30% of patients [41]. By this ICD-11 definition, the pain must be *attributable to the surgery*.

It follows firstly, therefore, that CPSS is not a complete or direct replacement for FBSS. The latter does include failure of the pain to resolve after surgery and cases where it is not clear whether surgery caused the pain.

Secondly, the ICD-11 definition also states: “*The post-surgical or post-traumatic etiology of the pain should be highly probable; if it is vague, consider using codes in the section of Chronic primary pain.*” [40, 51]. The ICD-11 category Chronic primary pain may not, however, always be an appropriate alternative when the surgery is not known to be causative. *Primary* implies a major emotional-psychological component which requires, primarily, treatment of the distress and disability [52]. This will be correct in many cases; the surgery may not have

been indicated in the first place, because these and other factors had not been adequately addressed. In other cases, however, the surgery did not definitely cause the pain, but the pain may still be secondary to physical factors other than the surgery. Hence, the coding of this latter cohort of patients might, in many cases, be better directed towards other diagnostic categories—in particular, Chronic secondary musculoskeletal pain and Chronic neuropathic pain.

Thirdly, there is a lack of clarity about cases where late relapse/recurrence occurred after initially successful surgery. This can be due to the surgery, but indirectly as in adjacent segment strain and degeneration.

Finally, and salient to our proposal, cases where there was *no* prior surgery may be otherwise essentially the same as those postsurgical cases where the surgery did not clearly cause the chronic symptoms. This commonality may not be immediately apparent from ICD-11, and this may provide scope to enhance the classification system.

Proposal for a Resolved Terminology

As with the evolution of other taxonomies in medicine, the structure of a replacement term should encourage the inclusion of pathologies that contribute to the symptoms constituting the syndrome. Any new taxonomy should attempt to retain those features embodied in the anatomic distribution and description of continuing pain and associated symptoms that have historically been used to describe the syndrome. Replacing the term FBSS provides an opportunity to increase the accuracy and clarity of the classification of the whole gamut of cases whose similar clinical picture—chronic axial pain and/or radicular symptoms of spinal origin—has or has not been caused by spinal surgery, or who have *not undergone* any spinal surgery (no surgically-remediable pathology, or unfit for or declined surgery). The term which we are proposing—Persistent spinal pain syndrome—could coexist with, and incorporate, CPSS. It provides a cohesive classification for cases of chronic or relapsing pain of spinal origin which are not covered by CPSS.

Persistent Spinal Pain Syndrome: A Balanced, Additional Terminology

The term Persistent spinal pain syndrome (PSPS) emerged as the preferred option of our international group of experts. This resulted from widespread discussion, followed by a consensus workshop which employed a Delphi technique similar to the process used to select Complex regional pain syndrome (CRPS) as summarized in **Appendix 1**.

The proposed term encompasses the diverse potential symptoms of a syndrome of chronic pain (as per the usual criteria for establishing pain persistence) or recurrent pain of spinal origin, paresthesia, numbness, stiffness,

muscle spasms and weakness, and, in some cases, sphincter disturbance. The distribution is variably axial and/or radicular, and most commonly lumbosacral, but can be cervical. It may also be thoracic but less commonly; splinting by the ribcage affords a degree of protection to this region. Spinal surgery may or may not have occurred and may or may not be relevant in particular cases.

It is proposed that the combination of the sustained upright posture, unique to *homo sapiens*, and the anatomy of the spine and associated structures *at their present stage of evolution* creates a persistent predisposition to a chronic pain syndrome. Susceptibility will vary between individuals. It would seem reasonable to surmise that the sustained upright posture exerts mechanical stresses that the spine and associated anatomy and physiology cannot fully accommodate over time. These compressive, tension, and shearing forces are likely to be proportionately greater and more sustained in humans than in any other vertebrates. The unique anatomical relationship between the vertebral column and the nervous system will dictate much of the resulting symptomatology. Thus, there is a fundamental and persistent predisposition to axial and radicular pain of spinal origin, to its chronic, or relapsing nature, and to a failure rate following spinal surgery. It may account, to a varying degree, for the persistence or recurrence of symptoms not only after spinal surgery or other treatments, but also in the absence of such interventions.

If the effects of the upright posture acting upon specific anatomical and physiological features of the spine are central etiological factors, then a broader approach to the taxonomy, which does not pivot on or start with surgery, would establish an appropriate diagnostic/etiological context. It would also allow generalization to the cervical spine and upper limbs, where a similar syndrome occurs [42, 44]; the cervical spine supports the upper limb girdle—not just the head.

Exclusion from PSPS

Chronic primary musculoskeletal pain is defined by ICD-11 as pain located in muscles, bones, joints, or tendons that lasts or recurs for longer than three months, that is associated with significant emotional distress and/or functional disability, and *that cannot be better accounted for by another diagnosis* [52]. This will accommodate a subset of the cases previously included in FBSS, where surgery did not cause the pain (see above), but it is distinct from PSPS, which comprises a predisposition to developing symptomatic structural or pathological changes. Where psychosocial factors, as is commonly the case, contribute to the maintenance or exacerbation of symptoms and/or disability which *are* caused by another (secondary) diagnosis, they are accommodated in ICD-11 by extension codes [24].

Surgery is not indicated for primary pain but may in some cases be performed. Failure to relieve the pain

would not be classified as PSPS, and the diagnosis of primary pain would remain; an inappropriate treatment that does not work cannot change the underlying diagnosis. However, if the spinal surgery caused a new, additional persistent pain, that would be classified as PSPS (type 2). This would add to, not replace, the original diagnosis (Primary musculoskeletal pain).

Subtypes

PSPS type 1: no relevant surgery PSPS type 2: surgery

(This notation is comparable with CRPS types 1 and 2 [53])

Primary Subdivisions (Location of the Pain)

predominantly axial—predominantly radicular—mixed—lumbar and sacral—thoracic—cervical

Pathophysiology (Nature of the Pain)

neuropathic—nociceptive—neuropathic and nociceptive—nociplastic

Examples

1. PSPS type 1—upper limb—radicular—facet joint hypertrophy.
2. PSPS type 1—lumbar—axial—spondylosis.
3. PSPS type 2—upper limb—radicular—cervical disc protrusion (operated).
4. PSPS type 2—lower limb non radicular (referred) and lumbar axial—post lumbar fusion—adjacent-segment disease.

Integrating Persistent Spinal Pain Syndrome with ICD-11

The diagnostic groups within ICD-11 which are relevant to PSPS are shown in Figure 2.

Under the ICD-11 definitions, Chronic postsurgical pain, which includes the third-level category CPSS, refers specifically to cases where “*the postsurgical etiology of the pain should be highly probable*” [51]. The surgery is regarded as the initiator of the pain. A degree of uncertainty and lack of clarity is, however, common and has significant medicolegal implications. “Highly probable” is itself imprecise. Chronic symptoms may also result *indirectly* from surgery, as in adjacent-segment strain. ICD-11 advises the use of other categories when there is uncertainty. The factors underpinning PSPS, essentially the effects of the upright posture, can contribute to the severity and persistence of surgery-induced chronic pain, such as that arising from an implant or graft, or from adjacent-segment disease. A meaningful assessment of the relative contributions may be impossible in a particular case. Rather than excluding “pure” CPSS from PSPS and excluding all uncertain surgery-related cases from CPSS, these issues could be overcome by use of the novel ICD-11 tool “multiple parenting” [24] to place CPSS within two first-level diagnostic groups: Chronic postsurgical or post-traumatic pain (as now) and PSPS.

While CPSS per se does not equate to the heterogeneous FBSS, PSPS not only accommodates FBSS but also includes those cases that are similar but in which surgery, for whatever reason, has not been undertaken. PSPS therefore comprises:

Type 1

- Where no (relevant) surgery was performed.
- Where pain persists despite optimal nonsurgical management.

Type 2

- Where surgery was directly causative (this equates to CPSS).
- Where surgery was indirectly causative.
- Where it is unclear whether surgery was causative.
- Where surgery was performed but was not causative.
- Where pain recurred after initially successful surgery.
- Where surgery failed to relieve the pain and other related symptoms.

If, in the last condition (surgery failed to relieve the symptoms), the original diagnosis was Chronic primary musculoskeletal pain, that diagnosis would continue to apply, not PSPS (see Exclusion from PSPS above). In other situations, failure of spinal surgery to relieve pain and other symptoms does not necessarily indicate that the surgery was inappropriate.

Surgery is taken to mean invasive procedures on the spine, typically decompressions and fusions, intended to treat pain of spinal origin, to correct spinal instability or deformity, or as part of the treatment of other conditions such as intraspinal tumors. Procedures such as percutaneous vertebroplasty and kyphoplasty (but not simple injections) and insertion of interspinous spacers would be included. The ICD-11 definition [40, 51] refers to spinal stenosis, disc surgery, and to fusion procedures for idiopathic scoliosis/kyphosis but is not more explicit.

With regard to neuromodulation, if a procedure to implant a device (e.g., a spinal cord stimulator) caused or exacerbated persistent pain, the diagnosis would be PSPS type 2, as for any other spinal operation. If the stimulation caused pain, exacerbated it, or failed to relieve it, that would not in itself be PSPS; the original diagnosis would prevail (which might or might not be PSPS).

When surgery has been performed, the cases in which it was not clearly the direct cause of the chronic pain, i.e., are not CPSS, will constitute a large majority. Except where Chronic primary musculoskeletal pain is appropriate, they, along with cases where no surgery was performed, could be classified under Chronic secondary musculoskeletal pain (spondylosis) [54] or Chronic peripheral neuropathic pain (painful radiculopathy) [55], depending upon whether axial or radicular symptoms predominate. Underlying specific conditions, e.g., ankylosing spondylitis, would also be accommodated within Chronic secondary musculoskeletal pain [54]. Any neuropathic element of axial pain would have to be accommodated within Chronic neuropathic pain, because

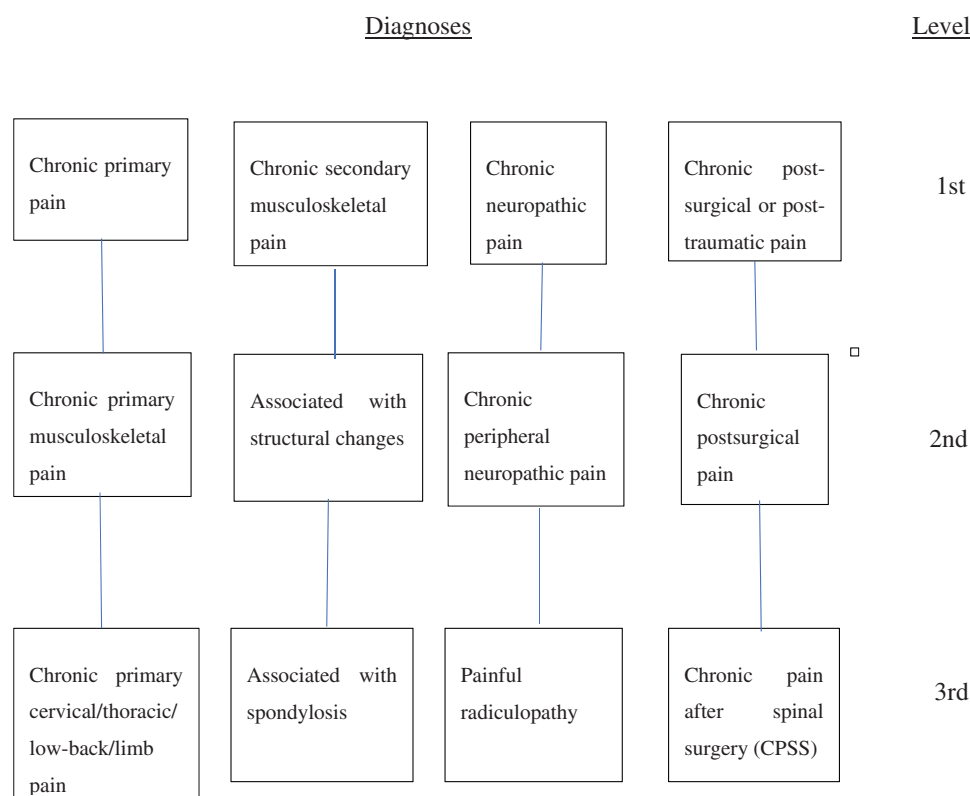


Figure 2. Diagnostic groups within the ICD-11 classification of chronic pain which are relevant to PSPS, through either exclusion (Chronic primary pain) or inclusion.

Chronic secondary musculoskeletal pain is specifically limited to nociceptive pain by the ICD-11 definition [51]. However, the incorporation of the concept of PSPS brings additional clarity to the classification system and logic regarding the etiological commonality of these patients.

PSPS type 1, axial, radicular, or mixed, and PSPS type 2, axial, radicular, or mixed, would all represent third-level diagnoses. PSPS types 1 and 2 (unspecified distribution) would be level 2 and PSPS itself would be a first-level diagnosis (Figure 3). The spinal region—lumbar and sacral, thoracic, and cervical—would be indicated and coded accordingly.

The ICD-11 innovation “multiple parenting” should facilitate the placement and ranking of the parent term PSPS and its “children”, as illustrated in Figure 3. Thus, PSPS types 1 and 2 would both be parents to the third-level diagnoses: Associated with spondylosis (which is also under Chronic secondary musculoskeletal pain) and Painful radiculopathy (also under Chronic neuropathic pain). PSPS type 2 would be a parent to CPSS (also under Chronic postsurgical or post-traumatic pain).

PSPS is not a single diagnosis. It is an encompassing term which brings these diagnostic categories together logically, to remove ambiguities arising from spinal surgery and to better contextualize the biology of pain of spinal origin. The three relevant categories are as defined within ICD-11. Chronic primary musculoskeletal pain is

excluded. PSPS type 2 comprises cases where spinal surgery has been performed; all other cases will be classified type 1 (persisting despite optimal nonsurgical management).

Discussion

Pain of spinal origin, with its associated symptoms, constitutes one of the most prevalent causes of suffering and disability worldwide [56] and is of enormous social, clinical, and economic significance. Chronic pain after spinal surgery is particularly disabling and gives a worse quality of life than other chronic pain conditions [27]. Use of the term Failed back surgery syndrome (FBSS) is well-established and increasing despite widespread dissatisfaction with its imprecise, misleading, and pejorative character.

Our group was assembled for the purpose of selecting and promoting a more appropriate alternative term. After broad consultation and discussion, a workshop, and a Delphi selection procedure, the term Persistent spinal pain syndrome (PSPS) emerged as the preferred option. Concurrently, an IASP Task Force was undertaking a thorough revision of the classification of chronic pain, now published within ICD-11 [24] and accepted by the WHO. Their selected replacement term is Chronic pain after spinal surgery (CPSS), which is subordinate to Chronic postsurgical or post-traumatic pain.

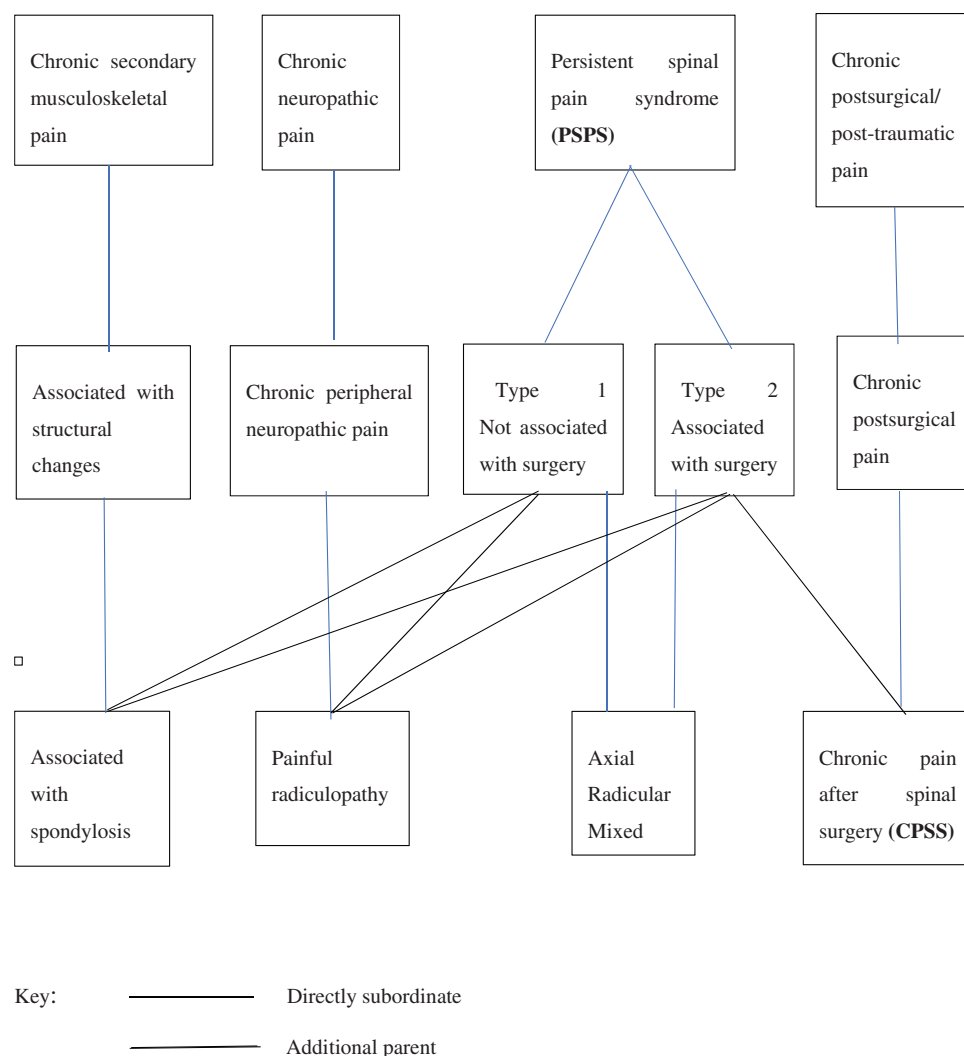


Figure 3. Proposed modification of the ICD-11 schema for chronic spine-related pain which allows the integration of PSPS (only relevant parts of ICD-11 diagnostic groups are shown). Multiple parenting allows a diagnostic category to belong to more than one group. The group Chronic primary pain is excluded (see text).

The cardinal shortcoming of FBSS is that it fails to differentiate between the failure of surgery to relieve the target symptoms, and the surgery being the direct cause of them. Any term which includes a reference to surgery, such as “postsurgical” or “after surgery,” can be interpreted to imply—rightly or wrongly—that the surgery caused the chronic pain. This would apply to the ICD-11 term CPSS, but the issue was neutralized by limiting this term, by definition, specifically to cases where surgery was, or probably was, the key etiological factor. However, this is only a subgroup; the majority who have undergone surgery and have persistent pain will need to be accommodated elsewhere in the classification. Chronic primary musculoskeletal pain is suggested, but ICD-11 is clear that *primary* emphasizes an association with significant emotional distress and/or significant functional disability, and that the symptoms are not better accounted for by another diagnosis [52]. Cases can, however, be secondary, though not directly to the surgery

or to psychological factors. Other ICD-11 diagnostic categories that are relevant are Chronic secondary musculoskeletal pain and Chronic neuropathic pain. Patients previously labeled FBSS will now have to be accommodated within four diagnostic categories: Chronic postsurgical or post-traumatic pain; Chronic primary musculoskeletal pain; Chronic secondary musculoskeletal pain; and Chronic neuropathic pain. This diversity creates both a need and an opportunity for the introduction of a broad and cohesive new term such as PSPS.

In addition to specifically excluding cases where surgery was not the cause of the symptoms, CPSS is defined as “*pain that develops or increases after a surgical procedure,*” which excludes the failure of surgery to relieve preexisting pain. Thus, on two counts, CPSS is not directly equivalent to FBSS. Other issues to be accommodated where spinal surgery has been performed include: indirect consequences of the surgery, e.g., increased stresses adjacent to a spinal fusion; the effects of an

underlying naturally progressive degeneration; new pain after a period of relief (as from a further disc protrusion becoming symptomatic); and secondary causes of late recurrence or worsening, e.g., excessive epidural scarring.

A fundamental consideration is that a marked commonality exists between cases where surgery was performed but was not responsible for their persistent symptoms and otherwise similar cases where no lumbar or cervical surgery was performed. A more inclusive approach would be appropriate, and this accords with a stated aim of the IASP Task Force: *“The proposal in this article is that all chronic pain diagnoses should be presented in ICD-11 as a coherent category of diagnoses and not be divided artificially as is the case in ICD-10.”* [52]. As replacing FBSS touches upon four sections within the new classification, this may be an area where achieving coherence is challenging. There is room for an addition to ICD-11 that would address this, strengthen the links, and underpin a more cohesive classification.

The sustained upright posture, which is characteristic of humans, inevitably exerts stresses—compression, tension, and shearing—on the spinal column and its associated musculature and other soft tissues. It would appear that our evolution has yet to accommodate this. Important evolutionary changes have occurred in the human spine since our Neanderthal ancestors [57], and there is no reason to assume that its evolution has ceased. The result of this “evolutionary lag” is a persistent predisposition to chronic pain of spinal origin through various mechanisms. Other, variable, components of the syndrome, including paresthesia, numbness, stiffness, weakness, and sphincter disturbances, result from the unique anatomical relationship between the spine and the nervous system. The distribution is axial and/or radicular, most commonly lumbosacral but also cervical, while splinting by the ribcage affords a degree of protection to the thoracic spine.

The principle of PSPS can account for chronic and/or recurrent symptoms after spinal surgery and other treatments *and in the absence of such treatments, including surgery*. This (as well as poor case selection) may help to explain the relatively high failure rate of spinal surgery. Perhaps the goal of more of this surgery should be identified as “damage limitation” rather than cure. Surgery can of course be entirely successful, but PSPS helps to place it more meaningfully within the wide landscape of chronic pain of spinal origin. Spinal surgical outcomes have confounded the classification; PSPS should facilitate it.

For the new term, PSPS, “persistent” was preferred to “chronic.” The latter refers only to duration (usually, as in ICD-11, more than three months), whereas “persistent” includes a sense of a prior situation which then continues despite interventions, such as surgery, or altered circumstances (e.g., giving up a physically demanding job). The symptoms are chronic, but the underlying predisposition and promoter, are persistent.

This concept could be readily incorporated into ICD-11, complementing it rather than competing with it (Figures 2 and 3). PSPS would be a first-level term. Type 1 (no surgery) and type 2 (surgery) would be second-level. The innovation that permits links to multiple parent terms would allow these to be additional parents to third-level terms which are subordinate to Chronic secondary musculoskeletal pain and Chronic neuropathic pain, i.e., Secondary to spondylosis and Painful radiculopathy, respectively. Both type 1 and type 2 would be “axial, radicular, or mixed.”

PSPS type 2 could also be a parent to CPSS. They may appear to be mutually exclusive as CPSS is caused directly by surgery, irrespective of the etiology of the indication for that surgery. However, the principle of PSPS may interact with the surgical causation, to make CPSS more likely, more severe, or more persistent. Adjacent-segment disease, spinal instability and problems arising from implants or grafts are examples. In practice, the inability to assess accurately any contribution from these predisposing and exacerbating factors is common and may complicate the classification of a case. The ICD-11 definition requires that *“The postsurgical or post-traumatic etiology of the pain should be highly probable...”* [51]. This, in itself, lacks certainty and is imprecise. Giving CPSS the additional parent, PSPS type 2, would provide appropriate classification opportunities where uncertainty existed and should also simplify the issue of attribution.

In many instances where the chronic pain was not directly caused by the surgery, Chronic *primary* musculoskeletal pain will be an appropriate category [40]. The definition of this category requires there to be no other attributable diagnosis [52]. This means that the origin of the pain cannot be identified as spinal; it is spine-related pain, not pain of spinal origin, and is therefore outside the definition of PSPS. However, the principle of PSPS (the stresses of the upright posture) may have produced a focus for chronic primary musculoskeletal pain. When, as is often the case, psychosocial factors are significantly contributory but not the main diagnosis, ICD-11 makes provision within “extension codes.” This allows classification of the main diagnosis in another (chronic secondary pain) category as appropriate.

The ICD-11 category Chronic secondary musculoskeletal pain refers to disease processes and structural changes, whereas “secondary” in the context of PSPS type 1 relates to a fundamental aspect of the human condition. It can be argued, however, that the predisposition underpinning PSPS leads to and/or promotes those disease processes and structural changes. This could also apply in respect of specific diseases, such as ankylosing spondylitis and neurofibromatosis. As the IASP Task Force explains: *“The structural change is inferred from clinical examination or demonstrable on imaging”*; and *“This pain diagnosis (Chronic secondary musculoskeletal pain) should be given regardless of whether the exact*

mechanism of nociception can be determined" [54]. This would indicate compatibility with PSPS.

An accurate and meaningful classification system is essential to optimize healthcare from the national level down to the individual patient and to inform clinical research and data gathering. The implementation of revised and improved classifications is inevitably problematic, particularly when well-established terms such as FBSS (which was recognized by ICD-10 [58]) are superseded by terms with different specificity, such as CPSS. The removal of the ambiguity of the term CPSS, by specifying "caused by surgery" in the definition, made its application more precise. However, the ambiguity may work in the other direction and impede its implementation. If the precision of CPSS contrasting with the imprecise scope of FBSS and the ambiguity inherent in Chronic pain *after spinal surgery* are not recognized, CPSS might be used, incorrectly, as a direct equivalent of FBSS. The incorporation of the broad and etiologically unifying concept of Persistent spinal pain syndrome might facilitate the accurate adoption of this section of ICD-11 and assist in achieving the coherence called for by the IASP Task Force [52]. Subsuming FBSS into the broader concept of PSPS would make the former term redundant and thereby encourage its replacement.

Conclusions

The IASP Task Force for the Classification of Chronic Pain, which was formed in 2012 to work with members of the WHO to develop diagnostic codes for chronic pain, is to be commended and has addressed some of the inadequacies of the term FBSS. The new term within ICD-11, Chronic pain after spinal surgery (CPSS), is not a direct equivalent, as it refers only and specifically to cases where surgery caused, or probably caused, the pain. FBSS includes cases where there is no such clarity, and this is its cardinal flaw. CPSS also excludes cases where preexisting pain was simply not relieved. The broad and fundamentally flawed FBSS could not be replaced completely by a very specific term. Our independent group was formed concurrently; its chosen term, Persistent spinal pain syndrome (PSPS), emerged soon after the publication of ICD-11.

PSPS provides a new and unifying perspective for a highly prevalent chronic condition, in which surgery commonly and prominently features but, in many cases, is not relevant. By including patients who are otherwise similar but have not undergone spinal surgery and relating all groups to the discrepancy between the upright posture and the evolutionary inability of the human spine to accommodate the resulting stresses, a greater etiological coherence is brought to the classification. PSPS is broader and more fundamental in principle than either FBSS or CPSS. It provides clarification and should rationalize, and extend beyond, the replacement of FBSS. It could be incorporated into ICD -11, and it would

capitalize on the connectivity which results from the innovative shared/multiple-parent concept of that system.

The wide and well-established use of the term FBSS by clinicians, in the published literature and by insurance carriers, the biomedical industries, commissioning and regulatory bodies, and government agencies will make its replacement complex and challenging. The logical framework provided by PSPS, by introducing coherence and clarity to the diagnostic classification of this patient population, should facilitate this process and lead to better-informed clinical management. The ultimate beneficiary will be the patient.

Authors' Contributions

Dr. Christelis initiated the project with Dr. Russo and led the program. Drs Christelis, Russo, Simpson, Stanton-Hicks, and Barolat formed the core taxonomy steering committee and wrote the initial draft manuscript. Dr. Simpson introduced and developed the principle of a persistent spinal syndrome and its integration and, with Drs Stanton-Hicks and Christelis, was responsible for the final draft of the manuscript. All authors contributed to discussions, drafts, and critical revision of the manuscript.

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Appendix: Selection Process for Replacement Terminology

An international group of experts was formed by invitation by an initial steering committee of five members. The areas of pain medicine, neurosurgery, spinal orthopedic surgery, neuromodulation, neurology, rehabilitation medicine, and medicolegal practice were represented by members from the USA, Europe, and Australia.

In a process similar to that used to rename Complex regional pain syndrome [53], the history and key issues were reviewed and a discussion paper prepared. After extensive discussion via e-mail, an initial list of 14 candidate terms was generated. The group members were canvassed for their personal preferences, but definitive ranking was based on agreed criteria:

Points were awarded for inclusion of each of the following (Table 1):

- a. Pain.
- b. Syndrome.
- c. Postsurgical or postoperative.
- d. Spine or spinal.
- e. Chronic or persistent.

Terms scoring less than four points were rejected, along with those that could not be abbreviated to four initials (more was considered unwieldy). The resulting shortlist was:

1. Persistent postsurgical spine syndrome (PPSS).
2. Chronic postoperative spine syndrome (CPSS).
3. Persistent spinal pain syndrome (PSPS).
4. Chronic pain after spinal surgery (CPSS).

A consensus workshop was held during the 14th World Congress of the International Neuromodulation Society in Sydney, Australia and attended by 13 members in person plus one by conference phone. A Delphi protocol (38) was employed, with presentations in support of each of the final four terms (above), followed by debate and successive “round robin” voting to select the preferred option: Persistent spinal pain syndrome (proposed by Simpson).

Table 1. Ranking of proposed terms by key word-inclusion scores.

Score	Term
5	Persistent postsurgical spinal pain syndrome (PPSPS)
5	Chronic post spinal surgical pain syndrome (CPSSPS)
4	Persistent postsurgical spine syndrome (PPSS)
4	Chronic postoperative spine syndrome (CPSS)
4	Persistent spinal pain syndrome (PSPS)
4	Chronic pain after spinal surgery (CPSS)
3	Persistent postsurgical pain (PPSP)
3	Persistent spinal syndrome (PSS)
3	Postoperative pain syndrome
3	Postoperative persistent syndrome (POPS) [36]
3	Chronic low back and leg pain of spinal origin
2	Persistent lumbosacral pain (PLP)
2	Chronic lumbar and lower limb pain (CLLLP) [34]
1	Persistent back and leg pain