



OOS or MUD? Time for a cleanup

Peter Dodwell

Use of the term 'occupational overuse syndrome' (OOS) in New Zealand confuses the diagnosis of disorders of the upper limbs, since it has come to encompass both a classification and a specific disorder and also both an effect and its supposed cause. We need to adopt a more logical approach and use more precise terminology.¹

Although New Zealand's ACC law was intended to eliminate the concept of fault, this persists in the area of work-related, gradual-process injuries. As a major grey area, OOS is the focus of fierce debate over whether or not a person's work has caused a gradual-process injury. It is not the proper role of doctors to take sides and prejudge such matters but to determine the effect of work in causing injury and illness so that problems can be prevented.

Historical review of gradual-process terminology

A succession of misleading terms has arisen, describing symptoms of workers in occupations with intensive hand use. 'Telegrapher's cramp' was described in 1875, and an editorial in the *Lancet* that year indicated its most frequent occurrence in writers, telegraph operators and musicians.^{2,3} Descriptions then emphasized the 'spasm (cramp) and pain in groups of muscles in consequence of overuse or frequently repeated muscular acts'.⁴ In musicians, the dominant symptoms were summarised in a review by Fry as pain, weakness and loss of response and control, and he noted that the terms of spasm, cramp, paresis and palsy were an overstatement and it was more a question of 'loss of accuracy and agility'.⁵ Vague initial symptoms were often noted by musicians or writers, such as a feeling of weight, tightness, numbness or coldness. Swelling was noted in some severe cases and more than half the major authors documenting these conditions noted areas of tenderness in the affected limbs. Most authors emphasized that these conditions were quite separate from tenosynovitis. Poore observed that 'Fatigue of a muscle is much more easily brought about by prolonged contraction than by a succession of intermitting contractions, no matter how forcible these may be,' and that in violinists it was therefore generally a problem of 'the left hand which grasps the instrument and fingers the strings'.^{6,7} Others noted the process spreading from one muscle group to another and to the non-involved side quite frequently (arguing for a more central element to the nervous system aspect of the lesion). Although there were a number of less popular terms, the two main ones used during the late 19th century were 'occupational cramp' and 'occupational neurosis' (meaning a neurological disorder of occupational origin, without the modern implication of a psychiatric condition).⁵

After 1910, terminology became divided in three directions: the use of 'occupational cramp' continued in parts of Europe; Brain described 'occupational neurosis' (but, ignoring previous literature, he compared it with hysterical paralysis); and the third and most substantial line of literature introduced an emphasis on the term 'tenosynovitis'.^{5,8}

The last term has persisted in many countries as a favourite. And yet Howard, studying peritendonitis crepitans, demonstrated that ‘the site and distribution of swelling, of tenderness, and of crepitation never coincided with the extent and boundaries of normal tendon sheaths’ and showed histologically that tendon sheaths were not involved.⁹ He asserted that ‘tenosynovitis’ was a misnomer and that ‘The primary change is without doubt in the muscle, the other factors developing secondary to muscle exhaustion...’ Yet this particular confusion was to linger for decades to come, so that Semple described ‘tenosynovitis’ as ‘the second commonest industrial disease in the United Kingdom’.¹⁰ That same year tenosynovitis was called ‘the terminological hoax’ by Fry, and this diagnosis continues to cause concern.^{11,12}

1986 marked the ascendancy of ‘repetition strain injury’ (RSI) as well as OOS, and a paper by Fry demonstrated the proliferation of confusing terminology.¹³ In this he used the terms ‘overuse injury (RSI) of the upper limb,’ ‘overuse injury,’ and ‘overuse injury syndrome,’ and went on to state categorically that ‘overuse injury is incorrectly termed tenosynovitis and inappropriately called Repetition Strain Injury,’ despite using the term RSI as synonymous with ‘overuse injury’ in his own abstract. Yet Fry described all these variously-named conditions as being ‘a common and distinct clinical entity’. His view was that ‘Tenderness of intrinsic muscles of the hand and ligaments of the wrist joints and carpometacarpal joint of the thumb are virtually diagnostic of overuse injury.’

In contrast, Semple in 1991 noted that few compensation claims during the Australian ‘RSI epidemic’ came from heavy industry (implying a dubious dose-response relationship for biomechanical factors).¹⁴ He concluded that ‘a careful study of the available literature strongly suggests that this particular Emperor has few, if any, clothes.’

Quintner summarized the RSI epidemic in Australia in similarly ambiguous terms: ‘There was general agreement that RSI included conditions with a known pathological basis, such as tenosynovitis, elbow epicondylitis, shoulder rotator cuff degeneration, and carpal tunnel syndrome. More difficult to understand [were] those syndromes characterised by poorly localised pain where the underlying pathology was difficult to define – for example, tension neck, cervical syndrome, and thoracic outlet syndrome. The most commonly encountered RSI condition was a diffuse pain syndrome, termed repetitive (or repetition) strain injury (RSI).’¹⁵

Here, within a single sentence, was the ‘doublethink’ that allowed professionals to use the same term (in this case RSI) to describe both a particular condition and also the group of conditions of which it was a part. Others to this day have been indulging the same doublethink with the terms ‘the overuse syndrome’ and ‘occupational overuse syndrome’.

In New Zealand, ACC and OSH published a guideline book on OOS.¹⁶ The three-page-long section entitled ‘Definition’ fails to provide a succinct and unambiguous definition of OOS and it concedes ‘not all practitioners agree with this definition’. A ‘classification’ is offered that is more in the nature of a differential diagnosis, listing conditions that might or might not involve occupational overuse in a particular case. There are a number of explanatory notes (including the statement that this ‘syndrome’ is not a clinical entity or a diagnosis on its own but is a general or ‘umbrella’ term – thus refuting the earlier belief of Fry).

There followed two major efforts at clarification of causes and terminology: Hagberg et al and the NIOSH review.^{17,18} Both saw the importance of not prejudging causes and both used the generic term ‘musculoskeletal disorder’ (MSD) in a classification of conditions that are potentially work related. The major difference between the classifications in the two books was that the former included a section on more non-specific disorders whereas NIOSH deliberately excluded these (emphasizing clarity of biomechanics). Both publications stressed first reaching a non-judgmental diagnosis, thus permitting a separate logical analysis of evidence of a causal relationship with work. Hagberg summarised this well in a flow diagram, in which the list of potential conditions caused by work, which are termed in this document ‘work-related musculoskeletal disorders’ (WMSDs), was similar to the ACC-OSH classification, but was more comprehensive, and focused on a functional organ/tissue classification ie, the site of presumed pathology.

Credibility of diagnosis: separating cause from effect

The problems with the term OOS are twofold. First is uncertainty about causes; ‘tennis elbow’ (lateral epicondylitis, but with the added implication of a known cause) may be a tempting diagnosis, but often has nothing to do with tennis. Other causes of epicondylitis than the merely mechanical are possible. Of all the specific musculoskeletal disorders none is exclusively caused by employment. The individual circumstances must be weighed very carefully.

Often, a person with a particular syndrome (eg, carpal tunnel syndrome, CTS) may prove to have multiple factors involved, or the cause may remain unknown.¹⁹

Uncertainty should be even greater where the apparent site of injury is widespread and objective findings scant, yet some echo Fry by claiming that such patients with no objective signs have symptoms and history ‘typical of the overuse syndrome’. Uncertainty generates a paradoxical certainty.¹³

The credibility of experts who claim to diagnose fibromyalgia reliably (another disorder based entirely on subjective evidence) came into question in 2000 when the *Journal of Rheumatology* featured two case histories (one involving a family of six) where experts swore fibromyalgia was the problem until this was clearly refuted by videotape evidence confirming fraud.^{20,21} A finding of the US Supreme Court was that it is not good law for courts to accept the firm belief of an expert without adequate explanation.²¹ In August 2000, the District Court, in its role as an appeal forum for ACC decisions in New Zealand, rejected the sole diagnosis of OOS (without objective evidence) as insufficient foundation for conclusions about work as the cause of pain.²² In 2002 it was similarly ruled that a diagnosis of fibromyalgia is not evidence in itself of physical injury.²³

The second problem is unnecessary obscurity; there is a conflict in using OOS as both a ‘single’ diagnosis and as a classification. In the Oxford English Dictionary the term ‘syndrome’ is defined as ‘A group of symptoms or pathological signs which consistently occur together, esp. with an (originally) unknown cause; a condition characterized by such a set of associated symptoms.’

It makes sense to have a general descriptive term for a group of conditions caused by work. But the OSH/ACC handbook on OOS is self-contradictory in calling this group

‘occupational overuse syndrome’. An umbrella term for a group of conditions cannot at the same time be used to describe a syndrome.

Those who use the term OOS as though describing a specific entity tend to speak of ‘it’ or ‘the overuse syndrome’ rather than using the plural (as though disorders of occupational overuse might be a single disease process).

Some doctors will claim that a single patient has a combination of, for example, epicondylitis, writer’s cramp and rotator cuff disorder. It stretches credibility to claim that this protean mixture is a single ‘entity’ of ‘*the* overuse syndrome’ with a single mechanism of injury. In these circumstances, if pain alone (in multiple sites) has been identified, the diagnosis of OOS is no clearer than MUD: a Musculoskeletal Undiagnosed Disorder or a Muddled Unscientific Diagnosis.

Determining causes

The multifactorial nature of many MSDs was emphasised by Hagberg.¹⁷ Macfarlane, reporting on both physical and non-physical predictors of the development of forearm pain, found evidence that the non-physical stressor of ‘dissatisfaction with support from supervisors and colleagues’ is a stronger predictor than the physical stressor of repetitive movement of forearm or wrist.²⁴

In the NIOSH review, evidence for physical work as the substantial cause was found for a number of the more clear-cut clinical syndromes – but only for specific work tasks. For example, these might be neck/shoulder conditions such as rotator cuff disorder in tasks involving extreme use of the shoulder (forceful or repetitive flexion beyond 60 degrees), or carpal tunnel syndrome in those involving forceful or repetitive gripping/twisting actions with hand/wrist movement.

A review of biomechanical research by Keyserling considered the plausibility of CTS arising from keyboard work.²⁵ It emphasized that the muscle activity during keying and mouse work was ‘relatively low (less than 10% of Maximum Voluntary Contraction)’. This undermines arguments that depend for their logic on anaerobic changes that occur only during maximal contraction. A more persuasive finding was that ‘Peak wrist acceleration was found to be the best discriminator between high- and low-risk jobs.’ A Mayo Clinic study also found no evidence of increased incidence of CTS in those making heavy use of keyboards.²⁶

It has been ruled in court that ACC legislation requires reasonable proof (on the balance of probabilities) regarding the cause of a supposed injury.²⁷ This requires a plausible biomechanical mechanism of injury from a specific work task, and evidence of effects of exposure to that task consistent with a dose-response curve. It is more convincing to see not only onset but offset of symptoms in a time sequence plausibly matching the period of exposure and of its cessation. Terms such as ‘occupational overuse’ have a legitimate place as a cause (a stressor) rather than as a diagnosis. Non-physical stressors as causes are specifically excluded by ACC law (but not by OSH law).

Terminology to separate cause from effect

1. The term ‘work-related musculoskeletal disorder’ (WMSD)^{16,17} is a recent attempt at improvement, but ambiguity arises from varying meanings for ‘work-related’. It seems wise to accept the wider meaning so that WMSD would apply where there

is greatest uncertainty regarding causes, thus including conditions aggravated, but not necessarily caused, by work. Its value would be in encompassing various scenarios under the jurisdiction of the Department of Labour.

2. A common situation is that in which a practitioner lacks evidence confirming a condition's exact origin (physical, emotional, or a combination of both) but feels that it does arise from work. Until now, 'OOS' has been used. Instead, we could speak of it being a 'disorder of occupational overuse or stress' (DOOS). The presence of more specific evidence, as follows, may permit further subdivision of DOOS.
3. 'Occupational overuse' should refer to a task or environment in which physical occupational stressors can be demonstrated to be the cause (or the most substantial of multiple causes) of a specific musculoskeletal disorder via gradual-process injury. Such physical stressors exclude accidents, but otherwise include mechanical work exposures (such as vibration, prolonged muscle tension, repetitive actions, forceful movements, and sustained or constrained postures), exceeding the usual ability of the body to recover rapidly. For the term to apply, there must be demonstrated:
 - (a) a plausible biomechanical mechanism of injury to explain the specific disorder under question;
 - (b) a plausible exposure preceding onset of the disorder;
 - (c) reasonable evidence of a dose-response relationship in terms of severity.After exposure ceases, appropriate offset of symptoms and signs can be useful further confirmation.
4. 'Disorder of occupational overuse' (DOO) could be used for a musculoskeletal disorder in a specific anatomical site, which can be shown (when the above criteria are applied to individuals with that disorder) to be likely, on the balance of probabilities, to be the direct result of occupational overuse.
5. If, for a particular person, the criteria for occupational overuse are not satisfied, but it appears likely (on the balance of probabilities) that non-physical work stress has been the cause or substantial contributor, this can be termed a 'disorder of occupational stress' (DOS).

Author information: Peter Dodwell, Occupational Physician, Wellington

Correspondence: Dr Peter Dodwell, P O Box 14666, Wellington. Fax: (04) 386 3878; email: dodwellassoc@paradise.net.nz

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